

ISOBAY XVI

XVI International

Symposium on Oceanography of the Bay of Biscay



June 5-7th 2018, Anglet, France

<https://isobay16-anglet.sciencesconf.org/>



Ifremer



Welcome

On the behalf of the members of the Organizing Committee, it is our pleasure to welcome scientists from different countries to the XVI International Symposium on Oceanography of the Bay of Biscay in Anglet (France).

This symposium offers a platform for the Bay of Biscay community to discuss state of the art topics in areas such as:

- 1 - Physical oceanography, coastal dynamics - Geology, erosion, transport and sedimentation
- 2 - Biogeochemical cycles - Pollution, Ecotoxicology, Eutrophication
- 3 - Biodiversity and ecosystems functioning
- 4 - Fisheries and aquaculture

We received a high number of abstracts for oral and poster presentations. We are grateful to the authors for their enthusiasm and to all the reviewers for their work and time given to evaluate the volunteered submissions in detail. A total of 63 oral presentations will be given during 4 sessions, and 67 posters will be presented all along the conference during several poster sessions, including coffee breaks and lunches.

Special attention will be given to the contributions of 4 keynote speakers who will introduce each session: Marie-Joëlle Rochet (Ifremer), Gerd Masselink (University of Plymouth), Ionan Marigomez (Research Centre for Experimental Marine Biology and Biotechnology) and Rodriguez-Valera Francisco (Universidad Miguel Hernández de Elche).

We encourage participants to exchange experiences, share new ideas and network with other researchers. We hope to have fruitful discussions and to get to important conclusions, which will be reflected in the publication of the best contributions to the symposium in a special issue of "Continental Shelf Research".

Of course there will be also plenty of time to have a good time during social events: coffee breaks, welcome drink, gala dinner, field trip. We hope you will enjoy these moments to learn more about our region and also explore the city of Anglet.

We specially thank the members of the Research Federation MIRA ("Milieux et Ressources Aquatiques") for their contribution to the organization of this symposium.

Finally, we wish to thank the city of Anglet, the Region Nouvelle-Aquitaine, the Communauté d'Agglomération Pays Basque, Ifremer, UPPA and CNRS for their financial support. Without their committed collaboration, this symposium would not have taken place.

Enjoy the symposium!

The organizing committee

Committees

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Table of contents

Keynote speakers.....	10
Planning.....	14
Field trip.....	15
S1: Physical oceanography and Coastal dynamics & Geology, Erosion, Transport and Sedimentation	17
Characterization of seiches in small-scale harbors.....	18
Baroclinic Instabilities in River Plumes: Numerical Idealized Simulations in the Bay of Biscay..	19
Tridimensional modelling of the suspended sediment transport in the Adour estuary	20
Hydrodynamic behavior of a channel harbor	21
Geophysical and geotechnical prospection for paleogeographical and paleoenvironmental reconstruction. Application to the archaeological site of the Lede du Gurp (Medoc peninsula)....	22
Influence of Adour River discharges on the thermohaline characteristics in the adjacent coastal ocean.....	23
Surface transport of marine litter in the coastal area of the south-eastern Bay of Biscay: a Lagrangian approach	24
A combined numerical/experimental approach to understand stratification and mixing processes in the Adour estuary	25
Characterization of waves and runup during a storm event based on coupled in situ measurements and videometry: marea field experiment on Biarritz beach	26
Long-lasting Microbial Methane Release at the Aquitaine Shelf Break (Bay of Biscay): Relation with the (Plio)-Pleistocene Sedimentary Progradation of the Continental Margin	27
Using MODIS to characterize the dynamic of the main Cantabrian river plumes.....	28
High Frequency Hydrodynamics in the French South East of the Bay of Biscay from In Situ Measurements.....	29
ROV submarine exploration of the proximal part of the Capbreton canyon. Preliminary morphological and geological results of the HaPoGé oceanographic survey	30
Use of bayesian networks for beach litter prediction	31
High resolution time-lapse morphobathymetry and short-term evolution of the upper part of the Capbreton submarine canyon	32
Airborne LiDAR derived geomorphological indicators to analyse pluriannual evolution of sandy beach systems at regional scale	33
In-situ measurement of wave impact pressure on a composite breakwater in St-Jean-de-Luz.....	34
Changes in sediment stabilisation induced by invasive cordgrass colonisation in the Bay of Arcachon.....	35
Dispersion of microplastics inside the Bay of Biscay	36
T-S properties of the upper water masses in the SE Bay of Biscay from a long-term (2007-2017) mooring line. Comparisons with a time series (1986-2017) of vertical CTD profiles.....	37
Present-day diagenetic transformation of Holocene sediments of the Bay of Biscay.....	38
On the return period of winter 2013-2014 on the Basque coast focusing on flooding damages.....	39
The Basque Operational Oceanography System EuskOOS, part of a global effort	40
Intra- and inter-annual variability of fluid mud presence along the Gironde estuary	41

Spatio-temporal analysis of co-evolution between seagrass beds, their decline and hydro-morphological changes in Arcachon Bay (France)	42
Turbulence measurements in a stratified man-controlled estuary, the Adour case	43
Relation between mesoscale dynamics and phytoplankton/floating marine litter distribution in the South-Eastern Bay of Biscay	44
Factors controlling sediment dynamics of a recently deposited mud layer over a sheltered sandy beach following a drastic regression of seagrass meadows (Arcachon Bay, France)	45
Preliminary investigations on the use of HOBO®Pendant light sensors as low-cost turbidimeter: The good, the bad and the ugly	46
Benthic foraminifers as a proxy of the range of the Tidal wave in the Oyambre Estuary (Cantabria, Spain).....	47
An Integrated Framework for Offshore Wind Farm Feasibility with respect to Marine Spatial Planning.....	48
How does the JERICO Research Infrastructure support marine science in the Bay of Biscay?	49
Is the West Gironde Mud Patch (SW France) still an active depocenter today?	50
Long-term, low-frequency monitoring of suspended sediment concentration in a turbid macrotidal estuary.....	51
S2: Biogeochemical cycles & Organic and Inorganic Pollution, Ecotoxicology, Eutrophication	52
Mercury species reactivity in the deep sea sediment of the Capbreton Canyon (Biscay Bay, SW France).....	53
The physico-chemical speciation of dissolved copper in the Loire estuary in relation to humic substances distribution.....	54
Nutrients in estuaries and coastal waters of the Basque Country: Long-term variability (1995-2017) associated to natural and anthropogenic factors.....	55
Relationship between fish contamination and trophodynamic in three French subregions	56
Tritium as an original continental runoffs tracer in the Bay of Biscay: measurements and modelling.....	57
Life LEMA project: Facing the challenge of floating marine litter in the Bay of Biscay.....	58
Recent geological record of human impact and environmental improvement in the Abra of Bilbao (N Spain): A geochemical and microfaunal approach	59
Multiple regression analysis to assess the spatial distribution and speciation of mercury in surface sediments of a contaminated lagoon (Ria de Aveiro, Portugal)	60
Intersex mullets in the south east Bay of Biscay: evolution and trends in Gernika and Pasaia	61
MSFD descriptor 8 assessment in the French part of the Bay of Biscay	62
Assessing the water quality of the Oka estuary (SE Bay of Biscay) in relation to the sewerage scheme	63
Priority and emerging micropollutants in sediments of Capbreton Canyon (SW France).....	64
Accumulation of priority and emerging pollutants in benthic macrofauna from the rocky coast of the Bay of Biscay.....	65
Mercury speciation and isotope compositions (Hg, C and N) in bivalves along the French coastline.....	66

Copper and other trace metals in sediments, seawater, phytoplankton and oysters from the Arcachon Bay: Results of a one-year field study	67
A simple and low cost method for total mercury (Hg) determination in natural water samples	68
Geographical distribution of metallic pollution in sediments of the estuary of the Nerbioi-Ibaizabal estuary (Bilbao, Basque country).....	69
Photodegradation Kinetics of Organic Micropollutants in Water	70
Chemical status assessment of the of the coastal and transitional water bodies in the Adour-Garonne district	71
The use of Precision cut liver slices (PCLS) in sole as an in vitro tool to investigate the toxic effects of Oil Water Accommodated Fractions (WAF)	72
Methylmercury effect on migration propensity and metabolism in European glass eels (<i>Anguilla anguilla</i>) from South Bay of Biscay, France.....	73
Seabird blood and feathers as effective biomonitoring tools for mercury marine contamination ..	74
Selenium Speciation in Adour Estuarine Waters (Bay of Biscay)	75
Effect of methylmercury on feeding behaviour and social interactions in glass eels	76
Transport of mercury species in a contaminated lagoon (Ria de Aveiro, Portugal)	77
Investigation on Sn and Hg organometallic compounds in plastic debris in Northern Atlantic Ocean: From method development to analysis	78
Seasonal and spatial distribution of micropollutants in surface waters of Adour estuary (Bay of Biscay, SW France).....	79
S3: Biodiversity and Ecosystems functioning	80
Biology, distribution, acoustic abundance and vertical diel of <i>Maurolicus muelleri</i> (Gmelin, 1789) in the Bay of Biscay	81
Disentangling the cooccurrence patterns of marine top predators and prey in the Bay of Biscay: environment versus species interactions	82
Otolith microchemistry distinguishes natal sources of returning Atlantic salmon at inter-basin, basin, river and hatchery spatial scales in the south-western Europe.....	83
Assessing macroorganisms biodiversity in the Bay of Biscay through environmental DNA.....	84
Remote sensing in small estuaries. Comparison of images and classification approaches for mapping estuarine vegetation	85
Long-term trends of zooplankton and sea warming across the North Atlantic and Mediterranean Sea	86
Environmental factors controlling growth of seagrass meadows of <i>Zostera noltei</i> in a context of drastic decline (Arcachon Bay, France)	87
Different trophic functioning of fish assemblages in French marine subregions.....	88
Larval dispersal and connectivity of reef-forming <i>Sabellaria alveolata</i> along the French Atlantic coast.....	89
Characterization of <i>Cystoseira baccata</i> rocky subtidal stands along the French Basque coast (Bay of Biscay).....	90
Wave conditions effects in coastal areas on benthic communities structure, distribution and dynamic along the French Basque Coast.....	91
Systematic Conservation Planning based on ecosystem characteristics and services provided: the Basque Country (SE Bay of Biscay) experience	92

Rocky intertidal communities' response to sewage discharges and associated micropollutants along the Basque coast (Southeastern Bay of Biscay)	93
Zooplankton indicators of water quality based on time series for estuaries on the southeastern Bay of Biscay	94
Co-occurrence of marine predators in the northern Iberian Peninsula inferred from spatial modelling	95
Small-scale spatial variations of fishing impact on food web structure	96
Are intertidal macroalgae modified along the Bay of Biscay in less than a decade?.....	97
Fine profile of the Mediterranean stratified and mixed water column revealed by metagenomic genomic assembly and recruitment	98
Habitats characterization of circalittoral rocky bottoms of the Avilés Canyon System (Cantabrian sea).....	99
Deep water fish ontogenic changes in habitat preferences in several NE Atlantic ecosystems....	100
<i>Grandidierella japonica</i> along the French Basque Coast: preliminary assessment of local establishment and possible impacts on estuarine systems.....	101
Multi-isotopic analysis of baleens from Mediterranean Sea and Atlantic Ocean fin whales: focus on nitrogen and mercury isotopes as biomonitors of dietary, contaminants and movement	102
Climate change impacts on top predators: first evidence of regime shifts in the south of the Bay of Biscay	103
Molecular confirmation of the presence of <i>Marphysa sanguinea</i> (Montagu, 1803) along the Atlantic coasts of France	104
Can we use trawled benthic invertebrates as a surrogate for estimating benthic production preyed by juvenile fish in nurseries?.....	105
Why not monitoring circalittoral reef habitat of the south of the Bay of Biscay with INDEX-COR approach?.....	106
Recent MSFD assessment for the commercial (D3) and fish & cephalopods species (D1): Conclusions for the Bay of Biscay	107
Seasonal dynamic of zooplankton abundance and biodiversity in the Southern Bay of Biscay. Micropolit program - Preliminary results (summer 2017- spring 2018).....	108
Response of subtidal rocky benthic assemblages to pollution mitigation.....	109
Salt marshes microbial mats in French Atlantic coast: microbial diversity and biotechnological resources	110
Life history of <i>Cleonardopsis carinata</i> (Crustacea, Amphipoda): a 'canyon indicator species' from the Capbreton Canyon (SE Bay of Biscay)	111
The occurrence of <i>Uromunna</i> (Crustacea, Isopoda, Munnidae) in Arcachon Bay and Hossegor Lake (SW French Atlantic coast): a putatively new species	112
Estimating predator abundance to ascertain key areas in the southern Bay of Biscay.....	113
Pressures facing marine top predators in the Bay of Biscay: insights from rehabilitation centres	114
Copepod trends in the coastal area of the southeastern Bay of Biscay during the period 1999-2015	115
Spatiotemporal changes in surface sediment characteristics, benthic macrofauna composition and sediment profile images in the West Gironde Mud Patch (Bay of Biscay, SW France).....	116

Dynamics of microbial communities across the three domains of life in the Bay of Biscay with emphasis on marine mucilage	117
Ecological quality and food profitability of coastal nurseries: are they linked?	118
Characterizing the pelagic fish and crustacean community of the Bay of Biscay	119
Interaction between seabirds and trawlers in the Bay of Biscay	120
Spatio-temporal abundance patterns of northern gannets in the Central Cantabrian Sea inferred from coastal at-sea surveys.....	121
First record of <i>Chiroteuthis veranii</i> (Férussac, 1834) in the Bay of Biscay.....	122
Assessment of circalittoral reef benthic assemblages along a distance gradient to the coast in N2000 Basque coast (southern Bay of Biscay)	123
Temporal patterns of canopy loss: coherent groups of associated benthic species that covary across years.....	124
Ecological network analysis reveals the impact of bottom trawling on food web structure	125
Food web functioning of benthic-demersal assemblages in the southern Bay of Biscay based on diet and stable isotope analyses	126
Implementation of MARXAN spatial planning approach for the management of El Cachucho MPA (Cantabrian Sea)	127
Dermal denticles as discriminant criteria in the identification of elasmobranch species (Gen. <i>Deania</i> ; Fam. Centrophoridae)	128
Main results of demersal elasmobranch tagging surveys in the Cantabrian Sea.....	129
Assessing impact of sewage outfalls on intertidal rocky shores along the Basque coast (southeastern Bay of Biscay): assemblage structure analysis of benthic communities.....	130
Fifteen years of data from the PELGAS integrated survey (2000-2015): what have we learned on the Bay of Biscay pelagic ecosystem?.....	131
Spatial and temporal patterns in prokaryotic community composition in the Adour estuary (SW France).....	132
S4: Fisheries and Aquaculture	133
Assessment of the reproductive cycle and presence of parasites in molluscs cultured in offshore waters of the southeastern Bay of Biscay.....	134
Productivity and Susceptibility Analysis (PSA) of the species caught by the Basque demersal fleets in the Bay of Biscay	135
A methodology based on data filtering to identify reference fleets to account for the abundance of fish species: application to the Striped red mullet (<i>Mullus surmulletus</i>) of the Bay of Biscay	136
Assessment of Climate Change Impacts in the Bay of Biscay anchovy	137
Assessing size and density dependent mortality of anchovy juveniles in the Bay of Biscay during winter.....	138
Basque coast marine resources exploitation: does the cooperative management of resources work?	139
Spatial and temporal variability of albacore predation upon small pelagics in the Bay of Biscay	140
Using spatially balanced sampling designs to optimise cost-efficiency of long term monitoring programs: application to Manila clam in Arcachon Bay.....	141

The Pacific and the Portuguese cupped oysters, two semi-isolated species as genomic resources for shellfish farming	142
Does glass eels migration propensity depends on metabolism and autophagy?	143
Pressure and impacts of fisheries on the Bay of Biscay fish communities: patterns and trends ...	144
Target strength and frequency response of Mueller´s pearlside (<i>Maurolicus muelleri</i>)	145
Counting and sizing bluefin tuna schools using medium range sonars of baitboats in the Bay of Biscay	146
Spatio-temporal dynamics of European seabass population: seasonal migrations, site fidelity and population structure inferred from large scale electronic tagging	147
John Dory: environmental and fishing drivers along 3 decades in the northern Spanish shelf.....	148
Acoustic-based fishery-independent abundance index of juvenile bluefin tunas in the Bay of Biscay: first results and challenges.....	149
Megrim (<i>Lepidorhombus whiffiagonis</i>) in northern Iberian waters: corroboration the age determination and estimation of mortality by year-class analysis.....	150
Estimation of set fishing gear effort for use as a pressure indicator	151
Rise and fall of <i>Nephrops norvegicus</i> in the Southern Bay of Biscay	152
List of participants	153
Authors Index	157

Keynote speakers

Gerd Masselink

School of Biological and Marine Sciences - University of Plymouth

Gerd Masselink is a Professor in Coastal Geomorphology at Plymouth University (PU) with >120 refereed journal publications (WoK h-index = 34) and over 25 years' experience in collecting and analysing coastal and nearshore morphodynamic data. Gerd did his MSc degree in Physical Geography at Utrecht University (the Netherlands) from 1984 to 1990, and completed his PhD in Marine Science at Sydney University (Australia) in 1994. After a 4-year postdoc at the University of Western Australia, he started as a Lecturer at Loughborough University (UK) in 1998. Since 2005, he has been working at Plymouth University, first in the School of Geography, then in the School of Marine Science and Engineering, and currently in the School of Biological and Marine Sciences.



Gerd has been (or is) a PI/CI on 13 UK research council funded projects, all involving shoreline dynamics and nearshore sediment transport processes, and has been (or is) involved with supervision of 25 coastal PhD students. Currently, Masselink is: (1) CI and work package leader on the NERC-funded project 'Physical and biological dynamic coastal processes and their role in coastal recovery' (BLUEcoast); (2) CI on the NERC-funded Environmental Science Impact Programme 'South West Partnership for Environment and Economic Prosperity' (SWEEP); (3) co-PI on the EPSRC-funded project 'Adaptation and Resilience of Coastal Energy Supply' (ARCoES); and (4) CI on the EU's framework programme Horizon 2020 HYDRALAB-PLUS project 'Dynamic Coastal Protection: Resilience of Dynamic Revetments Under SLR' (DYNAREV). He was the chair of the organising committee of the 2013 International Coastal Symposium (hosted at Plymouth University), is on the Editorial Boards of the Elsevier journal *Marine Geology*, is the author of the textbook *Introduction to Coastal Processes and Geomorphology*, and is editor of the textbook *Coastal Environments and Global Change*.

Apart from his academic role, Gerd leads the Coastal Processes Research Group (CPRG; <https://www.plymouth.ac.uk/research/coastal-processes>) and the consulting group Coastal Marine Applied Research (CMAR; <https://www.plymouth.ac.uk/research/cmarr>).

Schedule: **Tuesday, June 5th (10:15 – 10:45)**

Abstract

Coastal morphodynamics under extreme waves along the southwest coast of England

Using the southwest England as a natural laboratory, this presentation will discuss the coastal morphodynamics along exposed, macrotidal and embayed shorelines. Using recorded and modelled wave data, the key drivers for the Atlantic wave climate are discussed, highlighting the importance of climatic indices such as NAO and WEPA in controlling especially the storm wave conditions. The variability in wave conditions is what drives beach morphodynamics on the annual to decadal time scales, and a detailed analysis of storm response and recovery is presented for two key sites with unprecedented data sets: monthly survey data for 10 years from a fully-exposed sandy beach and a partially-exposed gravel beach. A key concept associated with embayed coastlines is the notion of whether an embayment is closed or open, and whether the sediment budget is balanced or not.

This will be addressed using the ‘total sediment budget’ approach, which entails quantifying all sediment present within the coastal system, including the dune, upper beach, intertidal zone, and the subtidal zone up to the depth of closure. Determining the total sediment budget is far from trivial and requires a multi-method survey programme as well as robust error-propagation to yield reliable results. Nevertheless, to attain quantitative understanding of the long-term coastal morphodynamics requires full insight into the cross-shore and longshore sediment fluxes and a total sediment approach is an essential tool to achieve this.

Ionan Marigomez

Director of Research Centre for Experimental Marine Biology and Biotechnology

Ionan Marigomez (Prof in Cell Biology; Expertise in Environmental Toxicology and Pollution Monitoring). Director of Research Centre for Experimental Marine Biology and Biotechnology (Plentzia Marine Station) of the University of the Basque Country since 2012; he was Head of the Department of Zoology and Animal Cell Biology (2000-2003; 2006-2009).



Researcher in the Consolidated Research Group Cell Biology in Environmental Toxicology; he has been Principal investigator in > 25 projects/contracts (European, National, Regional) and authored > 150 articles and book chapters (> 85% in Q1; H Index = 35), and 2 textbooks. He has regularly participated in European research projects since 1999. He was Founding Council President of the Sociedad Ibérica Contaminación y Toxicología Ambientales (SICTA, 1998). He was Member (Ministerial Representative of the Cantabrian Sea Universities) of the Scientific Coordination Board for “Accident Marine Spills” DGI-MICINN (2003-2007) and Member of the Basque Government Board for “Prestige” Oil Response and Chair of its Scientific Steering Committee (2002-2004). He was Co-leader of the Co-creation Committee of the Euskampus (Internat Excellence Campus) Pole of Knowledge on Ocean Health and Valorisation (i-BLUĒ) (2012-2015) and Promoter and Scientific Head of the Biscay Bay Environmental Biospecimen Bank (BBEBB-UPV/EHU) (2010-today).

He is Director of the Marine Environment & Resources PhD Program (Ministry Quality Award) of the U Basque Country and International Coordinator of the Erasmus Mundus Master in Marine Environment & Resources (EMMC 2013-19) and the Erasmus+ MSc in Marine Environment (EMJMD 2017-22), as well as UPV/EHU Coordinator of the Erasmus+ MSc IMBRsea (2016-2021).

Schedule: **Wednesday, June 6th (08:30 – 09:00)**

Abstract

Integrated biological effects monitoring in the Bay of Biscay based on ICES/OSPAR core biomarkers

The OSPAR Joint Assessment and Monitoring Programme Guidelines contain advice on the appropriate combinations of chemical and biological effects measurements in integrated monitoring programmes using mussels as sentinel organisms. The ICES Working Group on Biological Effects of Contaminants recommends biological effects techniques available for national and international monitoring programmes, which have been included in OSPAR guidelines.

Amongst those approaches, core biomarkers to be measured in mussels include reduced scope for growth and condition index, metallothionein induction, acetyl cholinesterase inhibition, reduced lysosomal membrane stability, and enhanced genotoxicity (Comet assay); others such as weakened stress-on-stress response and histopathology are considered promising. Their use together with tissue chemistry of Cd, Cu, Zn, Hg, Pb, PCBs, and PAHs constitutes the backbone of the ICES/OSPAR integrated monitoring strategy. In the Bay of Biscay, the application of this approach is patchy, with limited acceptance by the responsible administrations. This might be the result of euro-regional specific hurdles derived from the existing socio-economic and political-administrative complexity; however, these aspects will not be discussed herein. In contrast, the scientific reasons behind this poor implementation of biomarkers in environmental monitoring in the Bay of Biscay will be analysed with the objective of providing a solid rationale to support a scientifically based tool-box of biomarkers suitable for integrated biological effects monitoring founded on ICES/OSPAR core biomarkers.

Fundamental questions in this respect are (a) a better knowledge of natural variability, long term trends and the influence of confounding factors; (a) a better understanding of the biological mechanisms underneath responses to pollutants (e.g. aimed at determining AOLs); (c) an effective implementation of the best available practices for monitoring and analysis; and (d) the reliable use of integrative indices suitable for easy interpretation and up-scaling, suitable to provide in parallel detailed information dealing with individual biological and chemical endpoints.

Francisco Rodriguez-Valera

Professor - Universidad Miguel Hernández de Elche - Department of Vegetal Production and Microbiology

Francisco Rodriguez-Valera is an outstanding microbiologist. Very early he applied genomics and metagenomics to the study of aquatic ecosystems including hypersaline, marine and freshwaters, reservoirs and even the Amazon River, the Caspian Sea or Lake Baikal. He has also used genomics and metagenomics to dissect the population genomics of prokaryotic populations. He has described multiple new aquatic microbes in both marine and fresh-water habitats, including Actinobacteria, Verrucomicrobia and different types of archaea. He has pioneered also the study of population genomics of different microbes including the role of viruses in keeping diversity of populations and mechanisms of evolution.



Schedule: **Wednesday, June 6th (14:00 – 14:30)**

Abstract

Fine profile of the Mediterranean stratified and mixed water column revealed by metagenomic genomic assembly and recruitment

The photic zone of aquatic habitats is subjected to several strong gradients of environmental parameters. In order to analyse temporal and depth variations in the marine microbiome we sampled every 15m depth at a single point of an off-shore Mediterranean site during a period of strong stratification and also the mixed photic water column during winter. We have used metagenome recruitment as an alternative approach to detect specific metagenome assembled genomes (94 new genomes) and some selected previously described genomes to assess the distribution at a fine resolution level (ecotypes) of marine microbes. Results showed major shifts in the community structure and, particularly at the level of fine variation, where most microbes had a distribution covering only a ca. 30m thick layer of seawater.

These results were confirmed by studying a single gene (rhodopsin) for which we found also narrow depth distributions.

Furthermore, this study allowed to define a comprehensive assessment of seasonal changes in bacterial diversity including particular bacterial clades impacted by the strong winter convection providing insights into the ecological factors affecting the success of lineages and the potential metabolism encoded in the genomes.

Marie-Joëlle Rochet

Researcher at the Department "Ecology and Models for Fisheries"

Marie-Joëlle Rochet has contributed empirical and theoretical analyses of the effects of fishing on fish populations and communities. Her main applied work has been towards the development and use of ecological indicators for fisheries management. She has developed qualitative methods to combine indicator trends to assess exploited communities, an important step towards integrated assessment for management advice.



She has also conducted research on fisheries discard estimation and analysis; she has been involved in several national and regional studies to help fishers adapt to the new European Union Common Fisheries Policy, which includes a landing obligation, that is, a major change in the discard policy. She is head of the French sampling programme onboard commercial vessels.

Marie-Joëlle Rochet received her PhD in 1991 from the University of Lyon, France. She joined IFREMER Nantes in 1992 where she has been a fisheries scientist since then. She is author or co-author of > 70 papers in scientific journals and a cookbook.

Schedule: **Thursday, June 7th (11:15 – 11:45)**

Abstract

Pressure and impacts of fisheries on the Bay of Biscay fish communities: patterns and trends

Fishing has a long history on the shelf of the Bay of Biscay. A wide diversity of fleets exerts direct pressures on many target species, as well as on bycatch species, both in the pelagic and demersal fish communities. Fishing also generates direct pressures on the seabed and benthic communities, and indirect cascading effects on ecosystem components which depend on or are eaten by these communities. These pressures may, or may not, generate impacts, that is, changes in target or non-target ecosystem components. The Bay of Biscay fish communities are changing, but are these changes due to fishing pressure or to other changes, e.g. water warming or other anthropogenic drivers?

I will present an overview of patterns and trends in fishing pressure and impacts. Much work has been carried out over the last decades, based on fisheries statistics, onboard observer data, trawl and acoustic surveys, and other data. I will provide an attempt to synthesize these studies. Which links can be found between fleet dynamics, changes in gears, catches and bycatches, on the one hand, and fish community dynamics on the other hand? To what extent are fisheries manageable, that is, which economic or management drivers of fleet dynamics have had detectable consequences in the water?

Planning

		Monday 4th	Tuesday 5th	Wednesday 6th	Thursday 7th	Friday 8th		
08:15	08:30							
08:30	08:45		Registration + welcome coffee					
08:45	09:00			S2 : Biogeochemical cycles, Pollution, Ecotoxicology, Eutrophication	S3 : Biodiversity and ecosystem functioning			
09:00	09:15							
09:15	09:30		Opening conference					
09:30	09:45							
09:45	10:00			Coffee break/Poster session	Coffee break/Poster session	Field trip on board Basque coast, main issues, research		
10:00	10:15		S1 : Physical oceanography, coastal dynamics, geology, erosion, transport and sedimentation					
10:15	10:30				S3 : Biodiversity and ecosystem functioning			
10:30	10:45				S2 : Biogeochemical cycles, Pollution, Ecotoxicology, Eutrophication		S4 : Fisheries and Aquaculture	
10:45	11:00							
11:00	11:15							
11:15	11:30							
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12:30	12:45		Lunch	Lunch	Lunch			
12:45	13:00							
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13:45	14:00							
14:00	14:15							
14:15	14:30		S1 : Physical oceanography, coastal dynamics, geology, erosion, transport and sedimentation	S3 : Biodiversity and ecosystem functioning	S4 : Fisheries and Aquaculture			
14:30	14:45							
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16:00	16:15		Coffee break/Poster session	Coffee break/Poster session				
16:15	16:30							
16:30	16:45				Coffee break/Poster session			
16:45	17:00							
17:00	17:15		S1 : Physical oceanography, coastal dynamics, geology, erosion, transport and sedimentation	S3 : Biodiversity and ecosystem functioning	Closing conference/Price awards			
17:15	17:30							
17:30	17:45							
17:45	18:00							
18:00	18:15		S2 : Biogeochemical cycles, Pollution, Ecotoxicology, Eutrophication					
18:15	18:30							
18:30	18:45	Registration						
18:45	19:00			Communication grand public				
19:00	19:15							
19:15	19:30		Welcome drink					
19:30	19:45							
19:45	20:00							
20:00	22:30			Gala dinner				

Field trip

The challenges of the basque coast Research activities and management strategy

(8 June 2018 - 8h30-12h30)

Organizers

Marie-Noëlle de Casamajor (Ifremer) - marie.noelle.de.casamajor@ifremer.fr
Denis Morichon (SIAME, UPPA) - denis.morichon@univ-pau.fr

Speakers

Stéphane Abadie (SIAME, UPPA) - stephane.abadie@univ-pau.fr
Alain Roudil (Pôle Pêche et Ports du conseil général des Pyrénées Atlantiques)
Gilles Morandeau (Ifremer) - gilles.morandeau@ifremer.fr
Marie-Noëlle de Casamajor (Ifremer) - marie.noelle.de.casamajor@ifremer.fr
Iker Castège (Centre de la Mer) - iker.castege@centredelamer.fr
Laura Huguenin (IPREM, UPPA-UPV/EHU) - laura.huguenin@univ-pau.fr
Caroline Lummert (CAPB) - C.Lummert@communaute-paysbasque.fr
Mathilde Monperrus (IPREM, UPPA) - mathilde.monperrus@univ-pau.fr

Conduct of the visit

- **Route:** Bay of Saint-Jean-de-Luz to Bay of Hendaye
- **Departure by bus:** 8h30 am place to define
- **Boarding:** 9:30 am in Saint-Jean-de-Luz
- **Disembarkation:** 11:30 am in Saint-Jean-de-Luz
- **Return to Anglet:** 12h30 pm or free time

Introduction

The objective of this field trip on board the Nivelles V is that the participants (number of places limited to 80 people) can become fully aware of the stakes of the territory and the efforts implemented in order to favour the rapprochement between the research structures and the public organizations in charge of the management of the coastal environment.

Tour schedule

Intervention 1: (Bay of St Jean de Luz)

- *Study of the impact of storms on coastal protection structures* by S. Abadie (Prof. UPPA) & A. Roudil

The Artha breakwater which protects the bay of Saint Jean de Luz is subjected to very violent wave impacts due to the significant depth in which this structure is implanted. As part of the European MAREA project, a system for measuring instantaneous pressures has been set up on a permanent basis (i.e., integrated into the structure). The first part of the intervention will describe the experimental set-up and the associated research problem. The second part of the intervention will illustrate the monitoring of the condition of the breakwater and in particular the concrete blocks that protect it, whose instability is a cause for concern.

- *Coastal water quality and coastline management strategy* by C. Lummert (CAPB)

The Agglomeration has implemented high-resolution hydrodynamic models that predict the bacteriological quality of bathing water in real time. These tools are effective in protecting users. Research projects are also underway to identify sources of faecal pollution in watersheds. The CAPB is also piloting a "coastal risk management strategy" which is a tool projecting the effects of erosion hazard by 2020 and 2040 on the territory.

This tool has made it possible to formalise political choices to fight (hard structures) or adapt (relocation) to erosion, by monitoring the evolution of the retreat of the coastline, and by initiating a "risk culture" to make citizens aware of the dangers caused by erosion and flooding. Research projects are also underway to develop local flood warning tools.

Intervention 2: (Cliffs of Socoa)

- ***Erosion of the cliffs*** by BRGM (speaker to be confirmed)

This site will illustrate the mechanisms at work in the evolution of a rocky coast as well as the problems of cliff collapse.

- ***Fisheries resources*** by G. Morandeu (Ifremer Anglet)

144 vessels are registered in Bayonne with 791 seamen on board. 62% of the vessels are active within 12 nautical miles, the rest of the fleet operates offshore. The main target species are hake, anglerfish, sole, bass and tuna (red and white).

Intervention 3: (In front of the Abadia domain)

- ***Seabirds*** by I. Castège (Biarritz Sea Center)

Monitoring of birds and marine mammals under the ERMMA programme makes it possible to monitor the spatio-temporal evolution of these populations. Locally, this work has contributed to the definition and management of Basque Coastal Marine Protected Areas.

- ***Evaluation of the ecological state within a WFD/MSFD framework*** by M.N de Casamajor (Ifremer Anglet)

Monitoring of benthic populations in rocky intertidal and subtidal environments has been initiated on the Natura 2000 zone since 2008 under the WFD and then under the MSFD since 2014. Reference stations are regularly sampled to define the ecological state of the environment.

Intervention 4: (On the way back to St Jean de Luz)

- ***Micropolit project*** by M. Monperrus (UPPA)

The south-aquitaine coast is an exceptional and fragile natural heritage. Preserving this environment involves improving knowledge of water quality, identifying and quantifying inputs from the continental environment, the nature of reactivity processes in the land-sea interface zone and the potential of organisms to adapt. MICROPOLIT proposes to respond by conducting interdisciplinary research on emblematic areas of the south-aquitaine coast, providing a global inventory and a prospective vision of environmental quality.

- ***Evaluation of the ecological state*** by L. Huguenin (UPPA/ University of the Basque Country)

The evaluation of the state of conservation of the environment is a major issue. The main pressure identified locally is the discharge of wastewater treatment plants, the monitoring of communities through the study of biodiversity present on rocky substrates along the Basque coast is an indicator of ecological status.

**S1: Physical oceanography and Coastal dynamics & Geology, Erosion,
Transport and Sedimentation**

Characterization of seiches in small-scale harbors

Presentation: Oral

Speaker: André Gaël

André Gaël¹, Bellafont Florian², Leckler Fabien¹, Morichon Denis²

1 - Service Hydrographique et Océanographique de la Marine (France)

2 - Univ Pau & Pays Adour/ E2S UPPA, Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au Génie Electrique - Fédération MIRA, EA4581, 64600, Anglet

Contact: gael.andre@shom.fr

Abstract

Harbor oscillations may have dramatic coastal impacts. This phenomenon is known as coastal seiches and creates important hazards for population safety and economic activities. Harbors are particularly vulnerable to these phenomena, which can seriously affect operations and cause severe and expensive damages to harbor facilities and moored ships. Associated currents can also induce substantial sediment transport and may modify the harbor bathymetry. The aim of our work is to characterize the main forcings that drive harbour oscillations in particular during energetic climatic conditions. Semi-enclosed basins and harbors have natural resonant periods ranging from a few tens of seconds to a few hours. The amplitude of small oscillations coming from the ocean may be strongly increased by resonant processes. The most common mechanisms driving coastal seiches in harbours are related to atmospheric disturbances and infragravity (IG) waves with frequencies generally defined as being between 0.004 and 0.04 Hz. For small-scale basins with resonant periods of a few minutes, seiches are forced mainly by IG waves. In order to illustrate this phenomenon, we focus here on the case study of Port-Tudy harbour, located on Groix Island on the Western Coast of France. Strong seiches regularly develop in this harbour, with some of the highest amplitudes observed along the French metropolitan coast. The development of seiches in the harbour results from the amplification by resonance of IG waves released around the island and trapped inside the harbour. This hypothesis is verified using in-situ measurements collected during an extensive field campaign that was carried out during winter 2017. The results of this study provide informations that will be used to develop early warning system capable to predict coastal seiche events to prevent damages and secure harbour procedures.

Key words: coastal seiches, harbor oscillations, infragravity waves

Baroclinic Instabilities in River Plumes: Numerical Idealized Simulations in the Bay of Biscay

Presentation: Oral

Speaker: Ayouche Adam

Ayouche Adam¹, Charria Guillaume¹, Theetten Sébastien¹, Carton Xavier¹, Ayoub Nadia²

1 - Laboratoire d'Océanographie Physique et Spatiale (France)

2 - Laboratoire d'études en Géophysique et océanographie spatiales (France)

Contact: adam.ayouche@ifremer.fr

Abstract

The Bay of Biscay has two buoyant coastal plumes (Gironde and Loire rivers) linked with a frontal activity observed from remotely sensed observations. In those regions, baroclinic instabilities predominate following high resolution realistic numerical simulations. To understand underlying processes explaining those previous observations and numerical simulations, idealized numerical simulations spotlighting on river plume have been developed based on the CROCO model. In the present study, the influence of the different parameters (wind, tides, river discharge, bathymetric slope, bottom drag coefficient, large-scale circulation, and the horizontal resolution) on the river plume (e.g. baroclinic instability generation) is computed. For each of those parameters, three scenarios are used: weak, moderate and strong. The overall objectives of this study are to determine which conditions lead to baroclinic instabilities and which scenario inhibit or suppress those particular instabilities. The effect of this different processes could effect the vertical mixing and widens (deepens) the plume shape.

Key words: plume, baroclinic instability, vertical mixing

Tridimensional modelling of the suspended sediment transport in the Adour estuary

Presentation: Oral

Speaker: Bails Julien

Bails Julien¹, Dailloux Damien¹, Dugor Jérémy¹, Rihouey Didier¹

1 - Casagec Ingénierie (France)

Contact: bails@casagec.fr

Abstract

Modelling work was undertaken to improve knowledge of the sediment transport processes in the Adour estuary and the silting processes at the St Bernard dock of the Bayonne harbor using Telemac 3D system. Due to computation time constraint, the horizontal mesh is composed of about 26 000 nodes with a maximum size of 600 m offshore and 10m around the region of interest, and the vertical mesh is composed of 10 planes (fixed and sigma planes). In order to simplify the model and limit the computation time, the study is limited to cohesive sediment transport. Thus, bedload processes are not taken into account. The model is calibrated following a two steps approach: (i) hydrodynamic in-situ data is used to evaluate the Adour estuary local 3D currents, and (ii) a set of bathymetric surveys is used to calibrate erosion and deposition rate along with settling velocity surrounding the Saint Bernard dock. Similarly, to the other French estuaries, a turbidity maximum zone (TMZ) is observed. This phenomenon is linked to the freshwater-saltwater interface and tidal currents. The estuarine TMZ is studied for different tides (spring or neap tide) and different freshwater-discharge conditions. The results indicate that the turbidity maximum zone exhibit a strong variation in position, magnitude and extent. The main processes controlling these variations are: (i) the tidal currents which shift the TMZ upstream during the flood and downstream during the ebb, and increase cohesive sediment resuspension in relation to tide coefficient, and (ii) the river discharge which has a direct impact on upstream suspended sediment concentration. The 3D model proved to be able to reproduce the suspended sediment transport processes in the Adour estuary. The following step of this study is to take into account the bedload processes in the modelling work.

Key words: suspended sediment transport, tridimensionnal modelling, Adour, turbidity maximum zone

Hydrodynamic behavior of a channel harbor

Presentation: Oral

Speaker: Bellafont Florian

Bellafont Florian¹, Morichon Denis¹, André Gaël², Abadie Stéphane¹

1 - Univ Pau & Pays Adour/ E2S UPPA, Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au Génie Electrique - Fédération MIRA, EA4581, 64600, Anglet (France)

2 - Service Hydrographique et Océanographique de la Marine (France)

Contact: bellafont.florian@univ-pau.fr

Abstract

Harbor entrances are usually designed for protection against wind and swell waves with periods between 5 s and 20 s. However, many harbors experience water agitation problems caused by long waves with periods longer than 30 s. Port of Bayonne, located in SW France, is a channel harbor situated near the river mouth of the Adour. Long-period oscillations have repeatedly caused snapping of mooring lines of berthed ships and have led to resonance of adjacent marina (seiche). This study aims to investigate the hydrodynamic behavior of Port of Bayonne and mechanisms for generation of external forcing. A field campaign was carried out during 2017 and 2018 winters. Wave conditions were measured offshore by a directional wave buoy moored in 50 m water depth. Four pressure sensors, each with a sampling frequency of 1 Hz, were installed at the river mouth and further upstream. A spectral analysis was performed to study the energy distribution in different frequency bands as well as their spatial and temporal evolution. 'Bound' infragravity waves (IG) are reconstructed from the wave buoy spectrum by second-order nonlinear interactions of short waves. The analysis of the data shows that the energy in the short-wave frequency band is very low contrary to the one in the IG frequency band (30-300 s): H_s reaching a value of 0.70 m with 0.65 m in IG band. Good correlation (> 85%) between IG harbor oscillations and offshore bound IG waves shows that IG are generated by ocean forcing and associated with offshore incident waves. When IG waves penetrating in the harbor, they propagate freely in the river and gradually dissipate by friction.

Key words: hydrodynamics, infragravity waves, harbour oscillations

Geophysical and geotechnical prospection for paleogeographical and paleoenvironmental reconstruction. Application to the archaeological site of the Lède du Gulp (Medoc peninsula)

Presentation: Oral

Speaker: Buquet Damien

Buquet Damien¹, Sirieix Colette¹, Frédérique Eynaud², Londeix Laurent¹, Zaragosi Sébastien², Naessens Fabien¹, Bujan Stéphane², Sabidussi Jonathan¹

1 - Université de Bordeaux (France)

2 - Environnements et Paléoenvironnements OCéaniques (France)

Contact: damien.buquet@u-bordeaux.fr

Abstract

The severe erosion of the linear Atlantic coast along the Médoc Peninsula (SW France) recently bared large surface of Quaternary deposits originally buried under the modern dunes. Within these geological old formations, the site of the "Lède du Gulp", especially presents inestimable values regarding paleogeographical and paleoenvironmental reconstructions of the Medoc peninsula and of the Gironde estuary outlet. It actually registered 14,000 yrs of sedimentation with an exceptionally richness in archaeological remains. The last vestiges of the site now lie on the foreshore, constituting a residual clayey-peaty mound 1 to 2 m high surrounded by Pleistocene formations themselves topped by beach sands. Previous studies considered 2 main hypotheses to explain the formation of this mound. The first one is related to the presence of a paleo-channel meander, the second to a sinkhole linked to the karstified underlying Eocene limestone. To go further, geophysical and geotechnical techniques were used. Electrical Resistivity Tomography has been used to constrain the lithology. For that, 8 tomographies have been realized around the mound. Geological formations with similar resistivities were characterized thanks to the use of a penetrometer. Fields observations and penetrometer allowed us to map clayey Pleistocene deposits all around the mound. These observations conduct to eliminate the hypothesis of a meander. Tomographies show many areas with various resistivities. Deduced from the Archy's law, the occurrence of limestone was considered at a few meters under the sea level, in line with their occurrence offshore. A continuous heterogeneity occurs in the limestone, suggesting alteration that may be associated with karstification. Our study allows refining the geomorphological context of the site and confirms previous interpretations about the origin of these atypical lithofacies, i.e. the deposit of a thick Holocene sequence related to a depression consecutive of karstic processes which could have been climatologically controlled.

Key words: electrical resistivity tomography, penetrometer, paleogeographical and paleoenvironmental reconstructions, quaternary, coastal erosion, karstic processes

Influence of Adour River discharges on the thermohaline characteristics in the adjacent coastal ocean

Presentation: Oral

Speaker: Costoya Xurxo

Costoya Xurxo¹, Fernández-Nóvoa Diego¹, Decastro Maite¹, Gómez-Gesteira M.¹

1 - University of Aveiro (Portugal)

Contact: jorge.costoya@ua.pt

Abstract

River plumes have a great impact on the characteristics of the adjacent seawater, affecting economic activities associated to these areas. Plumes influence the morphodynamics and the ecological balance of the affected areas since they transport sediments, contaminants, organic material, and fresh water, among others. Physical modifications are associated with variations in circulation patterns, stratification, available light, or SST. Previous studies have analyzed the influence of the river plume formed by the two main freshwater inputs in the Bay of Biscay (Loire and Garonne+Dordogne) on the thermohaline variability along the French continental shelf. The third river in importance in terms of river discharge in the Bay of Biscay is the Adour River. The main aim of the present study will be analyzed the influence of Adour freshwater inputs on the physical features of the adjacent coastal ocean, with special attention to the thermohaline structure. To carry out this purpose, different databases will be combined. Thus, MODIS imagery composites will be used to characterize the river plume formed by Adour river discharge. In addition, temperature and salinity data from the Atlantic-Iberian Biscay Irish-Ocean Physics Analysis and Forecast dataset (Copernicus project) will be used due to its high spatial resolution (0.028°) that allow monitoring the thermohaline variability in this turbid plume.

Key words: adour river, turbid plume, thermohaline variability

Surface transport of marine litter in the coastal area of the south-eastern Bay of Biscay: a Lagrangian approach

Presentation: Oral

Speaker: Declerck Amandine

Declerck Amandine¹, Delpy Matthias¹, Rubio Anna², Ferrer Luis², Basurko Oihane², Mader Julien²

1 - Centre Rivages Pro Tech, SUEZ Eau (France)

2 - AZTI-Tecnalia-Marine Research (Spain)

Contact: amandine.declerck@suez.com

Abstract

Marine litter is today a major contribution to ocean pollution with multiple impacts on environment, economic and societal activities. As a consequence, the management of marine litter is a major challenge for coastal regions. However, the dispersion of marine litter in the coastal ocean remains poorly understood. In this context, transport in the surface ocean layer is investigated in the coastal area of the south-eastern Bay of Biscay. This work is part of the LIFE LEMA project, aiming at evaluating the feasibility of using real time ocean observations and operational forecasts to support marine litter collection both at sea and onshore. Lagrangian tracers advection is modelled using two kinds of ocean surface current information: (i) measurements from High Frequency Radar, (ii) results from the IBI Copernicus model configuration. A Lagrangian transport model was set up and validated against measurements. The high seasonal variability of marine litter pattern in the area is characterized using a multi-year numerical simulation of Lagrangian transport, together with surface ocean dynamics and litter observations. The analysis of these data also allows to search for accumulation areas at sea, or possible marine litter "hotspots", as well as privileged areas of onshore beaching. Finally, the use of these results in an operational context is considered, in order to help collection operations depending on surface ocean dynamics along French and Spanish coasts of the south-eastern Bay of Biscay.

Key words: Lagrangian, surface transport, Bay of Biscay, high frequency radar, numerical model, marine litter, coastal operational oceanography

A combined numerical/experimental approach to understand stratification and mixing processes in the Adour estuary

Presentation: Oral

Speaker: Defontaine Sophie

Defontaine Sophie¹

1 - Laboratoire de Chimie Analytique Bio-Inorganique et Environnement (France)

Contact: sophie.defontaine@univ-pau.fr

Abstract

River plumes play a central role in the input and transport of dissolved and particulate matters that can lead to the dispersion of pollutants into coastal waters. Understanding the dynamics of river plumes is thus essential to evaluate the potential threat to coastal-marine ecosystems, in order to improve management and mitigation policies. The Adour estuary morphology combined with the competition between the tide and the river flow result in a partially stratified estuary. A dual approach, coupling field experiments and numerical modeling, has been carried out to better understand the physical processes that govern the Adour river plume hydrodynamics. A field campaign was performed inside the estuary in September 2017. Velocity profilers and high frequency point current-meters were moored, at two different stations inside the estuary, during one month. Series of salinity profiles were realized at four stations including mooring stations. Meanwhile, a numerical model has been developed based on the open source code TELEMAC-3D to investigate the interaction between light continental waters and heavy salty marine waters, focusing on the salt-wedge intrusion inside the estuary. The resulting density stratification playing a major role in the transfer of water masses and the transport of dissolved and particulate matters, its precise reproduction is one of the cornerstones of our study. Inside the estuary, a competition between density gradient and velocity/bottom shear regulates mixing processes. First comparisons between model and field data show a good agreement between measured and simulated water levels and velocity profiles. The correct representation of density stratification processes by the numerical model remains, as expected, a challenging issue. The choice of the turbulence model, which is of the foremost importance for a good representation of the interaction between water masses, will be discussed within the physical framework provided by field measurements.

Key words: numerical modelling, stratification, hydrodynamics, estuary, field experimentation

Characterization of waves and runup during a storm event based on coupled in situ measurements and videometry: marea field experiment on Biarritz beach

Presentation: Oral

Speaker: Delpey Matthias

Delpey Matthias¹, Somdecoste Tom¹, Morichon Denis², Liria Pedro³, De Santiago Iñaki³, Epelde Irati³, Danglade Nikola¹, Mader Julien³

1 - Centre Rivages Pro Tech, SUEZ Eau (France)

2 - Univ Pau & Pays Adour/ E2S UPPA, Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au Génie Electrique - Fédération MIRA, EA4581, 64600, Anglet (France)

3 - AZTI Tecnalia (Spain)

Contact: matthias.delpey@rivagesprotech.fr

Abstract

The southern Aquitaine coast counts several structurally-engineered beaches largely exposed to ocean waves and related risks. Storm events especially induce recurrent coastal flooding episodes due to large wave run-up on some vulnerable sites like e.g. Biarritz beaches, with an important risk for people and goods. As part of the MAREA project (POCTEFA), an intensive field experiment was conducted during winter 2017-2018 on Biarritz main beach, with the aim of monitoring the impact of a storm episode. In the present study, measurements collected as part of this deployment are analyzed to characterize waves and run-up dynamics during a flooding-type event induced by combined energetic waves and large tidal range. Observations were collected by a combination of in situ sensors and a video imagery system. In the nearshore, an ADCP and a pressure sensor were deployed to record incident wave conditions. In the surf and swash zones, a 9 pressure sensors array was deployed during a three-days storm event, together with a current velocimeter. At the same time, run-up estimation was obtained from a video station. This station, based on the open source software SIRENA, recorded images for 14 min each quarter hour during daylight with an acquisition frequency of 1 Hz. Run-up values are obtained from timestack images at two locations along the beach, using data from topographic surveys performed at each low tide during the storm. The combination of these measurements provides a unique data set on Biarritz site. Data analysis allows to characterize storm wave dynamics in the nearshore and across the surfzone, together with the induced run-up on the beach. A specific focus is made on the energy transfers between short incident waves and infragravity waves. The contribution of the infragravity band to the run-up amplitude and to upper beach flooding occurrences is investigated.

Key words: wave runup, storm, coastal flooding, field experiment, videometry

Long-lasting Microbial Methane Release at the Aquitaine Shelf Break (Bay of Biscay): Relation with the (Plio)-Pleistocene Sedimentary Progradation of the Continental Margin

Presentation: Oral

Speaker: Dupré Stéphanie

Dupré Stéphanie¹, Pierre Catherine², Ruffine Livio¹, Michel Guillaume¹, Scalabrin Carla¹, Ehrhold Axel¹, Loubrieu Benoît¹, Gautier Emeric¹, Baltzer Agnès³, Battani Anne⁴, Imbert Patrice⁵, Deville Eric⁴

1 - IFREMER, Marine Geosciences unit (France)

2 - Laboratoire d'Océanographie et du Climat: Expérimentations et Approches Numériques (France)

3 - Université de Nantes (France)

4 - IFPEN (France)

5 - TOTAL-Scientific and Technical Center Jean Féger (France)

Contact: stephanie.dupre@ifremer.fr

Abstract

The recent identification of acoustic and visual gas release in the water column at the Aquitaine Shelf (140 and 220 m water depths) led to the discovery of a 200 km² fluid system at the seafloor with 3000 bubbling sites associated with microbial methane (Dupré et al 2014 Cont. Shelf Res.; Ruffine et al. 2017 Geofluids). The moderate methane fluxes (measured in situ, on average 200 mLn/min per bubbling site) contribute to the formation of small-scale sub-circular authigenic carbonate mounds (with reliefs < 1 m in height) (Pierre et al. 2017 Cont. Shelf Res.). The emitted methane has neither a genetic link with thermogenic hydrocarbons from the Parentis Basin beneath, nor is issued from gas hydrate dissociation, but originates from microbial CO₂ reduction. Based on estimated thickness and growth rate of authigenic carbonates, this system has lasted for at least several tens to possibly hundreds of kyears with a volume of escaping methane reaching 3.1012 Ln per 10 kyr. Seismic evidence for gas-charged layers and fossil authigenic carbonates point to organic matter source levels within the sedimentary deposits of the Late Pleistocene progradation system. The Aquitaine Shelf fluid system highlights the edge of continental shelves as preferential areas for bio-geological processes. The GAZCOGNE project is co-funded by TOTAL and IFREMER as part of the PAMELA (Passive Margin Exploration Laboratories) scientific project.

Key words: aquitaine, microbial methane, seepage, shelf

Using MODIS to characterize the dynamic of the main Cantabrian river plumes

Presentation: Oral

Speaker: Fernández-Nóvoa Diego

Fernández-Nóvoa Diego¹, Costoya Xurxo², De Castro Maite¹, Gómez-Gesteira Moncho¹

1 - University of Vigo [Pontevedra] (Spain)

2 - University of Aveiro (Portugal)

Contact: diefernandez@uvigo.es

Abstract

River plumes formed in the Cantabrian coast of the Bay of Biscay constitute the main source of nutrients for this coastal area. They are able to sustain high levels of phytoplankton and primary productivity which, in turn, affects the associated ecosystems. Moreover, these plumes also influence other processes as stratification, flow circulation, transport of pollutants or erosion-sedimentation patterns, affecting the morphodynamics and biogeochemical characteristics of the area. In spite of their importance, the Cantabrian plumes are characterized by their relative small extension due to the low discharges of the rivers in the area, which present small drainage basins, with the exception of the Adour River. This makes necessary the use of high spatial and temporal resolution data to characterize the fine-spatial structure of the plumes and to identify their evolution that happens at a short time scale. MODIS is an especially suitable tool due to its high resolution of up to 250 meters at a daily scale, which allows mapping the main plume features. The extension, shape and behavior of the Cantabrian plumes were analyzed through MODIS imagery composites characterizing their response to the main forcing, including river discharge, wind, tides and coastal currents, as well as to the teleconnection patterns. In general, river discharge showed to be the main driver since well developed plumes can only be formed under high discharges. The rest of drivers are secondary since they are conditioned by discharge rates. However, they can have a remarkable impact when acting on well developed plumes. This is the case of wind, the most important secondary driver, which plays a key role on plumes displacement. Plume material is dispersed or retained attending to the main wind direction, conditioning the characteristics of the plume area. The impact of other drivers like tides showed to be rather limited.

Key words: modis imagery, river plumes variability, cantabrian coast

High Frequency Hydrodynamics in the French South East of the Bay of Biscay from In Situ Measurements

Presentation: Oral

Speaker: Gauthier Victor

Gauthier Victor¹

1 - Institut Français de Recherche pour l'Exploitation de la Mer (France)

Contact: ingrid.puillat@ifremer.fr

Abstract

In July 2017, the Etoile cruise was organised in the framework of the H2020 JERICO-NEXT project (www.jerico-ri.eu). It enabled the acquisition of temperature and current data from several measurement systems on the Aquitaine shelf to investigate both mesoscale and high frequency variability. Here, the focus is on internal waves induced by the barotropic tide on the slope. Thank to data acquired on a transect traveled during 4 days at the latitude 44 °N off the coast from 25m deep to 200m by the MVP (Moving Vessel Profiler) which delivers temperature, salinity profiles continuously. In addition, 3 ADCP moorings (bottom current measurement at the surface) and 2 thermistor chains positioned at the ends of the transects were maintained for more than 3 weeks in July. A preliminary analysis of this unprecedented dataset on the Aquitaine shelf already reveals an internal tide of about 15m in amplitude (depending on the spring-neap tidal cycle) as well as the regular presence of wave trains, soliton type of period ~ 30min whose amplitude can also reach 15m. Here we will characterize the soliton trains: amplitude, period, velocities of the associated currents from the set of data, and evaluate their propagation speed from MVP data or correlations between different moorings. In-situ observations will also be confronted with satellite images.

Key words: jerico, coastal, hydrology, tide, internal wave, next

ROV submarine exploration of the proximal part of the Capbreton canyon. Preliminary morphological and geological results of the HaPoGé oceanographic survey

Presentation: Oral

Speaker: Gillet Hervé

Gillet Hervé¹, Guiastrennec-Faugas Léa¹, Gazzoli Léa¹

1 - Environnements et Paléoenvironnements Océaniques et Continentaux (France)

Contact: herve.gillet@u-bordeaux.fr

Abstract

The first submarine exploration of the proximal part of the Capbreton canyon was conducted in July 2017 using the new Ariane H-ROV (Hybrid ROV). It was especially developed by Ifremer for coastal applications and is the only one French institutional ROV that can be deployed from a small vessel. During HaPoGé survey, the Ariane H-ROV was deployed from the R/V "Côtes de la Manche" (INSU). This survey involved scientists from Ifremer, Bordeaux and Pau universities. It had several objectives: i) to explore the morphology of the side-slopes and rocky cliffs of the canyon, ii) to sample the rocky outcrops and characterize the benthic communities and iii) to determine the nature, concentrations and distribution of contaminants in sediments and water column. Four distinct sites have been visited over five 3 to 6 hours long dives. All dives started in the canyon talweg or in middle slope at depth ranging from 450 to 200 m. The ROV then climbed upslope up to the edge of the canyon at 100 m depth. We present here the preliminary results of the morphological and geological investigations on these sites: middle slope is characterised by deep gullies and sharp slide scars alternating with bioturbated muddy gentle slopes. Upper slope and canyon edge are characterised by both biocolonised stratified carbonate cemented sandstones and boulder field. More complex stratifications associated to vertical pipes were locally observed. These are interpreted as seep-related authigenic carbonate structures. The lower part of the water column (up to 70 m above seabed) was systematically characterized by high turbidity.

Key words: submarine canyon, roV, morphology, geology, exploration

Use of bayesian networks for beach litter prediction

Presentation: Oral

Speaker: Granado Igor

Granado Igor¹, C. Basurko Oihane¹, Fernandes Jose¹, Ferrer Luis¹, Rubio Anna¹

1 - AZTI-Tecnalia-Marine Research (Spain)

Contact: igranado@azti.es

Abstract

The Bay of Biscay is being affected by increasing levels of marine litter, which are causing a wide variety of adverse environmental, social, public health, safety and economic impacts. The term "beach litter" is used by some authors to refer to the marine litter that is deposited on beaches. This litter can reach the coast due to the wind, the sea and through land-based pathways, such as rivers, draining or sewage systems and beach users. Local administrations are concerned on the problems associated to dirty beaches due to loss of aesthetical value, beach cleaning cost, environmental harm or tourism revenue reduction among others. And they have started to search for innovative approaches to manage their beaches more efficiently. However, they lack smart tools to do so. This study aims at developing an effective model to predict the amount of marine litter at eight main Gipuzkoa beaches (Basque Country), as a part of LIFE LEMA project. To achieve this, we developed one model for each coastal municipality managing one or several beaches using naïve Bayes classifiers. These probabilistic models use metocean and environmental data to forecast the amount of litter at those beaches with at least one day in advance. Supervised discretization was used to find tipping points to distinguish between "low" and "high" marine litter accumulation. These tipping points or specific threshold values were agreed with the local administration in charge of beach cleaning. The categorizing of marine litter allows an easy understanding of the results for managers. With these results, local governments could anticipate beach litter accumulation to plan and set up cleaning resource allocation. All this would ensure a better management and improve the efficiency of beach cleaning services.

Key words: Bay of Biscay, marine litter, bayesian network, modelling, forecasting, beach

High resolution time-lapse morphobathymetry and short-term evolution of the upper part of the Capbreton submarine canyon

Presentation: Oral

Speaker: Guiastrennec-Faugas Léa

Guiastrennec-Faugas Léa¹, Gillet Hervé¹, Silva Jacinto Ricardo², Hanquiez Vincent¹,
Dennielou Bernard², Simplet Laure²

1 - Environnements et Paléoenvironnements Océaniques et Continentaux (France)

2 - Institut Français de Recherche pour l'Exploitation de la Mer (France)

Contact: lea.guiastrennec-faugas@u-bordeaux.fr

Abstract

The Capbreton canyon stands out by its deep incision through continental shelf and slope and its present turbidite activity. The head of the canyon is disconnected from the Adour River since 1310 AD but is located close enough to the coast to allow a direct supply by longshore drifting. Gravity processes in the canyon body are well described, but many questions remain for the head and the upper part of the Capbreton submarine canyon such as: Do any others supply sources of the canyon exist (lateral supply)? Which processes provide sediment transfer from the head to the canyon? Our study is based on the analysis and comparison of eight multibeam bathymetric survey acquired between 1998 and 2018. This data set covers the same area of the canyon upper part and allows the comparison and morphologic follow-up of this outstanding dynamic area. The morphological evolutions in the upper part of the canyon over the last 20 years especially affect the floor of the talweg and the canyon head. Times of flat talweg are observed and suggest a partial filling, succeeded by periods of talweg surincision (low lateral terraces and narrow talweg), suggesting a return to the equilibrium profile. The surincisions are induced by regressive erosion and are evidenced by regressing knickpoints. Recent surveys show that regressive erosion is higher around the flanks meanders where key morphodynamic processes are generated. First accurate volume quantification in the canyon talweg has been undertaken. This underlines an alternation of filling and erosive period in the canyon axis and a continuous sediment deposition in the canyon head during the last 20 years.

Key words: capbreton canyon, time lapse bathymetry, knickpoints, regressive erosion, volume quantification

Airborne LiDAR derived geomorphological indicators to analyse pluriannual evolution of sandy beach systems at regional scale

Presentation: Oral

Speaker: Nicolae Lerma Alexandre

Nicolae Lerma Alexandre¹, Ayache Bruce¹, Ulvoas Beatrice¹, Paris François¹, Bernon Nicolas¹, Bulteau Thomas¹, Mallet Cyril¹

1 - Bureau de Recherches Géologiques et Minières (France)

Contact: a.nicolaelerma@brgm.fr

Abstract

Under an apparent uniformity, the 230 kilometers of the Aquitanian sandy coast presents many nuances/differences in terms of geomorphological evolutions at event, seasonal, annual and pluriannual time scales. The Aquitanian Coast Observatory (OCA), through various measurement protocols, tracks and characterizes these evolutions at regional scale, focusing on sedimentary sub-cells and in view of hydro-meteorological forcing. As part of a partnership with the National Geographic Institute (IGN), the OCA has and shares LiDAR data covering the entire Aquitanian coast for the years 2011, 2014, 2016 and 2017. The surveys are carried out in autumn, during low spring tides, allowing the maximum cross-shore coverage. The continuous coverage of the entire coast as well as the regular frequency of the surveys make these data highly valuable for large-scale analysis and the establishment of geomorphological indicators to describe spatial variability of the inter-annual evolutions of the intertidal and supratidal beach systems along the coast. This contribution highlights the work carried out recently on the basis of LiDAR data for the implementation of semi-automatic methods to determine the coastline position as a synthetic indicator commonly used for beach evolution description. The advantages and limits related to automatic detection of coastline position will be developed. Other indicators of geomorphological evolution are studied at the scale of the sedimentary sub-cells of the Aquitanian sandy coast, in particular the differences in volumes between two years in the form of a sedimentary budget, the appearance of dune erosion scarps and, conversely, the formation of incipient foredunes, or the evolution of the dry beach width. These various indicators are related to the hydrodynamic variables and show the complexity of responses of the subaerial part of beach systems at regional scale.

Key words: coastline, dune foot, erosion, observatoire de la côte aquitaine

In-situ measurement of wave impact pressure on a composite breakwater in St-Jean-de-Luz

Presentation: Oral

Speaker: Poncet Pierre-Antoine

Poncet Pierre-Antoine¹, Abadie Stephane¹, Larroque Benoit¹, Liquet Benoit², Sous Damien³

1 - Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au génie Electrique (France)

2 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

3 - Institut méditerranéen d'océanologie (France)

Contact: pa.poncet@univ-pau.fr

Abstract

In order to study wave impact on composite breakwaters two pressure sensors were installed on the Artha breakwater in St Jean de Luz. They were incorporated into the masonry, vertically displayed with 2m spacing and facing the open ocean. An acquisition station was set up on the other side of the breakwater transferring data through a 3G connexion. Pressure was acquired at 10kHz by 10-min bursts every hour. Simultaneously, wave field was recorded 1km off the structure with a directional wave buoy retrieving spectral wave parameters and data. Wind is also recorded at Socoa's semaphore while water level is obtained using Socoa's tide-gauge. The dataset extends from January to april 2016.

The results are in agreement with previous studies showing that significantly lower impact pressures are recorded compared to wave tank experiments and numerical simulations (De Rouville, 1938; Bullock, 2003; Hofland, 2011) . To study the influence of environmental parameters a statistical analysis of the data was conducted. It reveals that wave height is the prominent factor controlling wave impact pressure. The secondary factors are, by order of importance, the water level, the swell direction and period. In this dataset the correlation between the local wind and wave impact can not be explained by linear models.

Different types of impacts were identified in the pressure signal and further analysis on these phenomenon are conducted. Moreover, the strongest impacts occurred in conditions that do not match what the statistical model would suggest. To better understand the different types of impact, a new experimental set-up, to be installed in spring 2018, is proposed.

Key words: wave, impact, measurement, pressure

Changes in sediment stabilisation induced by invasive cordgrass colonisation in the Bay of Arcachon

Presentation: Oral

Speaker: Proença Barbara

Proença Barbara¹, Sottolichio Aldo¹, Michalet Richard¹, Ganthy Florian²

1 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

2 - Laboratoire Environnement Ressources Arcachon/Anglet (France)

Contact: barbara.proenca@u-bordeaux.fr

Abstract

In coastal wetlands, vegetation can play a valuable protection role against bed erosion. The introduction of new vegetation species might put at risk local biodiversity and hence threaten the system's resilience to the natural physical stresses it is subjected to. Therefore, understanding the conditions and tolerances that favour the installation of invasive species becomes crucial to assess eventual vegetation replacement scenarios and the impact it may have on wetland morphological stability. In the Bay of Arcachon (SW France), wetlands were initially dominated by *Spartina maritima*. In the 1970s, the arrival of the invasive *Spartina anglica* brought concerns to local communities due to its capacity to colonize wider extents of the intertidal flat. In this context, we conducted a field experiment to better understand the ecological and physical impacts inherent to the invasion of *S. anglica* in the Bay. We considered two isolated meadows of the two concerned cordgrass species, presenting similar extension and subjected to the same hydrodynamic conditions. Within each vegetation patch, we measured wind waves and associated sedimentation and erosion levels for a period of two years. We also analysed biomass allocation and productivity. The two species present opposite biomass allocations, leading to distinct sediment erosion/accretion patterns. The invasive *Spartina* shows higher root investment and important seasonal dependent loss in aerial biomass. This translates into a limited capacity for sediment accumulation and high resistance to sediment mobilization. Conversely, the native *Spartina* mainly allocates to leaves all year round, which favours sediment accumulation. Our results show that, even when the aerial biomass of the invasive *Spartina* is reduced to a minimum, in winter time, during more energetic events, soil stabilisation tends to be higher than under the native *Spartina* colony. This can be of relevance to face erosion in a scenario of climate change and increased storm events.

Key words: wetlands, biological invasions, bio, geomorphology, coastal protection

Dispersion of microplastics inside the Bay of Biscay

Presentation: Oral

Speaker: Rodriguez-Diaz Laura

Rodriguez-Diaz Laura¹, Gómez-Gesteira Moncho¹

1 - University of Vigo [Pontevedra] (Spain)

Contact: larodriguez@uvigo.es

Abstract

Plastic pollution has become a major problem due to the fast increase in production since the 1950s. When plastic breaks down and becomes microplastics, they can enter the marine environment through wastewater. Therefore, the analysis of their dispersion and the detection of accumulation areas is important to establish cleaning protocols. This study aims to simulate Lagrangian the trajectories of set of virtual particles that mimic microplastics, which are horizontally advected by currents. Advection is calculated from the speed of currents provided by the database Global Hybrid Coordinate Ocean Model (HYCOM) version GOFS 3.0 GLBu0.08 (<http://hycom.org/dataserver/gofs-3pt0/>). The horizontal resolution of this database is $0.08^\circ \times 0.08^\circ$ with 40 vertical levels range from surface to 5000 m. Data is available from October 1992 to present at daily scale, and the study covers the period 1993-2017. First, the area was split into different zones and particle released at all of them to identify the probability of transition between zones. The southernmost part of the Bay of Biscay, near Cape Ortegal, showed to be the most important release area due to the prevalent currents. Particles released there can potentially reach any part of the bay. In a second experiment, particles were released in a small region near Cape Ortegal, which was considered the entry point for contaminants according to the previous analysis. Particles were tracked for 90 days and their position recorded every day. The study allows identifying both the accumulation areas and the time needed to reach different zones.

Key words: Bay of Biscay, lagrangian trajectories, microplastics

T-S properties of the upper water masses in the SE Bay of Biscay from a long-term (2007-2017) mooring line. Comparisons with a time series (1986-2017) of vertical CTD profiles

Presentation: Oral

Speaker: Valencia Victoriano

Valencia Victoriano¹, Almudena Fontán¹, Nerea Goikoetxea¹, Manuel González¹, Marina Chifflet¹, Ander López²

1 - AZTI-Tecnalia. Marine Research División. Pasaia (Gipuzkoa) (Spain)

2 - Universidad del País Vasco-Euskal Herriko Unibersitatea (UPV/EHU)

Contact: vvalencia@azti.es

Abstract

A decadal (2007 to 2017) series of high-frequency temperature and salinity data from an offshore oceano-meteorological buoy moored at 500 m water depth off Pasaia-Donostia, in the Basque coast (SE Bay of Biscay), is presented. In addition to meteorological and dynamical variables, the buoy provides temperature and salinity data by means of seven CTs located from 10 to 200 m in depth on the mooring line. The raw high-frequency data have been tried and filtered to obtain a consistent time series of weekly average profiles of temperature and salinity. Yearly TS diagrams and isopycnal analyses have been performed to extract the temperature and salinity signatures of the winter mode of the upper waters. A semiquantitative estimation of the evolution of the stratification, in relation to the meteorological variables, and an approach to the Winter Mixed Layer Depth have been also obtained for each annual cycle. The results for quantitative variables and for qualitative indices and proxies are compared with those obtained from a multidecadal time series (“VARIACIONES” series of AZTI from 1986 to 2017) based mainly on vertical CTD profiles collected at approximately monthly frequency. Pros, cons and complementarity of each data acquisition procedure (moored buoy vs. CTD) are considered, basically focused on their application to obtain an accurate enough definition of the interannual variability of the upper water properties, together with their main anomaly patterns and regime shifts.

Key words: t-s analysis, winter mixed layer, eastern north atlantic central water, operational oceanography, Bay of Biscay.

Present-day diagenetic transformation of Holocene sediments of the Bay of Biscay

Presentation: Poster

Speaker: Anschutz Pierre

Anschutz Pierre¹, Charbonnier Céline¹, Mouret Aurelia², Howa Hélène²

1 - Université de Bordeaux (France)

2 - Laboratoire des Bio-Indicateurs Actuels et Fossiles (France)

Contact: pierre.anschutz@u-bordeaux.fr

Abstract

Early diagenesis processes in the Bay of Biscay have been studied previously on short interface cores (e.g. Mouret et al. *Deep-Sea Research I* 57 (2010) 528-540). In order to characterize deep anoxic processes, 1 to 3 meter long piston cores were collected at 150, 550, 1000 and 2000 m water depth, along the continental slope of the southeastern Bay of Biscay. The sediment consists of mud deposited continuously during the Holocene. The aim of this work was to 1) determine how a recorded geochemical signal can be changed during the several thousand-year of the Holocene period; 2) quantify fluxes generated from deep diagenetic processes to the sediment-water interface. Results show that mineralization of organic matter occurs down to the bottom of the studied cores. The distribution of redox sensitive compounds follows the well-established depth sequence of diagenetic reactions governed by the preferential use of the electron acceptor for the bacterially mediated oxidation of organic matter. Effects of anoxic processes on buried sediments were estimated from fluxes induced by chemical gradients in pore waters. Anoxic processes yield also the precipitation of secondary calcium carbonates, which represents up to 15% of total carbonates. This non-negligible fraction could affect sedimentary records. Gradients of dissolved sulphate suggest that anaerobic oxidation of methane and methanogenesis are responsible for influxes of sulphate and flux of phosphorus and ammonium to the sediment-water interface. These fluxes of N and P to the Bay of Biscay bottom waters compete with the fluxes from the Gironde estuary and other coastal rivers.

Key words: sediment record, diagenesis, nutrient fluxes, authigenesis, Bay of Biscay

On the return period of winter 2013-2014 on the Basque coast focusing on flooding damages

Presentation: Poster

Speaker: Arnoux Florian

Arnoux Florian¹, Abadie Stéphane², Kojadinovic Ivan¹

1 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

2 - Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au génie Electrique (France)

Contact: stephane.abadie@univ-pau.fr

Abstract

In this paper we try to give a value for the return period of winter 2013-2014 storms in terms of damages to the coast. Here we focus on damages subsequent to sea front flooding. A damage function was first built by analysing the statistical link between two datasets: 1- a damage level database covering the last 60 years and focusing on the Biarritz Grande Plage based on the analysis of local archives and press documents, 2- a database of hazard parameters (waves, water level) covering the same time period based on observations and simulations. This first study allows us to determine the combination of hazard variables explaining best the damages. The events of winter 2013-2014 are then analysed through this indicator revealing a much more relevant return period than the classical ones based on a specific hazard parameter (e.g., significant wave height). Individual storms as well as winters are qualified through this new analysis frame. Finally, quantitative return period values are given for specific locations along the Basque coast (Biarritz, Saint Jean de Luz, Zarautz).

Key words: return period, damages, 2014, 2013, storm, basque coast.

The Basque Operational Oceanography System EuskOOS, part of a global effort

Presentation: Poster

Speaker: Asensio Jose Luis

Asensio Jose Luis¹, Mader Julien¹, Rubio Anna¹, Liria Pedro¹, Irati Epelde¹, Del Campo Andrea¹, Caballero Ainhoa¹, Ferrer Luis¹, De Santiago Iñaki¹, Nogues Mikel¹, Gonzalez Manuel¹, Uriarte Adolfo¹, Aranda Jose Antonio²

1 - AZTI-Tecnalia (Spain)

2 - Euskalmet (Spain)

Contact: jlasensio@azti.es

Abstract

EuskOOS is the Basque coastal operational oceanography system operated by Euskalmet along with the expert advice of AZTI technology centre. It is part of a global effort, since its development is encompassed with that of several international observing systems like IBIROOS (Ireland-Biscay-Iberia Regional Operational Oceanographic System), EuroGOOS (European Global Ocean Observing System) and GOOS (the Global Ocean Observing System). EuskOOS envisages three purposes: providing an accurate description of current sea state conditions along the Basque coastline, offering operational forecasts of future sea conditions and supplying ocean-meteorological products to Basque coastal users. To accomplish these objectives, EuskOOS is fed with a wide network of observing platforms provided by Euskalmet: HF radars, deep-water buoys, coastal metocean stations and tidal gauges. Besides, the operational oceanography system is supported with video-monitoring systems developed by AZTI to provide highly valuable information for the prevention and management of extreme events and for the acquisition of morphodynamical coastal information valid for long term analysis (i.e. climate change). The information is shared within European marine data structures like Emodnet and Copernicus. At the same time, for local users in the Basque Country, EuskOOS works as a walkway towards other sources of information. As a result, all operational oceanographic data from the Basque coast is accessible in real time from a single platform using a web browser. Our future depends on the good condition of the oceans, since they are key climate regulators as well as a source of natural resources and a platform for tourism, transport and commerce. To take care of it, access to high quality and resolution data that can be shared continuously from different sources is needed. The data of EuskOOS aim to be integrated in different products applied in sectors of the blue economy and in the sustainable management of natural resources.

Key words: emodnet, operational, oceanography, eurogoos, goos, ibiroos, azti, euskalmet, euskoos, copernicus, operational data

Intra- and inter-annual variability of fluid mud presence along the Gironde estuary

Presentation: Poster

Speaker: Beudin Alexis

Beudin Alexis¹, Ripaud Yann¹, Sottolichio Aldo¹

1 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

Contact: alexis.beudin@u-bordeaux.fr

Abstract

Fluid mud is a high concentration aqueous suspension of fine-grained sediment which forms on the bottom in rivers, lakes, estuaries, and shelves. Because of its rapid formation and high persistence, it constitutes a significant management problem in estuarine channels by impeding navigation, reducing water quality and damaging equipment (McAnally et al., 2007). The presence of fluid mud in the navigation channel of the Gironde estuary is observed on the data recorded by the dual frequency single beam echosounder used by the port of Bordeaux for its daily routine hydrographic surveys. The echograms of two different frequencies (here 15 and 33 kHz, usually 33 and 210 kHz) are processed and compared automatically to detect various bed layers. The seasonal displacement of the fluid mud patches along the estuary is analysed for two recent years (2014 and 2017) of contrasted conditions in terms of river discharge, and is compared with previous similar works in the estuary (Allen, 1971; Sottolichio and Castaing, 1999). In general, fluid mud patches are displaced downstream during winter and spring (relatively high river discharge). Fluid mud is present all year round in the middle section of the estuary ($45 < PK < 50$) where the channel cross section area is reduced by the presence of multiple islands. The relatively dry year 2017 is peculiar: fluid mud is present constantly and extensively along the channel, presumably because of reduced estuarine flushing and/or large dredging operations. While calibration/validation of the acoustic bi-frequency differential response technique with tuning fork density profiler is still under progress, dredged material volumes estimates could provide valuable information to quantify fluid mud layer thickness.

Key words: gironde estuary, siltation, echosounding

Spatio-temporal analysis of co-evolution between seagrass beds, their decline and hydro-morphological changes in Arcachon Bay (France)

Presentation: Poster

Speaker: Cognat Mathis

Cognat Mathis¹, Ganthy Florian², Auby Isabelle², Rigouin Loic², Sottolichio Aldo¹

1 - Université Bordeaux (France)

2 - Ifremer - Laboratoire Environnement Ressources d'Arcachon (France)

Contact: mathis.cognat@u-bordeaux.fr

Abstract

The extent of *Zostera* spp. meadows in Arcachon Bay has drastically decreased in the last 20 years and a significant increase of suspended sediment concentration was observed in the meantime. *Zostera* spp. are well known ecosystem engineers able to reduce near-bed currents and promote sediment accretion; it is then suggested that such decline may lead to the observed increase of sediment re-suspension. Main consequences are an increase of net erosion trends on tidal flats, and a decrease of light penetration in the water column. In this context, this study focuses on spatio-temporal analysis of seagrass decline in relation with morphological and hydrodynamical changes in the Bay. Historical bathymetric charts and maps of *Zostera* beds extent were co-analysed. In addition, MARS3D, a numerical model that explicitly takes into account the damping effect of *Zostera* on flow velocity was used to simulate depth-averaged and near-bed velocity fields for the various configurations derived from the available historical data. Results firstly highlight that both *Zostera noltei* and *Zostera marina* principally declined in the deeper parts of the bay as well as in the inner parts of the bay, suggesting that the observed increase of suspended sediment concentration may have contributed to the regression of both species. Moreover, *Z. noltei* also significantly regressed close to channel edges and mostly where *Z. marina* disappeared. The simulations show that near-bed velocities increased in the channel edges where *Z. marina* disappeared. It can also be safely expected that *Z. marina* decline has promoted erosion on channel edges inducing both decrease of light penetration and mechanical wrenching of neighbourhood *Z. noltei*. Regression of *Z. noltei* also significantly impacts both near-bed and the global tidal circulation within the Bay. This study tends to confirm the hypothesized feedback loop between *Zostera* decline and hydro- and sediment dynamics.

Key words: *zostera* spp, computational model, environmental forcing, feedback processes, engineer species, seagrass decline, arcachon bay

Turbulence measurements in a stratified man-controlled estuary, the Adour case

Presentation: Poster

Speaker: Damien Sous

Damien Sous^{1,2}, Defontaine Sophie³, Morichon Denis⁴, Bhairy Nagib², Lanceleur Laurent⁵,
Monperrus Mathilde⁵

1 - MIO-USTV/AMU/CNRS/IRD, UM 110, Univ. Toulon, La Garde (France)

2 - Institut méditerranéen d'océanologie (France)

3 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

4 - Univ Pau & Pays Adour/ E2S UPPA, Laboratoire des Sciences de l'Ingénieur Appliquées à la Mécanique et au Génie Electrique - Fédération MIRA, EA4581, 64600, Anglet (France)

5 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

Contact: sous@univ-tln.fr

Abstract

The Adour river is a partially stratified river flowing into the Basque Country coastal waters. The dynamics of estuarine waters and suspended matters, including density stratification, mixing, residence and renewal times, is controlled by the competition between the input of terrestrial waters with strongly varying discharge and suspended load and the meso-tidal fluctuations of the ocean level. Since pycnoclines can form a decisive barrier for exchange processes within a water body, it is important to better understand the processes that govern their evolution in particular for water quality studies. A turbulence-dedicated field campaign was performed in the lower estuary in September 2017. The instrumentation is based on fixed bottom moorings with high frequency point currentmeters and velocity profilers. During the well-mixed phases of the tidal cycles, the flow properties are in good agreement with the standard hypothesis of the canonical turbulent boundary layer in open channel flows. Measurements carried out during the arrival of the salt wedge at rising tide demonstrate the strong influence of density stratification on the flow dynamics. Both turbulent kinetic energy and momentum fluxes are damped by the density stratification, which consequently affect the mixing and resuspension processes near the river bed. A second series of experiments has been performed in order to identify the turbulent properties away from the bed. Instrumented lagrangian drifters have been deployed during the two-layers flow pattern in the estuary. The results again show the important effect of density stratification. The local measurements of small-scale turbulent processes will be placed and discussed in a more general context aiming to describe the intra-estuary exchanges between river and ocean waters and the fate of dissolved and suspended matters.

Key words: estuary, turbulence, stratification, tide

Relation between mesoscale dynamics and phytoplankton/floating marine litter distribution in the South-Eastern Bay of Biscay

Presentation: Poster

Speaker: Dávila Xabier

Dávila Xabier¹, Louchart Arnaud², Delarbre Jessica², Gauthier Victor³, Ruiz Irene¹, Manso Ivan¹, Artigas Luis félipe³, Lazure Pascal⁴, Caballero Ainhoa¹, Cabezas-Basurko Oihana¹, Rubio Anna¹

1 - AZTI-Tecnalia-Marine Research (Spain)

2 - Laboratoire d'Océanologie et de Géosciences (LOG) - UMR 8187 (France)

3 - Ifremer Centre de brest (France)

4 - Dynamiques de l'Environnement Côtier (France)

Contact: acaballero@azti.es

Abstract

In the framework of the European H2020 Joint European Research Infrastructure for Coastal Observatory - Novel European eXpertise for coastal observatories (JERICO-NEXT) project, the ETOILE campaign surveyed an area covering the CapBreton canyon (south-eastern Bay of Biscay) in early August 2017. The main objective of this campaign was to gather hydrographic and hydrodynamic data, as well as to determine the distribution of phytoplankton and floating marine litter. Besides the various remote sensing data available for this area, such as HF radar or satellite data, in situ hydrographic measurements were collected by a CTD and a Moving Vessel Profiler. Likewise, other parameters such as temperature, conductivity and in vivo chlorophyll fluorescence were continuously recorded. Then, fluorescence casts, chlorophyll a and particulate suspended matter concentration, as well as marine floating litter abundance were sampled in selected stations. A saline frontal structure with high spatial variability was identified at 20-100 m depth at the edge of the continental shelf. This front separated the less saline coastal waters from the saltier open sea waters. Furthermore, the surface current displayed an anticyclonic circulation when encountering the saline front, showing coherence between the radar data and geostrophic currents derived from CTD data. The aim of this study is to carry out a joint analysis of all the available data for characterizing the mesoscale circulation of this region, and correlating this circulation pattern with the presence of advected particles such as particulate suspended matter, phytoplankton and floating marine litter. A better understanding of the interactions between physics and the observed distributions will contribute to a better management of fisheries and coastal cleaning services in the area.

Key words: mesoscale, front, hf radar, marine litter, phytoplankton

Factors controlling sediment dynamics of a recently deposited mud layer over a sheltered sandy beach following a drastic regression of seagrass meadows (Arcachon Bay, France)

Presentation: Poster

Speaker: Ganthy Florian

Ganthy Florian¹, Cognat Mathis², Lanson Méline¹, Rigouin Loïc¹

1 - Ifremer - Laboratoire Environnement Ressources d'Arcachon (France)

2 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

Contact: florian.ganthy@ifremer.fr

Abstract

Within the semi-enclosed mesotidal lagoon of Arcachon, most of intertidal mudflats are colonized by seagrass meadows of *Zostera noltei*. However, a drastic spatial regression of this species has occurred over the last 20 years. In the meantime, important modifications of hydrodynamics and sediment dynamics were observed: significant changes in tidal asymmetry, increase of suspended sediment concentration, massive accumulation of mud over eastern sandy beaches, increase in dredging requirements in upstream shallow channels. This study investigates the dynamics of newly deposited decimetric mud layer over a sheltered sandy beach, in order to assess the origin and the future of these muddy deposits. To achieve these objectives, a four-month high frequency field survey was performed. It consists in high-frequency measurements of bed altimetry, suspended sediment concentration, water level and waves characteristics, coupled with weekly surficial sediment sampling for grain-size and erodibility parameters determination. Our results showed that tidal asymmetry, favouring flood dominance, increased during spring tides, leading to an increase of sediment fluxes toward the study area. Moreover, suspended sediment concentrations tend to strongly decrease between flooding and drying of the mudflat, suggesting a significant deposition, confirmed by measurements of sediment altimetry. Despite the sheltered position of the site, significant wind-waves were measured ($H_s \sim 0.3\text{m}$), able to induce centimetric erosion during storms. An accretion phase was often observed at the end of the storm events, indicating deposition of previously re-suspended sediments. Because the study site is dominated by flood currents, the recently deposited mud over the sandy beach may come from far downstream tidal flats where the seagrasses disappeared, promoting bed erosion induced by both tidal current and wind-waves. During storm, local wind-waves lead to bed erosion followed by accretion when wave energy decreases. This indicates that locally eroded sediments tend to be re-deposited in the same area after storms and cannot be exported.

Key words: tidal forcing, wind wave forcing, sediment dynamics, mudflat

Preliminary investigations on the use of HOBO®Pendant light sensors as low-cost turbidimeter: The good, the bad and the ugly

Presentation: Poster

Speaker: Ganthly Florian

Ganthly Florian¹, Rigouin Loic¹, Cognat Mathis², Auby Isabelle¹

1 - Ifremer - Laboratoire Environnement Ressources d'Arcachon (France)

2 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

Contact: florian.ganthly@ifremer.fr

Abstract

Water turbidity is a key parameter controlling ecosystem productivity and bio-diversity due to its close relationships with light penetration within the water column. Hydrological networks (SOMLIT, REPHY, ARCHYD) spatially record this parameter at varying frequencies, usually weekly or monthly. This low acquisition frequency often causes difficulties for data interpretation because it cannot capture the short-term variability induced by extreme events or tidal cycles. By contrast, due to the high cost of autonomous turbidity sensors, high frequency measurements of turbidity are often restricted to short-term and punctual field surveys. In such surveys, spatial and long-term trends cannot be captured. In this context, we performed preliminary investigations on the possibility to use pairs of autonomous light sensors (HOBO®Pendant) as low-cost turbidimeters (about 140,- for a pair of sensors). Three sensors were deployed on an intertidal flat during four months at different heights above the bed. Turbidity was recorded calculated at the mean height between two successive sensors (InSitu®TROLL). Using a modified equation derived from the Beer-Lambert's law (taking into account the solar elevation angle and the air-water refraction), attenuation coefficients were calculated. One third of the light and turbidity data are used to build the model predicting turbidity, while the two-third remaining are used to evaluate its performances. Normalized root mean squared errors of predictions are about 10% for turbidity ranging from 0 to 250 NTU. Sensitivity analysis highlighted that the water level above sensors, the acquisition frequency and the presence of waves impact the quality of the prediction. Although some improvement of the method remains to be done, these preliminary results appear promising considering the cost, the autonomy, the robustness and the simplicity of these sensors. After further improvements, the method would be a good compromise for high frequency long-term survey of turbidity in shallow coastal ecosystems.

Key words: light sensor, turbidity, measurement

Benthic foraminifers as a proxy of the range of the Tidal wave in the Oyambre Estuary (Cantabria, Spain)

Presentation: Poster

Speaker: Pascual Ana

Pascual Ana¹, Martinez-Garcia Blanca¹, Mendicoa Jone¹

1 - Universidad del País Vasco /EHU. Fac. Ciencia y Tecnología. Dpto. Estratigrafía y Paleontología (Spain)

Contact: ana.pascual@ehu.eus

Abstract

The Oyambre Estuary consists of two valleys, El Capitán and La Rabia Estuaries. It is located in the southern area of the Bay of Biscay and belongs to a wider protected area of the "Parque Natural de Oyambre". Specially, in the last 100 years, the anthropogenic interventions that have been conducted in this estuary, in particular several dams, have affected the tidal wave, due to a modification in the natural hydrodynamics, which have reduced the potential flood zone. This fact has caused the blooming of invading species, specially *Baccharis halimifolia*. In 2010, an environmental recovery project of the estuary was implemented. Therefore, several dams and the above mentioned plant were removed, in order to recover the marsh environments. In order to know the environmental conditions in this estuary, four years after the recovery works, benthic foraminifers from the sediment have been studied. Marine environments located within the outer estuary are represented by *Cibicides lobatulus*. The assemblage of the subtidal environment from the middle estuary is characterised by *Ammonia tepida* and *Haynesina germanica*. In the inner estuary, in the secondary channels with low salinity, *Criboelphidium williamsoni* is the dominant species, while in marshes, the agglutinated *Miliammina fusca* and *Trochammina inflata* species dominate. Coastal marine foraminifers are scarcely represented in the middle estuary, which reveals persisting altered hydrodynamics. The presence of the invading *B. halimifolia* exotic plant and the *Balticammina pseudomacrescens* and *Entzia macrescens* foraminiferal species, which inhabits high marshes that are only affected by Mean High Water Spring Tides, further confirms this claim. All this data points to scarce tidal influence in the inner estuary after the environmental recovery works.

Key words: anthropogenic interventions, estuary, ecology, benthic foraminifers, tidal range, s Bay of Biscay

An Integrated Framework for Offshore Wind Farm Feasibility with respect to Marine Spatial Planning

Presentation: Poster

Speaker: Pinarbasi Kemal

Pinarbasi Kemal¹, Galparsoro Ibon¹, Borja Angel¹, Depellegrin Daniel², Bald Juan¹

1 - AZTI-Tecnalia (Spain)

2 - Istituto di Science Marine - ISMAR (Italy)

Contact: kpinarbasi@azti.es

Abstract

Demand for environmentally friendly offshore renewable energy is increasing steadily and promoted through the Blue Growth and regulated by national and international policies. Offshore wind energy sector has been clearly the fastest in its development among other options. Even though offshore areas provide better quality of wind source, large ocean space is required for this emerging industry in the marine environment. Therefore, there is a significant need of efficient spatial planning process. The site selection and development of this activity is constrained by a series of technical (wind resource, coastal distance, seafloor), environmental (impacts on marine environment) and other users related (space conflict, visibility) factors. This contribution presents a novel approach for an integrated spatially explicit site feasibility identification for offshore wind farms according to the above-mentioned factors. More specifically, the main objectives of this research are to: (i) develop a spatially explicit model that integrates the technical, economic, environmental and social dimensions of ecosystem-based marine spatial planning; (ii) to operationalise the model and (iii) to develop future scenarios for wind farm installation areas under a case study approach. In this context, Bayesian Belief Networks (BBN) are used to establish an integrated and comprehensive planning approach. Given these points, the Basque Country continental shelf was used as case study area for the implementation of the approach. The model allowed the identification of the most suitable areas for wind farm establishment according to given conditions, and at the same time, the model identified main conflicts between activity and the ecosystem components that might be affected.

Key words: trade, site identification, renewable energy, bayesian belief network, off, decision support tools

How does the JERICO Research Infrastructure support marine science in the Bay of Biscay?

Presentation: Poster

Speaker: Puillat Ingrid

Puillat Ingrid¹, Lazure Pascal¹, Artigas Luis Felipe², Rubio Anna³, Cabezas-Basurko Oihana³, Caballero Ainhoa³

1 - Ifremer Centre de brest (France)

2 - Laboratoire d'Océanologie et Géosciences (France)

3 - AZTI-Tecnalia (Spain)

Contact: ingrid.puillat@ifremer.fr

Abstract

Joint European Research Infrastructure of Coastal Observatories (JERICO-RI, www.jerico-ri.eu) is an ocean observing system of systems, designed to provide high-quality data that are supporting knowledge development on the complex and often coupled physical, chemical and biological processes characterizing the coastal waters of Europe. JERICO-RI integrates several observing platform types, e.g. fixed buoys, moorings, drifters, ferry boxes on ferries and vessels of opportunity, gliders, HF radars, coastal cabled observatories and the associated technologies dedicated to the observation and monitoring of the European coastal seas. The purpose of this research infrastructure is to serve both the implementation of European marine policies and the elucidation of contemporary and future key scientific questions. It therefore includes observations of the physical, chemical and biological compartments and aims at a better integration of marine biology with physical and chemical oceanology. Nowadays, in the area of the Bay of Biscay several actions and systems are running. In July-August 2017, the Etoile research cruise was organised in the framework of the H2020 JERICO-NEXT project. It enabled the acquisition of temperature, conductivity and current data from several measuring systems on the Aquitaine plateau to investigate both mesoscale and high frequency variability. In addition, measurements of phytoplankton distribution at fine spatial scale and collection of samples to evaluate the concentration of Floating Marine Litter were performed. Two preliminary analyses will be presented during the ISOBAY2018 conference and will be introduced here. In addition, we will highlight platforms and facilities operated in the Bay of Biscay as part of the JERICO-RI.

Key words: marine litter, phytoplankton, internal wave, mesoscale, infrastructure, observation, harmonization

Is the West Gironde Mud Patch (SW France) still an active depocenter today?

Presentation: Poster

Speaker: Schmidt Sabine

Schmidt Sabine¹, Deflandre Bruno¹, Lebleu Pascal¹, Gillet Hervé¹, Grémare Antoine¹

1 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

Contact: sabine.schmidt@u-bordeaux.fr

Abstract

The West Gironde Mud Patch (WGMP) is a 420-km² mud belt in the Bay of Biscay, located 25 km off the mouth of the Gironde estuary. This clay-silt feature of 4 m in thickness extends between 30 and 75m water depth, surrounded by the sands and gravels that cover the Aquitaine continental shelf. About 2-3 decades ago, sedimentological investigations have demonstrated the WGMP to be the marine collector of half of the Gironde solid discharge. As a contribution to the EU-JERICO-Next program, this work presents an update of the present-day WGMP sedimentation framework. In the context of ongoing regional changes (long-term decrease of river discharge, increase in winter storm intensity), the question is whether the WGMP is still an active depocenter. Interface cores were collected during JERICOBent-1 cruise (October 2016) along two cross-shelf transects for a total of 9 sites (5 and 4 along the northern and southern transects, respectively). Sedimentation intensity was characterized from seasonal to decadal timescales using a multi-tracer approach (²³⁴Th, ⁷Be, ²¹⁰Pb_{xs}, ¹³⁷Cs, ²³²Th, grain size, X-ray). Short-lived radionuclides were detected only at the interface, indicating moderate to low sediment fluxes over the last weeks before sampling. Excess ²¹⁰Pb were detected downcore at depths deeper than 20 cm, but profiles presented contrasted pattern among sites. The shallowest inner stations showed very disturbed profiles, due to the presence of interbedded sandy layers. By contrast, ²¹⁰Pb_{xs} profiles in the WGMP center present a surface mixed layer followed by a decrease with depth that corresponds to sedimentation rates ranging between 0.3 and 0.5 cm per year. We will compare the results of the JERICOBent-1 cruise to those of the first investigation, done in 90s, and discuss the potential change in fine sediment accumulation of the West Gironde Mud Patch.

Key words: fluvial discharge, transport, sedimentation, mud patch, climatic change

Long-term, low-frequency monitoring of suspended sediment concentration in a turbid macrotidal estuary

Presentation: Poster

Speaker: Sottolichio Aldo

Sottolichio Aldo¹, Derriennic Hervé¹, Ferreira Sophie², Nowaczyk Antoine¹

1 - UMR CNRS 5805 EPOC Environnements et Paléoenvironnements Océaniques et Continentaux - Université de Bordeaux (France)

2 - Obs. Aquitain des Sc. de l'Univers (France)

Contact: aldo.sottolichio@u-bordeaux.fr

Abstract

Suspended particulate matter (SPM) concentration is a fundamental parameter of the estuarine environment. SPM generates sediment deposition fluxes and bottom accretion, but it also modifies the transparency of water, biogeochemical processes and, in a more general way, the estuarine water quality. Compared with the use of automatic probes, the direct measurement of SPM concentrations by water filtration has the advantage of giving a true value of concentration, but it is limited to low frequencies (> hour), and has many sources of uncertainties inherent in sampling methods. Therefore, the SPM dynamics are difficult to observe at the tidal time scales. However, the systematic monitoring of the concentration on perennial estuarine stations makes relevant to analyze the dynamics of turbidity and suspended sediments over the long term, in relation to seasonal forcing. In the Gironde estuary, 4 stations distributed along 50 km have been monitored monthly for more than 20 years, as part of the SOGIR survey. Samples are taken below the surface and above the bottom, at four times during the semi-diurnal tidal cycle: mid-flood, high tide, mid-ebb, low tide. The dataset was analyzed from two perspectives. First, we determined the tidal phase which best represents the seasonal variability. This depends on the position of the station considered along the estuary. Second, the seasonal variability of the concentrations has been described. Results confirm the strong sensitivity of SPM concentrations to the displacements of the turbidity maximum under the effect of fluvial flows. The long-term trends revealed by the term time series are discussed and compared to the observed changes on estuarine cross sections for the same period.

Key words: long term, gironde estuary, spm concentration, turbidity, estuarine morphology

S2: Biogeochemical cycles & Organic and Inorganic Pollution, Ecotoxicology,
Eutrophication

Mercury species reactivity in the deep sea sediment of the Capbreton Canyon (Biscay Bay, SW France)

Presentation: Oral

Speaker: Azaroff Alyssa

Azaroff Alyssa¹, Tessier Emmanuel¹, Gassie Claire¹, Deborde Jonathan¹, Guyoneaud Rémy¹,
Monperrus Mathilde¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

Contact: alyssa.azarof@univ-pau.fr

Abstract

Due to its high affinity with particulate matter, mercury is readily scavenged from the water column and deposited to bottom sediment particularly in coastal and marine environments causing mercury contamination. In the sediment and under anaerobic conditions mercury can be converted into monomethylmercury (MMHg) the most toxic form. The net production of MMHg results in both methylation and demethylation reactions mediated by both biotic and abiotic processes. In this work, inorganic mercury (IHg) and MMHg contents and distribution were determined in deep sea surface sediment from the canyon of Capbreton in the Bay of Biscay. Twenty-four stations were investigated within the first 30 km of the canyon area in July 2017. Biogeochemical parameters (organic matter content, total carbon, 15N and 13C isotopes, grain-size distribution) were determined to characterize these samples. In parallel, sediment specimens from three stations were selected according to the distance to the coast, to perform slurry incubations using mercury isotopic tracers under biotic and abiotic conditions. Mercury speciation analyses exhibited a wide range of IHg and MMHg levels from 18 to 972 and 0.15 to 2.11 ng.g⁻¹ dw, respectively. IHg and MMHg concentrations increased with depth and distance from the coast, whereas proportion of MMHg decreased along these gradients. Net methylation potential were only observed under biotic conditions suggesting the involvement of prokaryotes in the transformations of Hg species, as confirmed by the amplification and sequencing of *hgcA* gene, a proxy for biotic methylation. Higher methylation potential was observed for the coastal station whereas demethylation potential was similar for the three stations. Our calculations also showed a net MMHg production, suggesting that this canyon could be a reactor for MMHg. These results seem to confirm the role of the canyon to capture and transfert pollutants via suspended matter from the continent to the abyssal plain.

Key words: isotopic tracers, capbreton canyon, mercury reactivity, sediments

The physico-chemical speciation of dissolved copper in the Loire estuary in relation to humic substances distribution

Presentation: Oral

Speaker: Dulaquais Gabriel

Dulaquais Gabriel¹, Waeles Matthieu¹, Derrien Pierre-Yves¹, Breitenstein Johann¹, Riso Ricardo¹, Knoery Joël²

1 - Laboratoire des Sciences de l'Environnement Marin (LEMAR) (France)

2 - Institut Français de Recherche pour l'Exploitation de la Mer - Nantes (France)

Contact: Gabriel.dulaquais@univ-brest.fr

Abstract

Copper (Cu) toxicity to aquatic life depends on its speciation. It depends more on inorganic than total Cu concentrations. In oxygenated aquatic systems Cu speciation is driven by its complexation with natural organic matter. Among the wide range of organic ligands, humic substances are thought to be the main Cu chelators in estuarine systems. Here we present new data on the organic speciation of dissolved Cu (dCu) in relationship with humic substances concentrations in both the soluble (< 0.02 μ m) and the colloidal (0.02 μ m-0.2 μ m) fractions along the Loire Estuary. High total dissolved copper (TdCu) concentration (80 nmol/kg) was observed upstream of the tidal front, while typical coastal seawater concentrations (3-4 nmol/kg) were measured in the marine end-member. TdCu displayed a non-conservative distribution along the estuary with a sharp decrease in the maximum turbidity zone that re-increased at low salinities (S = 5). This TdCu anomaly was related to colloidal concentrations that represented up to 50% of TdCu at low salinities. Differently, the distribution of soluble Cu was rather conservative along the salinity gradient. The organic speciation of dCu revealed that copper ligands concentrations (up to 147nmol/kg) exceed Cu concentrations, in both the soluble and the colloidal fractions, keeping inorganic copper below toxic levels. Humic substances with concentrations ranging from 52 to 161 μ mol-C/kg were the main component (~50%) of dissolved organic carbon in the estuary. However their complexing capacity was insufficient to explain the total copper ligand concentrations in the inner part of the estuary. Determination of dCu speciation by pseudopolarography demonstrated the occurrence of at least two probable classes of copper ligands in addition to humic substances; reduced sulfur and amino-acids. The size class distribution of dissolved organic matter determined by LC-OCD suggested a low molecular weight for these additional ligands. This work is a part of the Pollusols project.

Key words: copper estuary organic complexation dom

Nutrients in estuaries and coastal waters of the Basque Country: Long-term variability (1995-2017) associated to natural and anthropogenic factors

Presentation: Oral

Speaker: Franco Javier

Franco Javier¹, Bald Juan¹, Borja ángel¹, Fontán Almudena¹, Larreta Joana¹, Revilla Marta¹, Solaun Oihana¹, Valencia Victor¹, Zorita Izaskun¹

1 - AZTI-Tecnalia, Marine and Coastal Environmental Management (Spain)

Contact: jafranco@azti.es

Abstract

Nutrients are essential for photosynthetic organisms and, consequently, for foodwebs and ecosystems functioning. In aquatic environments, however, their excess can cause significant impacts on water quality, leading to eutrophication. Because of this, nitrogen and phosphorus are monitored as part of water quality programs worldwide. In the UE, nutrient concentrations are considered for the assessment of the ecological status of aquatic environments, as supporting elements, within the Water Framework Directive (WFD). In the Basque Country, the transitional (estuaries) and coastal waters are assessed by means of a monitoring program in operation since 1995. Water sampling is carried out, quarterly, in 32 estuarine stations, 16 coastal stations and 3 offshore stations. In addition to the main oceanographic variables (salinity, temperature, pH, oxygen), nutrient concentrations (ammonium, nitrate, nitrite, silicate and orthophosphate) are measured in surface waters. In this contribution several questions regarding nutrients in the study area will be addressed: what are the main patterns of nutrient distribution in the study area? what are the areas with the highest levels of nutrients? what are the meteorological and anthropogenic factors more likely affecting nutrient distribution? are nutrient concentrations fulfilling the objectives of the WFD? Temporal trends of nutrient concentrations will be also addressed. The results will be interpreted in relation to the measures taken in the last two decades for reducing wastewater inputs (e.g. the implementation of water treatment plans) and considering also the variability associated to meteorological factors.

Key words: estuaries/coastal waters/basque country/nutrients

Relationship between fish contamination and trophodynamic in three French subregions

Presentation: Oral

Speaker: Mauffret Aourell

Mauffret Aourell¹, Wessel Nathalie², Chouvelon Tiphaine³, Cresson Pierre⁴, Bănaru Daniela⁵, Bustamante Paco⁶, Baudrier Jérôme², Mialet Benoit⁶, Saibi-Yedjer Lynda⁷, Spitz Jérôme⁸, Harmelin-Vivien Mireille⁵

1 - Ifremer Biogéochimie et ecotoxicologie (France)

2 - Ifremer ODE-VIGIES (France)

3 - Ifremer Laboratoire de Biogéochimie des Contaminants Métalliques (France)

4 - Ifremer, Laboratoire Ressources Halieutiques Manche Mer du Nord (France)

5 - Institut méditerranéen d'océanologie (France)

6 - Littoral ENvironnement et Sociétés [La Rochelle] (France)

7 - French Agency for Food, Environmental and Occupational Health Safety [Maisons-Alfort] (France)

8 - Observatoire Pelagis (France)

Contact: amauffre@ifremer.fr

Abstract

Fish contamination (dioxins, PCB, Cd, Hg and Pb) was assessed within the Marine Strategy Framework Directive (MSFD) coordinated program through optimization of French fisheries surveys for the first time in 2014/2015 in three different marine systems, in the Atlantic: the Eastern English Channel (EEC) and the Bay of Biscay (BoB), and in the Mediterranean: the Gulf of Lions (GoL). Our objectives were to 1) assess MSFD good environmental status (GES), 2) compare fish contamination between the three French marine subregions, and 3) assess contribution of the trophodynamic to explain fish contamination. MSFD GES was not reached considering the high values of PCB, especially CB118, in all the three subregions, Cd in BoB as well as dioxin and coplanar PCB in EEC. For several contaminants, levels were higher in GoL and EEC than in BoB, likely reflecting subregion differences in terms of 1) exposure to continental contamination and 2) system characteristics (e.g. geochemical background, hydrology, primary production). Trophodynamic, here defined by fish diets, trophic levels and main food source sustaining species (i.e. benthic, pelagic, mixed), as well as individual characteristics (e.g. lipid content) contributed to explain differences in contamination patterns between species. By its spatial extent, number of species considered and variety of contaminants studied, this study is expected to provide key elements for understanding contaminant transfer in marine food webs. It will also enable the optimization of further monitoring programs by proposing relevant criteria for monitored species selection and associated parameters to be assessed to support a relevant interpretation of fish contamination.

Key words: trophodynamic, msfd, fish, contamination

Tritium as an original continental runoffs tracer in the Bay of Biscay: measurements and modelling

Presentation: Oral

Speaker: Oms Pierre-Emmanuel

Oms Pierre-Emmanuel^{1,2}, Bailly Du Bois Pascal², Dumas Franck³, Lazure Pascal¹, Morillon Mehdi², Voiseux Claire², Le Corre Cédric², Solier Luc², Maire Donovan², Caillaud Matthieu¹, Boyer Patrick²

1 - Institut Français de Recherche pour l'Exploitation de la Mer - Centre de Brest (France)

2 - Institut de Radioprotection et de Sûreté Nucléaire (France)

3 - Service Hydrographique et Océanographique de la Marine (France)

Contact: pierre-emmanuel.oms@irsn.fr

Abstract

Tritium (as HTO) has been traditionally used in oceanography since the early 70's as a tracer to study the global oceanic circulation. This results from the large amount of tritium injected at the surface of the oceans by the nuclear weapons tests in the atmosphere from 1945 to 1980. Nowadays, it remains a good tracer especially in the coastal areas where controlled and well known sources are released in surface waters (rivers or coastal zones). We illustrate here its relevance in the Bay of Biscay. Its presence is mostly due to chronic releases from the nuclear power plants in the watersheds of the Loire and Gironde rivers. Time series of tritium inputs in the Bay of Biscay from these releases have been reconstructed whereas synoptic sampling campaigns were performed over the continental shelf of the Bay of Biscay during the spring 2016. Both make possible to simulate and draw a general map of tritium distribution at the scale of the whole continental shelf. Besides, the conjoint use of salinity and tritium measurements thanks to different signatures between the Loire and the Gironde sources, make possible to establish the relative contributions of these runoffs over the continental shelf. All these data also allows to assess the amount of tritium over the shelf. The comparison with the inputs time series provides us an estimation of the residence time. These results compare well to a 3D hydrodynamic model simulations: they show similar pathways of the tritium plumes and respective rivers contributions over this continental shelf. The differences between individual measured and simulated concentrations are of 25% in average. It opens the way to a more thorough assessment of the residence time over the shelf and its variation according to the active processes that more or less efficiently renew the waters of this area.

Key words: hto, continental shelf, residence time, modelling, measurements, Bay of Biscay, tracer, tritium, plumes

Life LEMA project: Facing the challenge of floating marine litter in the Bay of Biscay

Presentation: Oral

Speaker: Ruiz Irene

Ruiz Irene¹, Basurko Oihane C.¹, Rubio Anna¹, Ferrer Luis¹, Uriarte Ainhize¹, Mader Julien¹,
Salvo Vanessa-Sarah¹

1 - AZTI-Tecnalia-Marine Research (Spain)

Contact: iruiz@azti.es

Abstract

Marine litter is an emerging issue of global concern causing harm to marine wildlife, coastal communities and marine activities. Floating marine litter constitutes the fraction of litter located at the water surface. In the Bay of Biscay, floating marine litter density is considerable in comparison to other European regions. Furthermore, this area concentrates relevant human activities linked to marine resources such as fishing, recreational activities, tourism. A healthy environment is essential to develop these activities, thus, monitoring the quantity, composition and pathways of floating litter in the region is pivotal for the efficient management of waste streams and the protection of its marine environment. The project LIFE LEMA aims at defining an optimized solution for local authorities for managing floating marine litter in two transnational locations in the SE Bay of Biscay (Gipuzkoa and Pyrénées-Atlantiques). This contribution presents the performance of two of the several technologies employed within the project to monitor, predict and manage marine litter: the use of retrofitted coastal fishing vessels to collect floating marine litter at sea; and a floating barrier placed at a river mouth to prevent their arrival to the sea. The litter collected has been characterized and quantified to define its source and abundance. The riverine litter monitoring has been complemented by regular campaigns with satellite location tracking buoys to monitor its drift. Results from the collection at sea, suggest a considerable contribution from sea-based sources, such as fishing. Both, the collection and the characterization of litter, represent a step forward in the monitoring of floating riverine and marine litter. Through these pioneering initiatives, standardized protocols for monitoring and improving the quality of data gathered have been implemented. It is highlighted that comprehensive multi-stakeholder involvement is needed to develop environmental protection solutions to face the challenge of floating marine litter.

Key words: barrier, monitoring, riverine litter, floating marine litter, Bay of Biscay, vessel, buoys

Recent geological record of human impact and environmental improvement in the Abra of Bilbao (N Spain): A geochemical and microfaunal approach

Presentation: Oral

Speaker: Serrano Humberto

Serrano Humberto¹, Cearreta Alejandro¹, Irabien Maria Jesús²

1 - Departamento de Estratigrafía y Paleontología, Facultad de Ciencia y Tecnología, Universidad del País Vasco / Euskal Herriko Unibertsitatea (Spain)

2 - Departamento de Mineralogía y Petrología, Facultad de Ciencia y Tecnología, Universidad del País Vasco / Euskal Herriko Unibertsitatea (Spain)

Contact: humberto.serrano@ehu.eus

Abstract

The Abra of Bilbao is a semi-enclosed bay at the mouth of the Nervión Estuary (N Spain). Since mid-19th century, the natural features of this bay have been strongly modified by urban, industrial and port activities. Since the economic recession of the 1980s and 1990s, an important decrease in the flux of pollutants to the estuary has occurred. This study uses an integrated geochemical-microfaunal approach to examine the recent history of anthropogenic impact in this area and a possible environmental improvement with time. Three subtidal short cores were sampled in 2015 in order to analyze their heavy metal and benthic foraminiferal contents. Sediments exhibit a low presence of foraminifera at the base with increasing numbers at the top, differentiating two sections in each core: ABRA2: A2.1 (39-61cm) range 4-479, median 11, A2.2 (0-39cm) 26-735, 203 tests/15g; ABRA3: A3.1 (12-69cm) 0-202, 4, A3.2 (0-12cm) 49-1088, 752; and ABRA5: A5.1 (29-52cm) 4-71, 17, A5.2 (0-29cm) 52-201, 141. Although levels of heavy metals are fairly variable, in the lower layers there are more samples (see %) exceeding the Spanish benchmarks for polluted dredged materials (Zn: 1640; Pb: 600; Cu: 675; Cd: 9,6 mg kg⁻¹): ABRA2: A2.1 Zn 502-2040 (9%), Pb 518-1860 (82%), Cd 2.3-14.8 (18%) mg kg⁻¹, A2.2 Zn 158-1480 (5%), Pb 115-687 (0%), Cd 0.5-8.6 (0%); ABRA3: A3.1 Zn 242-3400 (62%), Pb 156-3320 (79%), Cd 1.2-27.7 (59%), A3.2 Zn 391-1640 (17%), Pb 160-586 (0%), Cd 1.7-14.3 (0%); and ABRA5: A5.1 Zn 1260-2360 (55%), Pb 438-860 (64%), Cd 12.1-41.7 (100%), A5.2 Zn 453-1220 (0%), Pb 178-504 (0%), Cd 1.7-12.3 (13%). This improvement suggests that historical environmental degradation has given way to better environmental conditions in the most recent years. However, all cores show strong internal and spatial heterogeneity, interpreted as a reflection of the highly complex sedimentary dynamics of this area.

Key words: human impact, benthic foraminifera, heavy metals, abra of bilbao

Multiple regression analysis to assess the spatial distribution and speciation of mercury in surface sediments of a contaminated lagoon (Ria de Aveiro, Portugal)

Presentation: Oral

Speaker: Stoichev Teodor

Stoichev Teodor¹, Tessier Emmanuel², Coelho J. Pedro³, Valenzuela M. Gabriela⁴, Pereira M Eduarda³, Amouroux David²

1 - Interdisciplinary Center of Marine and Environmental Research, University of Porto (Portugal)

2 - Laboratoire de Chimie Analytique Bio-inorganique et Environnement, Institut des Sciences Analytiques et de Physico-Chimie pour l'Environnement et les Matériaux, Université de Pau et des Pays de l'Adour (France)

3 - Centre for Environmental and Marine Studies, Department of Chemistry, University of Aveiro (Portugal)

4 - Instituto de Química y Bioquímica, Facultad de Ciencias, Universidad de Valparaíso (Chile)

Contact: tstoichevbg@yahoo.com

Abstract

Different behaviour of inorganic mercury (IHg) and methylmercury (MeHg) was observed in surface sediments of a contaminated coastal lagoon, based upon multiple regression analysis including geochemical characteristics of the surface sediments and non-Euclidean distances between sampling points. This data treatment method was valid for all concentration range of IHg and MeHg, allowing robust quantitative evaluation with respect to extrapolation. For IHg, there was statistical separation of the dispersion away from the contamination source and geochemical characteristics of the sediments. The equations were not dependent upon the direction of the contaminants' dispersion, even in geometrically complex environment. Usually, the MeHg concentrations in the sediments followed those of IHg. However, the inclusion of geochemical variables in the models was necessary in order to describe the behaviour of MeHg in the whole concentration range. The models for MeHg demonstrated that, close to the mouth of the lagoon, IHg was more available for methylation in the sediments and/or there was lower MeHg degradation capacity. In future, the application of multiple regression analysis to separate and to evaluate quantitatively the effects in sediments could be applied to study the behaviour of other contaminants in the aquatic environment.

Key words: chloralkali industry, methylmercury, inorganic mercury, coastal lagoon, sediments, multiple regression model

Intersex mullets in the south east Bay of Biscay: evolution and trends in Gernika and Pasaia

Presentation: Oral

Speaker: Valencia Ainara

Valencia Ainara¹, Diaz De Cerio Oihane¹, Ortiz-Zarragoitia Maren¹, Cancio Ibon¹

1 - Universidad del Pais Vasco / Euskal Herriko Unibertsitatea (Spain)

Contact: ainara.valencia@ehu.eus

Abstract

Thicklip grey mullet (*Chelon labrosus*) is a sentinel species of exposure to endocrine disrupting chemicals (EDC). The reproductive cycle in this gonochoristic species presents a spawning season around February, when they leave the estuaries to migrate in the open sea and reproduce. Mulletts have been sampled in several estuaries and harbors of the Basque Coast, that include the Bilbao estuary, the Oka estuary in Gernika and the harbor areas of Plentzia, Ondarroa, Deba and Pasaia. The presence of EDCs has been confirmed by chemical analysis in water and sediment of the mentioned sampling areas as well as in bile of sentinel fish, showing presence of alkylphenols, phthalates, musk fragrances and pesticides in some of them. The most striking biological effect detected in some of the populations is the presence of intersex males, this meaning that oocytes are formed within testis as a consequence of exposure to xenoestrogens. During the last ten years, annual samplings have been performed in Gernika, and intersex males have always been detected. This area is near an old wastewater treatment plant, which combined with the low flow of the estuary makes the area a hot spot of EDC pollution. The Pasaia harbor is also rich in EDCs, due to different chemical discharges in this industrial impacted area. In any case, in the last samplings performed in Pasaia the prevalence of intersex males has decreased significantly. The prevalence on the contrary, has increased in Gernika, in some cases, reaching 50% of total males. In addition, intersex showed high severity index values, with high amounts of oocytes in the testis. The molecular mechanisms that leads to this condition remains unclear, which makes it difficult to characterize the differences between males and intersex. Funding: Basque Gov. (IT810-13 and predoctoral grant to AV), UPV/EHU (UFI 11/37), Spanish MINECO, EU-FEDER/ERDF (AGL2015-63936-R).

Key words: intersex, mullet, endocrine disruption

MSFD descriptor 8 assessment in the French part of the Bay of Biscay

Presentation: Oral

Speaker: Wessel Nathalie

Wessel Nathalie¹, Brun Mélanie¹, Parisot Florian¹, Thierry Burgeot², Mauffret Aourell²

1 - Ifremer ODE-VIGIES,

2 - Ifremer, Unité Biogéochimie et Ecotoxicologie (France)

Contact: nathalie.wessel@ifremer.fr

Abstract

In the marine strategy framework directive (MSFD) context, descriptor 8 (D8) achieves Good Environmental Status (GES) when "Contaminants are at a level not giving rise to pollution effects". GES assessment for D8 in Bay of Biscay (BoB) was conducted using data on chemical substance concentrations in sediment, bivalves and fish species and imposex in gastropods, and by comparing indicators with available thresholds and reporting when it was possible the contaminant or effect temporal trends. Sediment monitoring, conducted with high spatial extent, allows a temporal integrative assessment of coastal contamination, while bivalve monitoring, characterized by fewer stations than sediments but a higher frequency, allows to also assessing coastal chronic contamination through temporal trends evaluation. Contamination of the trophic networks extended until offshore system was assessed in five fish species collected through optimization of French fisheries surveys. Coastal hotspots were identified, through the sediment monitoring, in the bay of Lorient and in the Basque Country respectively for organic contaminants and metals. PCB congener CB118 and Dieldrin presented concentrations in bivalves higher than environmental thresholds for half of the monitored stations. All of them were in the south part of the subregion for Dieldrin. CB118 was also of concern in fish, with concentration higher than environmental threshold in mackerel and sardine. Moreover, dogfish presented concentrations of Cd higher than consumer thresholds. Biological effects of contaminants were evaluated by the Ospar common indicator Imposex, a specific effect of TBT to the nucelle. Along BoB coast, only 25% of the stations reached GES for this indicator. Impacts of the Dumpton syndrome, resulting in the nucelle resistance to TBT effect, on these results have to be assessed. These results showed a coastal and offshore contaminant pressure on the ecosystems.

Key words: msfd, sediment, molluscs, fish, organic and inorganic contaminants, imposex

Assessing the water quality of the Oka estuary (SE Bay of Biscay) in relation to the sewerage scheme

Presentation: Oral

Speaker: Zorita Izaskun

Zorita Izaskun¹, Bald Juan¹, Borja ángel¹, Fontán Almudena¹, Franco Javier¹, Larreta Joana¹, Revilla Marta¹, Solaun Oihana¹, Valencia Victor¹

1 - AZTI-Tecnalia, Marine and Coastal Environmental Management (Spain)

Contact: jafranco@azti.es

Abstract

The Oka estuary (SE Bay of Biscay) is the best-preserved estuary in the Basque Country; it was declared Biosphere Reserve by UNESCO in 1984. Since the 1970s there exist a waste water treatment plant in the innermost area of the estuary, but its efficacy is very low; this constitutes a risk for eutrophication and bathing. A new sewage treatment plant with higher capacity is in operation since 2015; it is expected that almost all the waste waters from the basin will be cleaned-up by 2020. The aim of this study was to determine the spatial and temporal trends of water quality in relation to the implementation of the different phases of the sewage system. Data from 3 stations located along the estuary were sampled quarterly from 1995 to 2017 for nutrient concentrations and main oceanographic variables. Additionally, faecal coliforms were analyzed weekly-fortnightly at estuary beaches during bathing season (June-September) from 2008 to 2017. The gradient from the innermost station to the outermost station was evidenced for all nutrients as well as for the oxygen. The innermost station showed an increasing trend for ammonium, phosphorous and chlorophyll-a, accompanied by a depletion of oxygen, especially in summer at low tide, indicating a higher risk for eutrophication. The outermost station presented nutrients in good status along the data series but a decreasing temporal trend in oxygen levels was observed. Overall, the estuary does not reach good status. As for the bathing waters, the inner ones were removed from the official census of in 2016 for having been classified as 'poor' quality for five consecutive years. This study provides relevant information to assess the effectiveness of the implemented sewage measures, especially in relation to the requirements of the Water Framework Directive and the Bathing Waters Directive.

Key words: water quality/oka estuary/eutrophication/sewerage/water framework directive/bathing waters directive

Priority and emerging micropollutants in sediments of Capbreton Canyon (SW France)

Presentation: Poster

Speaker: Azaroff Alyssa

Azaroff Alyssa¹, Miossec Carole¹, Tessier Emmanuel¹, Lancelleur Laurent¹, Guyoneaud Rémy¹, Monperrus Mathilde¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet, France

Contact: alyssa.azarof@univ-pau.fr

Abstract

Priority substances set by the Water Framework Directive (WFD) are of major interest to evaluate the quality of coastal and marine systems, the final receptors for pollutant emissions. Emerging substances not regulated by the WFD, i.e. personal care products and pharmaceuticals, are of high concern since only scarce information of their occurrence, reactivity and impact are available in the marine environment. A large screening of micropollutants has been achieved in surface sediments collected in the Canyon of Capbreton (Gulf of Biscay). Twenty-four stations have been sampled within the first 30 km of the canyon in July 2017. Occurrence and concentrations of priority (PAHs, PCBs, OCPs and trace metal) and emerging micropollutants (synthetic musks and sunscreens compounds) have been determined. In addition, sediments collected at three different depths were used to perform incubation experiments with a synthetic musk (HHCB) or a sunscreen compound (OD-PABA). Experiments have been performed at 12°C in the dark, controls have been also conducted with sterilized sediments. Some priority substances were lower than the detection limits whereas PAHs and PCBs exhibited high concentration levels ranging from 199 to 7,116 ng.g⁻¹ and from 0.1 to 18.6 ng.g⁻¹, respectively. Emerging micropollutants were measured at low concentrations. Musk compounds (HHCB, AHTN and MK) concentrations were up to 3.6, 2.3 and 7.0 ng.g⁻¹, respectively. Sunscreens (3-BC, 4-MBC, EHMC and OC) concentrations were up to 6.2, 9.2, 31.8 and 29.2 ng.g⁻¹, respectively. Highest concentrations were observed for offshore stations. Sediments from terraces or slopes of the canyon exhibited higher levels compared to those from the continental shelf. Degradation potentials have been only observed under biotic condition for OD-PABA suggesting the involvement of biologically mediated mechanisms.

Key words: priority pollutants, emerging pollutants, Capbreton canyon, sediments

Accumulation of priority and emerging pollutants in benthic macrofauna from the rocky coast of the Bay of Biscay

Presentation: Poster

Speaker: Bisch Amaëlle

Bisch Amaëlle¹, Huguenin Laura^{1,3}, Miossec Carole¹, de Casamajor Marie-Noëlle⁴, Lalanne Yann², Gorostiaga José Maria³, Monperrus Mathilde¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

3 - Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country UPV/EHU (Spain)

4 - Laboratoire Environnement Ressources Arcachon/Anglet (France)

Contact: amaelle.bisch@univ-pau.fr

Abstract

To date, over 110 000 micropollutants have been identified by the European Union coming from industrial, agricultural or domestic sources. Among them, priority pollutants (metals, organochlorines, pesticides, hydrocarbons) are set by the Water Framework Directive (WFD), whose emissions are intended to be reduced or eliminated in order to achieve the good ecological status. In addition, emerging pollutants (household products, cosmetics, pharmaceuticals) are not listed in the directives and become a major concern. Most of them are not eliminated efficiently by wastewater treatment plants (WWTP), and even at low concentrations, they are likely to have a toxic effect on aquatic organisms such as endocrine disruption, behavioral changes, energy metabolism disturbances and genetic responses. Coastal areas generally combine a high biodiversity with a high anthropogenic pressure leading to the need of the monitoring of micropollutants. In this study, benthic macrofauna is used as a chemical contamination assessment matrix. The bioaccumulation caused by their respiration or feeding makes it possible to analyze and measure the contaminants present in the coastal environment. Five stations were sampled on the Basque coast. Three are classified as "impacted" by the presence of WWTP discharges and two as "control". The sampling is done along a distance gradient from the outfall. Species had to be sufficiently abundant, present in all stations and belong to the different trophic levels. During the 2017 campaign, sampled organisms were *Patella* spp., *Enteromorpha* spp., *Gelidium corneum*, *Mytilus* spp, *Holothuria tubulosa*, and sponges. A multi micropollutants approach has been used to quantify several classes of priority and emerging micropollutants such as metals, organometals, musks, sunscreens, PAHs, PCBs, OCPs, alkylphenols and pharmaceuticals. The sample preparation procedure was mainly based on QuEChERS extractions before analyses using a combination of mass spectrometry techniques (GC-MS, LC-MS-MS, ICP-MS, GC-ICP-MS).

Key words: southeastern Bay of Biscay, benthic macrofauna, micropollutants, bioaccumulation, wastewater treatment plant discharges, quechers

Mercury speciation and isotope compositions (Hg, C and N) in bivalves along the French coastline

Presentation: Poster

Speaker: Briant Nicolas

Briant Nicolas¹, Knoery Joël¹, Chouvelon Tiphaine¹, Brach-Papa Christophe¹, Chiffolleau Jean-François¹, Savoye Nicolas², Sonke Jeroen³

1 - Laboratoire de Biogéochimie des Contaminants Métalliques (France)

2 - Environnements et Paléoenvironnements Océaniques et Continentaux (France)

3 - Géosciences Environnement Toulouse (France)

Contact: nicolas.briant@ifremer.fr

Abstract

Mercury (Hg) is a natural element toxic to all living organisms. Its biogeochemical cycle is dominated by its flux to the atmosphere, which human activities contribute to disrupt significantly. Marine organisms bioaccumulate and bioamplify this element throughout their food webs. As concentrations in some coastal species of high trophic level approaching health thresholds, understanding of biogeochemical processes and mechanisms leading to Hg concentrations found in coastal species is important. Since the 1970's, the ROCCH, a French Mussel Watch-like program, tracks contaminants on the metropolitan coastline using of bivalves as quantitative indicators of coastal chemical contamination. One of the purposes of this network is to track the sources of contamination using stable isotopes. The stable isotopic geochemistry of metal is indeed a promising way to trace processes and transfers from one biogeochemical reservoir to another. Hg isotopes undergo mass dependent or independent fractionation (MDF and MIF, respectively), thereby potentially enabling to track biological processes (MDF) and transfer between geochemical reservoirs (MIF). The coupling of these measurements with those of stable isotopes of carbon (C) and nitrogen (N) in biota, for the study of the structure and functioning of trophic networks, will further clarify the contaminant bioaccumulation processes such as Hg. In this context and through the Trococo project (funding Ifremer, Région Pays de la Loire (Pollusols), and INSU/EC2CO/Dril), we have mapped, for the first time at a national scale, temporal and spatial isotopic variations of Hg, C and N on samples from a monitoring network. Our intention was to better discriminate the sources and trace the origin of bivalves' mercury (e.g., global ocean, fluvial OM, atmospheric local deposition). This investigation is the first world wide systematic study at a national scale of Hg, C and N isotopic composition in intertidal bivalves.

Key words: coastal, isotopes, bivalves, mercury

Copper and other trace metals in sediments, seawater, phytoplankton and oysters from the Arcachon Bay: Results of a one-year field study

Presentation: Poster

Speaker: Chouvelon Tiphaine

Chouvelon Tiphaine¹, Rozuel Emmanuelle¹, Bruzac Sandrine¹, Gonzalez Jean-Louis¹, Knoery Joël¹, Sireau Teddy¹, Auby Isabelle², Méteigner Claire², Oger-Jeanneret Hélène², Perrière-Rumèbe Myriam², Rigouin Loïc², Gonzalez Patrice³, Gourves Pierre-Yves³, Savoye Nicolas⁴, Akcha Farida⁵

1 - Laboratoire de Biogéochimie des Contaminants Métalliques (France)

2 - Laboratoire Environnement Ressources Arcachon-Anglet (France)

3 - UMR 5805 Environnements et Paléoenvironnements Océaniques et Continentaux, équipe Ecotoxicologie Aquatique (France)

4 - UMR 5805 Environnements et Paléoenvironnements Océaniques et Continentaux, équipe Ecologie et Biogéochimie des Ecosystèmes Côtiers (France)

5 - Laboratoire d'Ecotoxicologie (France)

Contact: tiphaine.chouvelon@ifremer.fr

Abstract

The Arcachon Bay is an important site of oyster production in France, while it is contaminated by various pollutants such as copper (Cu). In the last decade, the national monitoring network "ROCCh" operated by Ifremer, which uses local bivalves as semi-quantitative bioindicators of the chemical contamination of the French coastline, observed indeed a clear increase in the Cu concentrations of oysters from this area. This may be partly explained by changing human practices and activities around the Bay, including the increasing use of Cu-based products (e.g., anti-fouling paints, pesticides) and the urban expansion that occurred overtime. These potential sources of Cu to the Bay and their impact remain to be explored, as well as the spatial and seasonal patterns of the contamination in the area. The TOUCAN project (Trophic transfer of major chemical pollutants in Arcachon Bay: which impact on the Pacific oyster *Crassostrea gigas*? - funding LabEx COTE, 2017-2018) firstly aims at investigating the occurrence, the distribution and the fate of major chemical pollutants in the Arcachon Bay, through a multidisciplinary approach (i.e. combination of chemical and biological parameters for explaining the environmental contamination). Here, we present the results of the monitoring of Cu and other trace metals in sediments, seawater, phytoplankton, and transplanted oysters during a one-year field study. Samples were collected at two stations: Comprian - under the influence of the Leyre river and inside the Bay, and Grand Banc/Courbey - more under oceanic influence. For seawater, metal concentrations obtained by both passive sampling (DGTs) and classical seawater filtrations (dissolved < 0,45 µm) were compared each month and showed some discrepancies. Original data concerning the contamination level of phytoplankton, as potential trophic vector of the contamination for oysters, were also obtained. Overall, Cu and other trace metal concentrations were higher in Comprian samples, although intra-annual variations were observed at both stations.

Key words: copper, inorganic elements, contamination, bioaccumulation, arcachon bay

A simple and low cost method for total mercury (Hg) determination in natural water samples

Presentation: Poster

Speaker: De Diego Alberto

Duval Bastien^{1,2}, De Diego Alberto¹, Fdez-Ortiz De Vallejuelo Silvia¹, Gredilla Ainara³,
Tessier Emmanuel², Amouroux David²

1 - Kimika Analitiko SAILA, Euskal Herriko Unibertsitatea, 48940, Leioa, (Spain)

2 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR 5254, 64000, Pau, (France)

3 - Department of Applied Chemistry, Faculty of Chemistry, University of the Basque Country, 20018, San Sebastian, (Spain)

Contact: bastien.duval@univ-pau.fr

Abstract

Among pollutants, mercury (Hg) is a major concern in the aquatic environments. While Hg is present at low concentrations in the marine systems, its specific biogeochemical cycling allows bioaccumulation and biomagnification in the marine food chain leading to serious consequences for marine animals, and, seafood human consumers. In this work, we developed an innovative analytical method for trace and ultra-trace determination of total Hg concentration in natural water samples (sea, estuarine, fresh). In this method, dispersive micro-solid phase extraction (DMSPE) is applied using graphene nanosheets to preconcentrate all dissolved Hg present in the water sample, before its direct analysis by pyrolysis gold amalgamation and atomic absorption spectroscopy (AAS). In this new in situ methodology, only two easy steps are necessary, saving time and effort. First, the operator has to add 500 μ L of nanoparticles suspension containing graphene, ammonium pyrrolidine dithiocarbamate (APDC) and Triton-X-100 in the water sample. This solution is filtered under vacuum and the complex formed by Hg, APDC and graphene is collected on a membrane filter (Polyethersulfone PES, 0.2 μ m). The filter obtained can then be analyzed back to the lab by direct pyrolysis of the PES filter using an Advanced Mercury Analyzer (AMA-254). Different parameters have been tested to optimize the present procedure, such as the amount of nanoparticles suspension and sample volume. The stability of the Hg concentration on the PES filters during their storage before analysis has also been investigated. Then, influence of the presence of other cations (e.g. calcium), sodium chloride and natural organic matter in the sample has also been studied to prevent possible matrix effects. Application of this method shows promising results with a limit of detection as low as 2ng.L⁻¹ using 200mL of water sample and a good reproducibility (replicate Std Dev < 7%). Thanks to REPLIM-OPCC project and POCTEFA-EU-INTERREG program.

Key words: dmspe, graphene, trace analysis, trace and ultra, preconcentration, hg, water sample, aas

Geographical distribution of metallic pollution in sediments of the estuary of the Nerbioi-Ibaizabal estuary (Bilbao, Basque country)

Presentation: Poster

Speaker: De Diego Alberto

Garmendia Marina¹, Gredilla Ainara¹, Fernández-Ortiz De Vallejuelo Silvia¹, Arana Gorka¹, Soto Manu^{2,3}, De Diego Alberto^{1,3}

1 - Kimika Analitikoa Saila, Euskal Herriko Unibertsitatea (Spain)

2 - Zoologia eta Animalia Zelulen Biologia Saila, Euskal Herriko Unibertsitatea (Spain)

3 - Plentziako Itsas Estazioa, Euskal Herriko Unibertsitatea (Spain)

Contact: alberto.dediego@ehu.eus

Abstract

Pollution in estuaries is an issue of high concern for scientists, local stakeholders and authorities. Sediments have been frequently used as sentinels of chemical pollution. The estuary of the Nerbioi-Ibaizabal River was subjected to an important input of metals since the late 19th century until about 1975. Afterwards, a significant decrease in chemical pollution has occurred due to a progressive closure of the most polluting activities and the pre-treatment of waste waters. However, an important actuation, including a large movement of highly polluted sediments, has recently started in order to reduce the effects of floods and improve the urban image of the city. It is therefore of interest to have a precise description of the situation in terms of chemical pollution, in order to make feasible a future quantification of the effects derived from the above-mentioned actuation. With this aim, we collected sediments at about 50 sites in the inter-tidal part of the estuary in January 2018, and the concentration of fourteen elements (Al, As, Cd, Co, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Sn, V and Zn) in the acidic extract of the samples was simultaneously measured by ICP/MS. Geoaccumulation indexes to estimate the metal fraction of anthropogenic origin, Normalized and Weighed Average Concentrations (NWAC's) to identify areas of higher concern and mean Effect-Range-Median quotients (mERMq's) to estimate the toxicity associated to the samples were computed. The results show that i) the geographical distribution of metals is rather heterogeneous within the estuary with relatively high concentrations only in a few points and ii) the toxicological risk associated to these sediments goes from slight to moderate. Acknowledgements: This work has been financially supported by the Spanish Government through the research project Ref. CTM2017 87766-R and the Basque Government through the Consolidated Research Group Project 2013-2018 (Ref. IT-742-13).

Key words: metal pollution, sediments, toxicity, nerbioi, ibaizabal

Photodegradation Kinetics of Organic Micropollutants in Water

Presentation: Poster

Speaker: Derrien Pierre-Yves

Derrien Pierre-Yves¹, Lanceleur Laurent¹, Deborde Jonathan¹, Miossec Carole¹, Monperrus Mathilde¹, Pigot Thierry¹

1 - CNRS / UNIV PAU & PAYS ADOUR, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR 5254, 64000, Pau, (France)

Contact: yves29.derrien@gmail.com

Abstract

The widespread use of organic compounds in daily products such as cosmetics, shampoos, pharmaceuticals or laundry detergents contributes to the continuous contamination of urban effluents. Many of these pollutants pass through classic wastewater treatment plants without substantial removal. Understanding the fate of pollutants during tertiary treatment processes initially dedicated to disinfection purpose and their transport in receiving water is essential to maintain water quality in downstream ecosystems. This work aims at studying the photodegradation rate constants and the degradation byproducts of musks (AHTN, HHCB), sunscreens (EHMC, OC), hormones (E1, E2, EE2) and pharmaceuticals (Carbamazepine, Ketoprofen, Ofloxacin, Oxazepam) when exposed to solar irradiation in simulated summertime (24 h; 44 mW/cm²) and wintertime (21 mW/cm²), UVc irradiation (2h; 0.75 mW/cm²) and UVc irradiation in the presence of H₂O₂ (45 mg/L). Irradiation experiments were carried out in ultrapure water, acidified water (3 mg/L performic acid), filtered (< 0.45 µm) and unfiltered wastewater. Aliquots of the irradiated samples were collected at specific times and internal standards were added. Half the aliquots were extracted in Ethyl Acetate and analysed by Gas Chromatography Mass Spectrometry (GC-MS) for musks and sunscreens. The other half was directly analysed by Liquid Chromatography tandem Mass Spectrometry (LC-MS-MS) for pharmaceuticals and hormones. First results in ultrapure water showed solar irradiations were efficient to remove Ofloxacin and Ketoprofen (>95% in 24 hours) while UVc irradiations highly degraded AHTN, E1 and Ketoprofen (>90% in 2 hours). In the presence of H₂O₂, UVc irradiations allowed the degradation (>90%) of all studied compounds. Obtained results gave important information on the efficiency of tertiary treatments in reducing domestic pollution. Calculated half-lives of studied micropollutants allowed to estimate the capacity of an aquatic system in recovering from disturbance and helped in understanding their potential dispersion pattern from a point source.

Key words: photodegradation, organic, pollutants, irradiation, contamination, wastewater, kinetic, musks, sunscreens, hormones, pharmaceuticals, degradation, micropollutants

Chemical status assessment of the of the coastal and transitional water bodies in the Adour-Garonne district

Presentation: Poster

Speaker: Gouriou Laure

Gouriou Laure¹, Trut Gilles¹, Oger-Jeanneret H  l  ne¹, Auby Isabelle¹, Lamouroux M  lina²

1 - Ifremer - Laboratoire Environnement Ressources Arcachon/Anglet (France)

2 - Agence de l'Eau Adour Garonne (France)

Contact: laure.gouriou@ifremer.fr

Abstract

ROCCH is the French monitoring network for the chemical contamination in coastal and transition water bodies. This network meets two objectives: assessing levels and trends of the chemical contamination of the French coastline and answering both environmental objectives of the Water Framework Directive (WFD) and obligations of marine regional conventions (OSPAR and Barcelona). For this purpose, bivalve mollusks are used as quantitative biological indicators for their properties to concentrate and accumulate pollutants in their soft tissues with a relationship to the ambient level; this characteristic makes the measurement of chemical contaminants technically simpler than in the water column. Furthermore, chemical monitoring in sediment is also performed. This sediment matrix remains also interesting for the monitoring of substances with significant accumulation potential. In the Adour-Garonne district, extending from the Pertuis charentais to the Bidassoa estuary (Spain border), the chemistry monitoring on bivalves is performed on nine coastal and five transition (estuaries) water bodies. The chemical contamination of marine sediments is studied in six coastal and five transition water bodies. According to different frequencies, the 25 hydrophobic and bioaccumulative substances of the WFD and OSPAR lists have been studied during the last decade. This poster presents the main results about chemical pollutants in the coastal and transition water bodies of the Adour-Garonne district, acquired in sediments and shellfish between 1999 and 2017. Finally, in this district a good chemical quality of the coastal and transitional water bodies is observed, with nevertheless some critical sectors such as Gironde estuary, where the persistent Cadmium contamination is confirmed by the recent results; Arcachon Bay showing high concentrations of PAHs; Bidassoa estuary, with high concentrations of TBT. Thanks to these results, an assessment of the chemical quality of the Adour-Garonne coastline has been established and can be used to plan the environmental public policies.

Key words: rocch, water framework directive, ospar, chemical quality, mollusks, sediment, adour garonne coastline

The use of Precision cut liver slices (PCLS) in sole as an in vitro tool to investigate the toxic effects of Oil Water Accommodated Fractions (WAF)

Presentation: Poster

Speaker: Hafez Tamer

Hafez Tamer¹, Zarragoitia Maren¹, Duran Robert²

1 - University of the Basque Country/Euskal Herriko Unibertsitatea (PiE) (Spain)

2 - Equipe Environnement et Microbiologie - IPREM UMR CNRS 5254 (France)

Contact: tahafez@aucegypt.edu

Abstract

Precision cut liver slices (PCLS) is a suitable in vitro tool to study the toxic effects of xenobiotics. PCLS maintains the cellular architecture and cell-to-cell communication, which are lost in hepatocyte primary cultures. Additionally, the cellular metabolism of the slices closely resembles tissue in vivo conditions. PCLS has been extensively applied in mammalian toxicology studies. However, fewer PCLS studies have been done on marine fish. Oil contamination is one of the most concerning threats to marine biota and ecosystems. Spills are combated using cleaning agents or dispersants, but the effect of those chemicals could enhance the toxic effects on exposed organisms. In this work, we develop a PCLS protocol using the liver of the marine fish species *Solea senegalensis*. The liver of adult soles was dissected out, placed in iced cold buffer and cored into 8 mm in diameter pieces. Using a tissue slicer, liver cores were sliced into 300 µm thick slices and quickly transferred into cell media containing 0% (control), 10%, 30% and 50% of Water Accommodated Fraction (WAF) of Norwegian Troll B oil. An additional group was exposed to a combination of WAF plus dispersant (Finasol 52,) using the same concentrations previously mentioned. PCLS were incubated for 48 hours at 15°C in triplicates. Cytotoxicity was assessed with the lactate dehydrogenase (LDH) assay and the tissue ATP content. In addition, slices were analyzed histologically in order to detect alterations in cellular structure. Transcription levels of genes involved in the metabolism of organic xenobiotics such as *cyp1a1* and *cyp3a*, were assessed. Preliminary results suggest that sole PCLS are stable for 48 h and responded to WAF exposure scenarios in a dose dependent manner. Funding: Basque Government (grant to consolidated research groups IT810-13) and UPV/EHU (UFI11/37). TH owns a grant of the UPV/EHU-UPPA cotutelle program.

Key words: water accommodated fraction + dispersant, water accommodated fraction, precision cut liver slices, *solea senegalensis*

Methylmercury effect on migration propensity and metabolism in European glass eels (*Anguilla anguilla*) from South Bay of Biscay, France

Presentation: Poster

Speaker: Lamarins Amaïa

Lamarins Amaïa¹, Liu Hengtong¹, Rives Jacques¹, Coste Pascale¹, Monperrus Mathilde², Seiliez Iban³, Bolliet Valérie¹

1 - UMR Ecologie Comportementale et Biologie des Populations de Poisson (France)

2 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

3 - UMR Nutrition Métabolisme Aquaculture (France)

Contact: valerie.bolliet@univ-pau.fr

Abstract

Glass eels migrate up estuaries to join rivers for a long period of growth. However, several studies have suggested that some glass eels may not reach rivers but rather complete their life cycle in coastal or estuarine waters. This might affect the sex ratio and population dynamics of this threatened species because individuals remaining downstream mostly develop in males, whereas those colonizing upstream mainly develop in females. Since most glass eels fast during their estuary migration, their propensity to migrate could be, at least in part, linked to their energy stores and metabolism. In addition, autophagy (a process of cellular self-eating) plays a major role in mobilizing diverse cellular energy and nutrients stores during starvation. To migrate up estuaries, glass eels use selective tidal transport, swimming during the flood and possibly hiding in the substratum during ebb tide. During migration, they might be exposed to several anthropic pressures such as pollution. This study aims to investigate the effect of methylmercury (MeHg) on glass eels' migration propensity, in relation to their energetic metabolism and autophagic activity. For this purpose, glass eels caught in Moliets were individually tagged using visible implant elastomer and exposed to two MeHg concentrations (100 ng.L⁻¹ and 1000 ng.L⁻¹) during 7 days. Then, swimming activity and tactics (synchronization with or against the water current) of each glass eel were assessed in experimental installations that mimic tides using water current reversal. Relationships between body MeHg concentrations, swimming activity, different genes expression and proteins activity involved in metabolism, autophagy, and oxidative stress were investigated.

Key words: glass eels, estuarine migration, methylmercury, metabolism, autophagy

Seabird blood and feathers as effective biomonitoring tools for mercury marine contamination

Presentation: Poster

Speaker: Renedo Marina

Renedo Marina^{1,2}, Amouroux David², Duval Bastien², Carravieri Alice³, Tessier Emmanuel², Barre Julien², Bérail Sylvain², Pedrero Zoyne², Chereil Yves³, Bustamante Paco¹

1 - Littoral ENvironnement et Sociétés - UMR 7266 (France)

2 - CNRS / UNIV PAU & PAYS ADOUR, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR 5254, 64000, Pau, (France)

3 - Centre d'Etudes Biologiques de Chizé - UMR 7372 (France)

Contact: renedo.marina@gmail.com

Abstract

As a consequence of their high position in marine trophic webs, seabirds are considered as effective bioindicators of marine contamination since they integrate biomagnifying pollutants, such as mercury (Hg), via food intake. Since seabirds display contrasted foraging strategies, they are appropriate models to assess Hg contamination at different marine compartments both in horizontal (inshore to offshore) and vertical (epipelagic to mesopelagic) scales. Blood and feathers are the most frequently used avian tissues for biomonitoring studies because they do not involve lethal-sampling. Besides, each tissue presents a specific Hg turnover rate, with Hg concentration in blood and feather reflecting short and long-term exposure, respectively. In this work, we investigated how Hg isotopic composition (e.g., $\delta^{202}\text{Hg}$ and $\Delta^{199}\text{Hg}$) of blood and feathers from either seabird chicks (skuas, $n = 40$) or adults (penguins, $n = 62$) can accurately provide information on exposure to Hg in marine ecosystems. Our results indicate a strong correlation between blood and feather Hg isotopic values for skua chicks, with similar $\delta^{202}\text{Hg}$ and $\Delta^{199}\text{Hg}$ values in the two tissues. Since blood and body feathers of chicks integrate the same temporal window of Hg exposure, this suggests that $\delta^{202}\text{Hg}$ and $\Delta^{199}\text{Hg}$ values of both tissues can be directly compared within and between avian groups. Conversely, penguin adults show higher $\delta^{202}\text{Hg}$ and $\Delta^{199}\text{Hg}$ values in feathers than in blood, most likely due to tissue-specific Hg temporal integration. Since feathers integrate long-term (i.e., the intermoult period) Hg accumulation, whereas blood reflects short-term (i.e., seasonal) Hg exposure in adult birds, the two tissues provide complementary information on trophic ecology at different time scales. This study highlights the capability of seabird tissues to biomonitor the factor controlling Hg sources and biomagnification in marine food webs.

Key words: mercury, seabirds, bioaccumulation, biomonitoring, marine ecosystems, sources, biogeochemistry

Selenium Speciation in Adour Estuarine Waters (Bay of Biscay)

Presentation: Poster

Speaker: Romero Rama Andrea

Romero Rama Andrea¹, Bueno Maïté¹, Tessier Emmanuel¹, Lancelleur Laurent¹, Veloso Sandrine¹, Amouroux David¹

1 - CNRS / UNIV PAU & PAYS ADOUR, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR 5254, 64000, Pau, (France)

Contact: a.romero-rama@univ-pau.fr

Abstract

This study investigates the fate of selenium (Se) and its compounds in the Adour estuarine waters (Bay of Biscay). The main goal is to acquire a better knowledge of Se cycling and relate it to biogeochemical processes occurring in estuaries. A seasonal sampling between 2017 and 2018 has been done in order to understand the variability of Se speciation along the year and as a function of physico-chemical parameters. Surface water samples were collected at low tide in May and September 2017 and in January 2018. Twelve different sampling points were chosen to study upstream waters coming from Adour River and Nive River, industrial and urban effluent waters, and downstream waters. The analysis of Total bulk and dissolved Se (TSe) was determined by ICP/MS. Dissolved Se compounds such as selenite (Se(IV)) and selenate (Se(VI)) were analyzed by HPLC-ICP/MS. Reduced Se fraction (Se(0), Se(-II) and organic Se forms) was obtained subtracting the inorganic fraction (Se(IV)+Se(VI)) to the dissolved TSe. Volatile species (Total Volatile Se (TVSe) as the sum of DMSe, DMSSe and DMDS₂Se) were determined by Cryo-GC-ICP/MS. Concentration range for dissolved TSe varies from 71 to 771 ng Se/L. Se(VI) is the main specie (50% of dissolved TSe in average); while Se(IV) represents, in average, the 11% of dissolved TSe. Reduced Se fraction represents in average the 42% of dissolved TSe. TVSe ranges from 51 to 2757 ng Se/L. Reduced species (Volatiles and Reduced fraction) have higher concentration in late summer conditions (September 2017). Otherwise, in flood winter conditions (January 2018) Se(VI) values are higher. These findings suggest that Se cycling is regulated by biological activity in the estuary and that anthropogenic contribution of Se is observed in effluent waters. Further research is ongoing to better assess Se speciation and cycling in this estuarine system.

Key words: gc, icp/ms, hplc, biogeochemistry, adour river, speciation, selenium, icp/ms, estuary, se cycling

Effect of methylmercury on feeding behaviour and social interactions in glass eels

Presentation: Poster

Speaker: Schler Morgan

Schler Morgan¹, Bardonnat Agnes¹, Huchet Emmanuel¹, Coste Pascale¹, Monperrus Mathilde², Bolliet Valérie¹

1 - UMR Ecologie Comportementale et Biologie des Populations de Poisson (France)

2 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

Contact: valerie.bolliet@univ-pau.fr

Abstract

The European eel (*Anguilla anguilla*) life cycle spans over a large area and through various ecosystems from the Sargasso Sea, where spawning occurs, to the European continental shelf, where larvae undergo their metamorphosis into glass eel. At this stage, glass eels migrate up estuaries to join rivers for a long period of growth. Most glass eels feed little or not at all during estuarine migration but there is some evidence that they restart feeding at stages VIA2-VIA3 in the Adour estuary, when the temperature reaches 10 °C. To our knowledge, feeding resumption and the effects of environmental conditions on this resumption are far from being understood. Estuaries are often exposed to anthropogenic discharges due to extensive urban development and can represent a stressful aquatic ecosystem. For example, the Adour estuary exhibits relatively high sedimentary concentrations of MeHg but the effect of contaminant on glass eels feeding behavior have never been investigated. To address this question, we studied the effect of methylmercury on food resumption and agonistic behaviour in glass eels. 40 tagged glass eels were exposed during seven days to a concentrations of 100 or 1000ng/L of MeHg, while the same amount of fish was kept in freshwater for control. Then, eight glass eels per condition were killed for MeHg concentration analyses and 32 were transferred into aquaria filled with freshwater (8 fishes per aquaria, 3 aquaria per condition), in order to observe their social interactions and feeding resumption. At the end of the experiment, metabolism of all fish was evaluated by measuring oxygen consumption in order to assess relationships between MeHg concentration, social interactions, feeding behaviour and metabolism.

Key words: glass eel, feeding behaviour, methylmercury, metabolism

Transport of mercury species in a contaminated lagoon (Ria de Aveiro, Portugal)

Presentation: Poster

Speaker: Stoichev Teodor

Stoichev Teodor¹, Tessier Emmanuel², Almeida C. Marisa¹, Basto M. Clara¹, Vasconcelos Vitor¹, Amouroux David²

1 - Interdisciplinary Center of Marine and Environmental Research, University of Porto (Portugal)

2 - Laboratoire de Chimie Analytique Bio-inorganique et Environnement, Institut des Sciences Analytiques et de Physico-Chimie pour l'Environnement et les Matériaux, Université de Pau et des Pays de l'Adour (France)

Contact: tstoichevbg@yahoo.com

Abstract

The export fluxes of dissolved and particulate inorganic mercury (IHg(II)) and methylmercury (MeHg) from contaminated Laranjo Bay (freshwater discharge from Antuã River) to the rest of the Aveiro Lagoon were estimated, based on salinity profiles obtained during six sampling campaigns at high and at low tide. This is one of the rarest examples where both speciation fluxes and partitioning of mercury is studied in a contaminated coastal environment. Different effective riverine concentrations were calculated for specific hydrological conditions. The export fluxes (324 and 1.24 mol year⁻¹) are much higher than the input fluxes from the Hg source (3.9 and 0.05 mol year⁻¹) and the Antuã River (10.5 and 0.10 mol year⁻¹) for total Hg and MeHg, respectively. Resuspension of contaminated sediments from Laranjo Bay is crucial for the transport of both IHg(II) and MeHg. Methylation and/or selective enrichment into biogenic particles are responsible for the mobilization of MeHg. Sorption of dissolved IHg(II) onto suspended particles limits its export flux. Despite the lower fraction of total MeHg, the contaminated lagoon may have an impact on coastal areas, particularly if change in the lagoon geometry occurs, due to sea level rise.

Key words: phytoplankton, coastal lagoon, methylmercury, inorganic mercury, flux, estuary

Investigation on Sn and Hg organometallic compounds in plastic debris in Northern Atlantic Ocean: From method development to analysis

Presentation: Poster

Speaker: Tessier Emmanuel

Richter Larissa^{1,2}, Amouroux David¹, Tessier Emmanuel¹, Fostier Anne², Ter Halle Alexandra³, Gigault Julien⁴

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR 5254, 64000, Pau, (France)

2 - Environmental Chemistry Group, Institute of Chemistry, University of Campinas (Brazil)

3 - Laboratoire des Interactions Moléculaires et Réactivité Chimique et Photochimique (France)

4 - Géosciences Rennes (France)

Contact: larissa.richter@univ-pau.fr

Abstract

Plastics and microplastics pollution in marine systems has been reported worldwide, what raises concerns about their impacts in these environments. One class of contaminants in this issue includes metallic and organometallic species, which can be adsorbed on sea debris' high surface area. These species are known for their high toxicity, however their quantification in plastic debris still configures a great challenge in terms of analytical chemistry once specific extraction processes and highly sensitive equipment may be required. The aim of this work was to propose analytical methods to evaluate the concentrations of mercury and tin organometallic compounds in sea plastic debris. For that we analyzed different types of plastics with different origins: plastics collected in marine waters and beaches from the Northern Atlantic Ocean gyres and French commercial plastic specimens. Samples were characterized through infrared analysis and separated according to their plastic type (PT), which were polyethylene (high and low density), polypropylene and polystyrene. Simultaneous mercury and tin speciation was evaluated through different extraction protocols and solvents. Analysis was performed by GC-ICP-MS. Due to absence of certified materials similar to samples, accuracy of extraction protocols for organometallic species is not accessible. Preliminary results exhibit low organometallic contents and no significant differences between commercial plastic samples and the ones found at sea, what may suggest that PTs evaluated in this study retain little amounts of metallic species during its residence time in the sea. Recovery of Hg species (total metal x metal speciation) through the extraction protocols observed higher correlations with PT. This may suggest that metallic species bond differently to each PT, what infers that each PT may need to have its extraction process optimized separately before proper analyses.

Key words: plastics, mercury, tin, organometallic speciation, method development.

Seasonal and spatial distribution of micropollutants in surface waters of Adour estuary (Bay of Biscay, SW France)

Presentation: Poster

Speaker: Veloso Sandrine

Veloso Sandrine¹, Lancelleur Laurent¹, Tessier Emmanuel¹, Deborde Jonathan¹, Miossec Carole¹, Romero Rama Andrea¹, Monperrus Mathilde¹, Duran Robert¹, Amouroux David¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

Contact: sandrine.veloso@univ-pau.fr

Abstract

Estuaries are characterized by unique biogeochemical processes, strongly influenced by tidal flow and freshwater inputs, which results in the great variability of the physico-chemical conditions along with waters mixing and seasonal regimes. These ecosystems are strongly influenced by human activities, including urban expansions, and agricultural and industrial activities leading to release of several types of contaminants such as metals, organometal, persistent organic pollutants, personal care products and pharmaceuticals. The aim of this work was to evaluate the seasonal occurrence of several classes of contaminants in the mesotidal Adour estuary, a moderated contaminated ecosystem. Surface water (~1 m depth) were sampled at low tide in 12 stations distributed along the Adour estuary during three campaigns covering contrasting hydrological situations (May and September 2017 and in February 2018). Metal concentrations of 17 elements were analysed by ICP-MS. Organomercury (MMHg) and organotin species (MBT, DBT, TBT) concentration were analysed by GC-ICP-MS. The levels of 16 polycyclic aromatic hydrocarbons (PAHs), 12 polychlorinated biphenyls (PCBs), 18 organochlorine pesticides, 10 musks and 6 sunscreens were analysed by GC-MS. Various types of 45 pharmaceutical residues (antibiotics, analgesics, hormones, psychiatric drug, ...) were analysed by LC-MS-MS. Determined contaminants patterns and their association not only with estuarine systems fluctuation (flow rates, temperature and salinity) but also with anthropogenic pressure will be presented and discussed in order to identify major chemical threat occurring in such estuarine system.

Key words: micropolluants, esturay, multicontaminants, seasonal variation

S3: Biodiversity and Ecosystems functioning

Biology, distribution, acoustic abundance and vertical diel of *Maurolicus muelleri* (Gmelin, 1789) in the Bay of Biscay

Presentation: Oral

Speaker: Alvarez Paula

Alvarez Paula¹, Sobradillo Beatriz¹, Aldanondo Naroa¹, Boyra Guillermo¹, Iñarra Bruno¹,
Martinez Udane¹

1 - Centro Tecnológico Pesquero y Alimentario (Spain)

Contact: palvarez@azti.es

Abstract

With the aim of evaluating the feasibility of commercial exploitation of mesopelagic fish species in the Bay of Biscay, a study on the acoustic abundance and biology of mesopelagic fish was carried in 2015 and 2016. Our results revealed that sound-scattered layers of mesopelagic fish were found over the continental shelf and slope off in the Bay of Biscay in autumn. *Maurolicus muelleri* was a major component of the mesopelagic fish assemblage, being found mostly between the surface to 300 m depth. In autumn, the *M. muelleri* population consisted of mature individuals displaying diel vertical migration (DVM). During the night, sound scattering layer assigned to *M. muelleri* stayed between 50-100 m depth and at 100-180 m during the daytime. Growth of *M. muelleri* was described by power equation and the age was determined on the basis of daily and annual increments readings. Likewise, annual rings indicated that individuals smaller than 4.5 cm belonged to group 0. Based on macroscopic gonadal maturity stages, our results revealed the high presence of individuals in "late ripening" stage, which suggests an early start of the spawning period. The fat content of *M. muelleri* ranged from 20-80 mg/g, with a high content of essential fatty acids of the Omega-3 group, mainly EPA and DHA. The total biomass of *Maurolicus* was of the order of 100-200 x 10³ tons. Judging from the length distribution, recruitment seems to be lower in 2015, where the presence of juveniles decreased by 3%. Although our results demonstrated that pearlside is a good candidate for future commercial exploitation, future work is needed to explore their consequences for the ecosystem.

Key words: mesopelagic, *M. muelleri*, distribution, diel vertical migration, growth, age, reproduction, biomass estimates.

Disentangling the cooccurrence patterns of marine top predators and prey in the Bay of Biscay: environment versus species interactions

Presentation: Oral

Speaker: Astarloa Amaia

Astarloa Amaia¹, Louzao Maite¹, Martinez Udane¹, Rubio Anna¹, Boyra Guillermo¹, Chust Guillem¹

1 - AZTI-Tecnalia-Marine Research (Spain)

Contact: aastarloa@azti.es

Abstract

During the last decades, several fish stocks have been seriously reduced whilst others have shifted poleward following the displacement of their thermal habitat. Although top predators have been proved to dampen the fluctuations of their prey populations by foraging opportunistically, their life-history traits and their position at the top of the food web make them vulnerable to changes. Disentangling the species' role in community assemblage is therefore necessary for conservation and management purposes. Within this context, the present study aimed at exploring the structure and the key interactions of the pelagic community of the Bay of Biscay by analysing the cooccurrence patterns of top predators (seabirds and cetaceans) and their prey (mainly pelagic fishes) obtained from JUVENA surveys during 2013-2016 period. To undertake this purpose, a probabilistic model was used to detect positive and negative associations among pairwise species. To determine the relative contribution of environmental conditions and species interactions (e.g. predators-prey interactions) to these associations, two statistical approaches were used: a null model based on the ecological niche concept and a canonical correspondence analysis. Results showed that interspecific associations of the overall community were mainly driven by environmental factors, in contrast to the low contribution made by the biotic factors. In addition, most of the associations detected were positive (65%), which indicated pair-wise cooccurrence due to sharing habitat and environmental conditions, according to the null ecological model. Based on a literature survey, these positive associations would also indicate predation in predator-prey species (gannet-mackerel), or mutualism (fin whale-shearwaters) or kleptoparasitism (skuasgulls) in species at the same trophic level. Increasing number of studies recognise the importance of positive associations in structuring communities; their high dependence on abiotic factors found in this study, however, make them vulnerable to fluctuations in the environment and calls for attention regarding climate change effects over them.

Key words: predator-prey assembly, seabirds, cetaceans, pelagic fish, cooccurrence patterns, biotic interactions, environmental drivers, Bay of Biscay

Otolith microchemistry distinguishes natal sources of returning Atlantic salmon at inter-basin, basin, river and hatchery spatial scales in the south-western Europe

Presentation: Oral

Speaker: Bareille Gilles

Bareille Gilles¹, Holub Alexandre², Tabouret H el ene¹, Marty Samuel¹, P echeyran Christophe¹, Nachon David³, Caballero Pablo⁴, Cobo Fernando³

1 - Institut des sciences analytiques et de physico-chimie pour L'Environnement et les mat eriaux (France)

2 - Ecologie Comportementale et Biologie des Populations de Poissons (France)

3 - University of Santiago de Compostela (Spain)

4 - Pontevedra Nature Conservation Service (Spain)

Contact: gilles.bareille@univ-pau.fr

Abstract

Various actions (habitat improvement, stocking, fishing regulation) were undertaken in Europe to mitigate declines in wild fish populations in the earl '80s. The Adour basin holds one of the greatest populations of Atlantic salmon (*Salmo salar*) in southern Europe, which consists of natural self-sustaining and stocked mixed population largely exploited by commercial and recreational fisheries. Nearby basins consist of smaller populations, mainly supported by stock enhancement programs (Gironde, Bidasoa) or very small self-sustaining population (Nivelle). Understanding population dynamics (i.e. philopatry, dispersal and success of stock enhancement) in this region at different temporal (short and long-term) and spatial (through regional to local) scales are greatly needed. To achieve this goal information on natal origin and connectivity is fundamental, with otolith microchemistry one of the most useful tools to address these questions. This study was conducted to investigate the spatial scale at which otoliths can be used to distinguish between putative origins of Atlantic salmon in the Bay of Biscay (broad to fine scale: watershed to tributary scales). Otoliths and water samples were collected over thirteen rivers inhabited by the Atlantic salmon from the Adour basin, as well as from several rivers throughout the Bay of Biscay. LA-ICP-MS and multicollector LA-ICP-MS we used to quantify Sr:Ca, Ba:Ca, Mn:Ca, Mg:Ca and ⁸⁷Sr:⁸⁶Sr ratios from the central zone to the zone corresponding with the freshwater residence period. Using a discriminant analysis with a random forest approach on the spatial baseline produced, adult salmon originating from the Adour were successfully discriminated (93% of correct classification) from other basins or group of basins including hatcheries. We thus apply this model to determine the rate of straying at different scales, the contribution of specific rivers in this basin and to distinguish naturally spawned from hatchery breed fish.

Key words: atlantic salmon, otolith microchemistry, natal origin, straying, homing, Bay of Biscaye

Assessing macroorganisms biodiversity in the Bay of Biscay through environmental DNA

Presentation: Oral

Speaker: Bouquieaux Marie-Catherine

Bouquieaux Marie-Catherine¹, Rey Anaïs¹, Mendibil Iñaki¹, Santos Mokoroa Maria¹, Cotano Unai¹, Irigoien Xabier¹, Rodriguez-Ezpeleta Naiara¹

1 - AZTI-Tecnalia (Spain)

Contact: mcbouquieaux@gmail.com

Abstract

Due to global change, marine biodiversity is declining around the world, which calls for measures to ensure a sustainable use of the marine environment and its resources. Development of such measures requires biodiversity surveys, which are generally invasive and costly. Recent improvements in DNA sequencing have led to the discovery of new genetic tools for marine monitoring. Among the most promising ones is environmental DNA (eDNA), which has the potential of providing information about the macroorganisms inhabiting a certain environment without the need of catching or seeing them. In this study, we have assessed the potential of eDNA to ease marine macroorganism biodiversity surveys. For that aim, we have amplified and sequenced a region of the 12S ribosomal RNA gene and of the cytochrome oxidase subunit 1 (COI) from the eDNA extracted from 48 water samples collected across the Bay of Biscay, including different depths. The taxonomic assignment of the several million sequencing reads obtained allowed the detection of fish, sharks and bird species expected in the area. The comparison of the biodiversity estimated through eDNA and other methods such as fishing and sightings in the same locations highlighted the potential of the eDNA based marine biodiversity surveys while demanding additional studies to better understand the advantages and limitations of this method.

Key words: environmental dna, fish, sharks, macroorganisms, metabarcoding, biodiversity

Remote sensing in small estuaries. Comparison of images and classification approaches for mapping estuarine vegetation

Presentation: Oral

Speaker: Calleja Apéstegui Felipe

Calleja Apéstegui Felipe^{1,2}, Ondiviela Eizaguirre Bárbara¹, Juanes De La Peña José Antonio¹

1 - Environmental Hydraulics Institute “IH Cantabria”, University of Cantabria (Spain)

2 - Unidad de Ingeniería Marítima, de Ríos y de Estuarios (iMARES) Universidad de Costa Rica (Costa Rica)

Contact: felipe.callejaapestegui@ucr.ac.cr

Abstract

Remote sensing for mapping estuarine vegetation has been used worldwide with varying methods based on the satellite image and classification approach (i.e. pixel based, object based). These elements affect the quality of the identification, especially in small estuaries where the surfaces' reflectance can be similar, and the image's spatial resolution can be comparable to the vegetation patches.

The objective of this work is to analyze the effect of the satellite image and classification approach in the identification of estuarine vegetation, to determine which combination is more suitable for small estuaries. The study site is the Oyambre estuary (c. 100 ha, Bay of Biscay), and the study species is *Baccharis halimifolia*, an alien species that represents an environmental threat for the European estuaries.

Two satellite images (Sentinel 2A and Landsat 8) were tested, along with three classification approaches: pixel-based, object-based, and a two-step method that combines segmenting the image, a primary object oriented classification of general categories, and a secondary pixel level classification in the areas where it's more likely to find the species. Classifications were made with a Support Vector Machines classifier. Open source software (Orfeo toolbox, QGIS, Python 3.6) was used for all calculations.

Independently of the approach, the results using the Sentinel image are more accurate than the ones made with the Landsat images for specific classes. Nevertheless, the difference between images' results using the pixel-based or the two-step approach are relatively low. This shows that despite its lower resolution, Landsat can be a useful tool for vegetation mapping in small estuaries when the correct approach is used.

The pixel-based classification had the highest accuracy for identifying *B. halimifolia* in both images, followed by the two-step classification. This approach could benefit management projects that require identification at a species level using free mid-spatial resolution images.

Key words: remote sensing, *baccharis halimifolia*, estuaries, classification approach

Long-term trends of zooplankton and sea warming across the North Atlantic and Mediterranean Sea

Presentation: Oral

Speaker: Chust Guillem

Villarino Ernesto¹, Irigoien Xabier¹, Villate Fernando², Iriarte Arantza², Uriarte Ibon², Zervoudaki Soultana³, Carstensen Jacob⁴, O'brien Todd⁵, Chust Guillem¹

1 - AZTI-Tecnalia (Spain)

2 - Department of Plant Biology and Ecology, University of the Basque Country (Spain)

3 - Hellenic Center for Marine Research (Greece)

4 - Department of Bioscience, Aarhus University (Denmark)

5 - Marine Ecosystems Division (United States)

Contact: gchust@azti.es

Abstract

The rapid warming experienced in the North East Atlantic during the last decades has affected distributional patterns of marine communities. Here, we examine the correspondence between sea surface temperature warming and long-term trends of zooplankton abundance (1980-2012) at three locations in the North Atlantic (NE Bay of Biscay and the Kattegat Sea) and in the Mediterranean Sea (Gulf of Saronikos). We analyzed the response of each species to temperature changes to test the hypothesis of thermal niche tracking using time series seasonal decomposition and habitat modelling. Further, we explored zooplankton community changes through time based upon \hat{H}^2 -diversity metrics, and their relation to climatic conditions. Results at both hierarchies reveal that the zooplankton community composition is changing over time across the North Atlantic and Mediterranean Sea: At species level, in 46% of the cases, the species abundance follows the expected trend by thermal niche (Kappa p-value 0.05), which is higher than what is expected by chance (41%). At community level, \hat{H}^2 -diversity changes were related to niche descriptors, mostly sea temperature. Our findings suggest a fundamental role of temperature in structuring cross-taxon zooplankton biodiversity, and reveal that changes in ocean temperature, may ultimately rearrange the global distribution of life in coastal ecosystems.

Key words: \hat{H}^2 , diversity, sea warming, zooplankton, time series, climate change

Environmental factors controlling growth of seagrass meadows of *Zostera noltei* in a context of drastic decline (Arcachon Bay, France)

Presentation: Oral

Speaker: Cognat Mathis

Cognat Mathis¹, Ganthy Florian², Auby Isabelle², Rigouin Loic², Barraquand Frédéric³,
Sottolichio Aldo¹

1 - Université Bordeaux (France)

2 - Ifremer - Laboratoire Environnement Ressources d'Arcachon (France)

3 - Chaire d'Ecologie Théorique et Intégrative, LabEx COTE (France)

Contact: mathis.cognat@u-bordeaux.fr

Abstract

The relative impact of light, depth, hydrology, hydrodynamics, sediment, nutrients on growth of the seagrass *Zostera noltei* was investigated in Arcachon Bay, where the extent of seagrass beds has dramatically decreased for 20 years. A comprehensive multi-parameter survey of 9 stations distributed all over the bay was conducted over one year. Light and temperature were recorded at high frequency while seagrass and bed sediments were sampled monthly to determine their respective characteristics. A three-parameter logistic growth model was implemented and used to unravel the relative contributions of environmental factors on seagrass growth. The present study highlights that additionally to the predominance of light reaching plants, the hydrological and hydrodynamics parameters are the most important drivers for *Z. noltei* growth at the scale of the Bay. Locally, other factors such as macroalgae mats or micro-topography (such as presence of tidal pools) may also significantly influence seagrass growth. The statistical model also demonstrates that the different sites are controlled by different factors. Finally, as the model is not able to predict biomass accurately for sites that received very little light, and present seagrasses with higher chlorophyll content and shoot heights, we suspect that adaptation to low light condition was at play. In the present context of worldwide decline of seagrass beds, this study is at our knowledge, one of the first where such of variety of factors are simultaneously taken into account to unravel the various drivers of seagrass growth.

Key words: seagrass, growth, environmental forcing, decline, statistical model, *Zostera noltei*, Arcachon bay

Different trophic functioning of fish assemblages in French marine subregions

Presentation: Oral

Speaker: Cresson Pierre

Cresson Pierre¹, Bănaru Daniela², Briand Marine², Chouvelon Tiphaine³, Mauffret Aourel⁴, Bustamante Paco⁵, Mialet Benoit⁵, Spitz Jérôme⁶, Wessel Nathalie⁷, Harmelin-Vivien Mireille²

1 - Ifremer, Laboratoire Ressources Halieutiques Manche Mer du Nord (France)

2 - Institut méditerranéen d'océanologie (France)

3 - Ifremer, Laboratoire Biogéochimie des contaminants métalliques (France)

4 - Ifremer, Unité Biogéochimie et Ecotoxicologie (France)

5 - Littoral ENvironnement et Sociétés [La Rochelle] (France)

6 - Observatoire Pelagis (France)

7 - Ifremer ODE-VIGIES (France)

Contact: pierre.cresson@ifremer.fr

Abstract

Trophic interactions shape ecosystem organization, fluxes of matter, energy transfers, and ultimately control ecosystemic services. Through the optimization of French ecosystemic surveys for the Marine Strategy Framework Directive (MSFD) monitoring program, several fish species were collected in the Bay of Biscay (BoB) and the Eastern English Channel (EEC) in the NE Atlantic, and the Gulf of Lions (GoL) in the NW Mediterranean. Three indices of food webs structure and functioning were produced: the relative contributions of benthic and pelagic organic matter (OM) as main trophic sources sustaining food webs, the trophic level and the energy density of species. Biomass data estimated from the surveys were also included to weight the relative importance of each species among the fish assemblage. Oligotrophy and depth were identified as crucial factors originating differences in the trophic indices considered. In the Mediterranean, oligotrophy explains the low $\delta^{15}\text{N}$ values, the low trophic levels, the predominant contribution of pelagic OM and also the lower energetic contents, at both the assemblage and species levels. Contrarily, the shallowness of the EEC likely allows a strong coupling between benthic and pelagic compartments, resulting in a higher contribution of benthic production sustaining EEC food webs. The pattern was intermediate in the BoB. The predominance of pelagic species, such as anchovy or sardine, drove the importance of pelagic OM sustaining food webs, although the integration of benthic sources is not negligible. Average trophic level was indeed low, even if the range of values was large, as a result of the presence of species at high (>4) trophic levels. The higher quantity or quality of food sources may originate the higher energy densities observed in most species. The subregional specificities of trophic network structures and the associated OM fluxes should be taken into account in future management issues, notably linked with contaminant transfer.

Key words: msfd, trophic structure, fish assemblages, ecosystemic surveys, stable isotopes, energy density

Larval dispersal and connectivity of reef-forming *Sabellaria alveolata* along the French Atlantic coast

Presentation: Oral

Speaker: David Carmen

David Carmen¹, Marzloff Martin¹, Cugier Philippe¹, Dubois Stanislas¹

1 - IFREMER- Dynamiques de l'Environnement Côtier (France)

Contact: carmen.david@ifremer.fr

Abstract

The gregarious polychaete *Sabellaria alveolata* forms reef-structures on tidal flats, which provide coastal protection and habitat for a wide range of species. A good ecological and functional status of the reefs depends on the recolonization by larval supply, as larvae do have key importance in habitat resilience and recovery following reef disturbances. Understanding larval dispersal and connectivity between reefs represents thus a major challenge for the conservation management of these biogenic constructions. The European distribution of this species expands from Morocco to Scotland, with the most widespread reefs on the French Atlantic coast. We use the hydrodynamic model MARS3D to simulate larval dispersal under realistic hydro-climatic conditions and generate connectivity matrices (larval exchange rates) between main reef areas on the French Atlantic coast. Moreover, we quantify the sensitivity of connectivity patterns to inter-annual changes in environmental conditions (e.g. river outflow, wind regime) and to key features in larval ecology (e.g. release period, planktonic larval duration, swimming behaviour). To assess the realism of simulations, we confront estimated connectivity patterns against present and past occurrence of the species on the Atlantic French coast, based on data mining and expert knowledge. Overall, our simulations provide insights on key drivers affecting population connectivity, such as environmental factors responsible for inter-annual variability in larval dispersal, as well as on specific life-history traits, such as larval vertical behaviour, responsible for dispersal distance and settlement success. Finally, this study aims at targeting crucial geographic area for the development and persistence of this foundation species over its latitudinal distribution.

Key words: larval dispersal, population connectivity, biogenic reefs, coastal protection

Characterization of *Cystoseira baccata* rocky subtidal stands along the French Basque coast (Bay of Biscay)

Presentation: Oral

Speaker: de Casamajor Marie-Noëlle

De Casamajor Marie-Noëlle¹, Lalanne Yann², Huguenin Laura^{3,4}, Derrien-Courtel Sandrine⁵, Gorostiaga José Maria⁴, Le Gal Aodren⁵, Quintano Endika⁴, Lissardy Muriel¹

1 - Ifremer - Laboratoire Environnement Ressources Arcachon/Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montaury) (France)

3 - Institut pluridisciplinaire de recherche sur l'environnement et les matériaux (France)

4 - University of the Basque Country [Bizkaia] (Spain)

5 - Muséum National d'Histoire Naturelle (France)

Contact: mndecasa@ifremer.fr

Abstract

The Basque coast is located at the Southernmost Eastern Bay of Biscay in an area characterized by warmer surface waters in summer zone. Thus, typical benthic habitat-forming species common in the Gulf of Bizkaia (kelps and furoids) are scarce or rare at the Basque coast. Locally, the only large brown seaweed that forms distinct subtidal beds is *Cystoseira baccata*. This engineering species was selected since 2008 as a biological quality element to evaluate the ecological status of the water mass "Basque coast" in the context of the implementation of the Water Frame Directive (WFD) in French coastal open waters. As part of the implementation of the Marine Strategy Framework Directive (MSFD) and given the need to better understand the functional character of coastal ecosystems, a strengthening of measured metrics was initiated in 2014 and repeated in 2017. It involves several population parameters such as density, thallus length and study of the epibioses that develop on this macroalgae. The results obtained at both campaigns are analyzed and discussed highlighting the importance of data at the population level to characterize reference conditions.

Key words: epiphytes, reference conditions, population parameters, bioindicator, habitat, forming algae, canopy

Wave conditions effects in coastal areas on benthic communities structure, distribution and dynamic along the French Basque Coast

Presentation: Oral

Speaker: Foulquier Clémence

Foulquier Clémence¹, Rihouey Didier¹, D'Amico Frank²

1 - CASAGEC INGENIERIE (France)

2 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

Contact: foulquier@casagec.fr

Abstract

The Basque country is exposed to the strongest swell of the French metropolitan coast. To assess how these wave conditions impact soft-bottom macrozoobenthic communities, three subtidal sites subjected to estuarine inputs and exposed to different exposure levels have been seasonally investigated during 2 years: Anglet coast, Saint Jean de Luz Bay, Hendaye Bay. A total of 187 taxa were recorded. Grain size and organic matter analysis were determined on each station (3 stations per site). Wave climate has been determined for each station by propagating wave parameters data base HOMERE with an operational model developed within the European project LOREA.

The wave conditions directly or indirectly affect the presence and abundance of benthic species. Indeed, Cluster Analysis and Indicator species analysis identified the main station groups corresponding to benthic faunal assemblages and their characteristic species. Stations are divided according to wave exposure. Anglet coast appeared as the highest exposed zone with similar wave exposure levels between the three stations. In less exposed sites, the station the more exposed of the Saint Jean de Luz Bay came close to the wave exposure level of Hendaye Bay. Multivariate analyses showed that the variations in macrofaunal distribution can best be explained by a combination of 4 environmental variables (2 sediment grain sizes, organic matter and mean wave agitation). The relationship between this environmental variability and species traits have also been considered. Finally, the results provide baseline knowledge for future ecosystem and resource management in this place where soft-bottom macrozoobenthic communities are still poorly described.

Key words: wave conditions, benthic communities, soft bottom, french basque country, anglet coast, saint jean de luz bay, hendaye bay

Systematic Conservation Planning based on ecosystem characteristics and services provided: the Basque Country (SE Bay of Biscay) experience

Presentation: Oral

Speaker: Galparsoro Ibon

Galparsoro Ibon¹, Pinarbasi Kemal¹

1 - AZTI-Tecnalia (Spain)

Contact: igalparsoro@azti.es

Abstract

The increase of the pressures exerted worldwide to marine ecosystems and the originated impacts and degradation of marine systems claims the adoption of conservation measures. Among others, it is demonstrated the utility of Marine Protected Areas (MPAs), as an effective conservation measure. But, the adoption of such management measures should be in a way that minimizes the potential incompatibilities between the economic growth and the conservation. The aim of the research presented here was the identification of priority areas for conservation under diverse conservation targets scenarios, taking the Basque Country, as case study. A systematic conservation planning approach was implemented for identifying representative areas for protection based on different criteria and targets defining conservation scenarios. The biodiversity surrogate elements used were the distribution of priority habitats, the biological value of four ecosystem components (i.e. cetaceans, seabirds, macro-benthos and macroalgae), and the ecosystem services provided by benthic habitats. Besides, the artisanal fisheries activity was considered as the most relevant socio-economic activity in the area. Different conservation targets scenarios were runned and analysed. The results showed that the area identified to reach to conservation targets, represents 11.3 % of the total area of the case study and that this represent 17.8 % of the total fishing effort of artisanal fishermen in the whole case study. It was seen that the definition of the size and shape of the area to conserve minimized the negative impact to artisanal fishery. The assessment of trade-offs of reaching to conservation targets and potential loss of artisanal fishery, is of special interest for managers. The implementation of such kind of approaches could be considered as being of high relevance towards the ecosystem-based marine spatial planning.

Key words: marine protected area, conservation features, ecosystem based marine spatial planning, socioeconomic activities

Rocky intertidal communities' response to sewage discharges and associated micropollutants along the Basque coast (Southeastern Bay of Biscay)

Presentation: Oral

Speaker: Huguenin Laura

Huguenin Laura^{1,3}, Gorostiaga José Maria³, de Casamajor Marie-Noëlle⁴, Lalanne Yann², Quintano Endika³, Deborde Jonathan¹, Monperrus Mathilde¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montaury) (France)

3 - Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country UPV/EHU (Spain)

4 - Laboratoire Environnement Ressources Arcachon (FED 4155 MIRA) (France)

Contact: huguenin.laura@gmail.com

Abstract

In compliance with the EU Marine Strategy Framework Directive (MSFD), a good environmental status of the European marine waters has to be achieved by 2021. For this purpose, a monitoring program including biogeographical specificities of the southeastern part of the Bay of Biscay has to be implemented to understand and assess the ecological condition of this area. Furthermore, this Directive emphasized significant deficiencies on how biological indicators respond to each anthropogenic pressure, in particular to coastal wastewater treatment plant (WWTP) and untreated urban discharges. The aim of this project is to study the impact of WWTP outfalls on rocky intertidal benthic communities along the Basque coast. Five intertidal locations were studied from March to July 2017. Three of them were considered as "impacted" due to the presence of WWTP discharges. The two others were used as "control". To test the effect of these outfalls and to characterize the disturbance gradients, three sites at each location were sampled with 33 x 33 cm quadrats at varying distances from the outfall and at two levels of the midlittoral zone as described within the EU Water Framework Directive. In parallel, samples were collected from the effluents at each WWTP to analyze the concentration of priority and emerging pollutants such as metals, organometals, PAHs, PCBs, synthetic musks, Alkylphenols and other substances. The main organisms present at each location and sufficiently abundant (*Patella spp.*, *Enteromorpha spp.*, *Gelidium corneum*, *Mytilus spp.*, *Holothuria tubulosa* and Sponges) were also collected to do the same chemical analyses from the tissues. Bioindicator properties of the benthic species and assemblages are discussed to highlight their sensitivity to WWTP discharges.

Key words: Bay of Biscay, wastewater treatment plant discharges, benthic communities, micropollutants

Zooplankton indicators of water quality based on time series for estuaries on the southeastern Bay of Biscay

Presentation: Oral

Speaker: Iriarte Arantza

Villate Fernando¹, Uriarte Ibon¹, Iriarte Arantza¹, Escudero Raquel¹

1 - Department of Plant Biology and Ecology, University of the Basque Country (Spain)

Contact: arantza.iriarte@ehu.es

Abstract

The usefulness of zooplankton as indicator of estuarine pollution was assessed using zooplankton time-series for the period 1998-2011 obtained from different salinity zones of two estuaries of the Basque coast (Bilbao and Urdaibai). Dissolved oxygen (DO) was taken as pollution indicator and three levels of water quality were established based on DO levels. The response of the zooplankton community to different DO levels was analyzed using data pooled for all months of the annual cycle and for each season separately. Several zooplankton indicators were tested i.e. abundance, relative abundance, abundance ratios, diversity (Shannon-Wiener) and evenness (Pielou's). The relationship of zooplankton indicators with DO levels was assessed by redundancy analysis. An initial selection of zooplankton indicators was performed using discriminant analysis and the final selection was based on those indicators that showed statistically significant differences between the different levels of DO. The best indicators were the relative abundance of the copepods *Oithona* and *Acartia*, the *Oithona/Acartia* abundance ratio, copepod diversity and total zooplankton abundance. The use of summer data provided the best results. A tendency for a higher contribution of small sized mesozooplankton under more polluted conditions was observed. Thresholds of the selected zooplankton indicators that can be used to characterize the level of water quality (based on DO) were also suggested.

Key words: zooplankton, indicator, water quality, estuary

Co-occurrence of marine predators in the northern Iberian Peninsula inferred from spatial modelling

Presentation: Oral

Speaker: Louzao Maite

Louzao Maite¹, Valeiras Xulio², Nogueira Enrique³, Bode Antonio⁴, Vázquez Jose⁵, Murcia José Luis⁶, Saavedra Camilo⁴, Pierce Graham^{7,8}, Fernández Ruth⁴, Garcia-Baron Isabel¹, Santos M. Begoña⁴

1 - AZTI-Tecnalia (Spain)

2 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Málaga (Spain)

3 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Baleares. (Spain)

4 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Vigo, (Spain)

5 - Alnilam Research and Conservation Ltd, Madrid (Spain)

6 - Asociación de Naturalistas del Sureste (ANSE) Murcia (Spain)

7 - Oceanlab, University of Aberdeen, (United Kingdom)

8 - CESAM and Departamento de Biologia, Universidade de Aveiro, (Portugal)

Contact: maite.louzao@gmail.com

Abstract

There has been a remarkable development of niche models to help understand the ecological response of species to current rapid environmental changes. Here, we applied niche modelling to the predator community of the northern Iberian Peninsula to analyse the coexistence of different species considering their habitat preferences. The PELACUS multidisciplinary surveys are annually conducted in the study region for the assessment of pelagic fish stocks and mapping of oceanographic conditions, in addition to collecting marine mammal and seabird sightings since 2007. Using data collected concurrently from these surveys, we developed niche models for 14 marine predator species (3 cetaceans, 10 birds and 1 fish species) incorporating multi-trophic ecological descriptors (e.g., phytoplankton, zooplankton and small pelagic fish) alongside the more usual oceanographic variables (e.g., sea surface temperature, chlorophyll a). This approach provided a test of the common assertion that oceanographic variables are useful to characterise predator habitats because they act as a proxy for prey distribution. Niche models were developed pooling observations for the 2007-2013 period. Overall results highlighted that niche models were mainly driven by bathymetry ($28.5\% \pm 20$), sea surface temperature ($11.0\% \pm 18$) and variability in fish biomass ($9.9\% \pm 9.3$), followed by the spatial gradient of chlorophyll a ($7.9\% \pm 9.7$), zooplankton biomass ($7.0\% \pm 9.6$) and variability in phytoplankton biomass ($6.2\% \pm 9.4$). Thus, direct environmental variables (collected concurrently during the oceanographic surveys) were among the main contributing variables explaining the distribution of the species. Based on the variable contribution (%) for each predator species, we found niche segregation among four groups of predators. This made it possible to identify consistent community-level hotspot areas. The highest number of species was found in the western sector of the study area (Galicia), covering the whole continental shelf and shelf-break, along with small diversity spots scattered throughout the Cantabrian coast.

Key words: biodiversity hotspots, marine predators, species distribution model, oceanographic surveys, northern iberian shelf

Small-scale spatial variations of fishing impact on food web structure

Presentation: Oral

Speaker: Preciado Izaskun

Preciado Izaskun¹, Arroyo Nina Larissa¹, González-Irusta José Manuel², López-López Lucia³,
Punzón Antonio¹, Muñoz Isabel¹, Serrano Alberto¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

2 - Universidade dos Azores (Portugal)

3 - Imperial College London (United Kingdom)

Contact: izaskun.preciado@ieo.es

Abstract

Bottom trawling represents one of the main anthropogenic pressures that impact soft-bottom habitats, directly affecting benthic and demersal communities and the structure of their food webs. Combining biological (scientific bottom trawl surveys) and anthropogenic pressure (Vessel Monitoring System, VMS) data, we analysed the impact of bottom trawling on community and food web structure at a local scale. Specifically, we used VMS continuous data, between 2007 and 2010, and established five Fishing Effort (FE) levels: very low, low, medium, high and very high. Then, we analysed changes in community indices (biomass, species richness and diversity) of the benthic-demersal assemblages across the five FE levels. Trophic indices (fullness index, trophic richness and diversity) were also estimated using diet data. Finally, using a spatial approach at a small scale, generalised additive models were used to analyse the direct impact on the mean trophic level of the benthic-demersal community. A significant decrease in community biomass with increasing fishing pressure was observed, seven out of the fifteen functional groups analysed showing lower biomass levels in the most highly fished areas. Species richness was also significantly affected by bottom-trawling, both at community and trophic level (trophic richness). The results of the generalised additive model also showed a negative relationship between fishing effort and the mean TL of benthic and demersal communities. Despite the apparent reduction in fishing effort observed in the study area during the last decade, our results demonstrate the heterogeneity of this impact at small scales and the strong local influence of this anthropogenic pressure on demersal food webs. Our conclusions highlight the importance of analysing the effect of fishing on trophic structure at smaller scales and its consequences for management purposes.

Key words: mean trophic level, food webs, fishing effort, ecological indicators, bottom trawling, demersal assemblages, benthic, anthropogenic pressure, vessel monitoring system

Are intertidal macroalgae modified along the Bay of Biscay in less than a decade?

Presentation: Oral

Speaker: Ramos Elvira

Ramos Elvira¹, F. De La Hoz Camino¹, Guinda Xabier¹, Puente Araceli¹, Juanes José Antonio¹

1 - Environmental Hydraulics Institute, University of Cantabria (Spain)

Contact: ramose@unican.es

Abstract

The distribution of macroalgae species along the Bay of Biscay is in a period of change, in which some species have decreased their cover and others have even disappeared. These shifts are probably the response to the modification of meteo-oceanographic factors that determine species distribution, caused by climate change. The aim of this study is to analyze the evolution of macroalgae species along the N and NW Iberian Peninsula within a decade. A standardized sampling methodology was carried out in 21 sites along the N and NW Iberian Peninsula during the low spring tides in two different years: 2011 and 2017. Intertidal macroalgae were analyzed in each of six quadrats of 50 x 50 cm for two or three transects per site, according to a stratified sampling procedure. Algae were identified to the species level in situ and the taxa cover was obtained by photographic analysis. This combined technique provides an objective cover estimation that allows the comparison between the two time periods. In order to test the differences in macroalgae species several statistical analysis were carried out. Besides, these differences are related with meteo-oceanographic factors. This valuable information obtained in this study is a key element to evaluate macroalgae species shifts in less than a decade. The results may be also powerful to support climate change effect on the coast of the Bay of Biscay.

Key words: macroalgae, species distribution, climate change, intertidal organisms shifts

Fine profile of the Mediterranean stratified and mixed water column revealed by metagenomic genomic assembly and recruitment

Presentation: Oral

Speaker: Rodriguez-Valera Francisco

Rodriguez-Valera Francisco¹, Haro-Moreno Jose M.¹, López-Pérez Mario¹

1 - Universidad Miguel Hernández [Elche] (Spain)

Contact: frvalera@umh.es

Abstract

The photic zone of aquatic habitats is subjected to several strong gradients of environmental parameters. In order to analyse temporal and depth variations in the marine microbiome we sampled every 15m depth at a single point of an off-shore Mediterranean site during a period of strong stratification and also the mixed photic water column during winter. We have used metagenome recruitment as an alternative approach to detect specific metagenome assembled genomes (94 new genomes) and some selected previously described genomes to assess the distribution at a fine resolution level (ecotypes) of marine microbes. Results showed major shifts in the community structure and, particularly at the level of fine variation, where most microbes had a distribution covering only a ca. 30m thick layer of seawater. These results were confirmed by studying a single gene (rhodopsin) for which we found also narrow depth distributions. Furthermore, this study allowed to define a comprehensive assessment of seasonal changes in bacterial diversity including particular bacterial clades impacted by the strong winter convection providing insights into the ecological factors affecting the success of lineages and the potential metabolism encoded in the genomes.

Key words: chlorophyll maximum, deep, metagenomics, genomics, photic zone

Habitats characterization of circalittoral rocky bottoms of the Avilés Canyon System (Cantabrian sea)

Presentation: Oral

Speaker: Sánchez Francisco

Sánchez Francisco¹, Rodríguez Basalo Augusto¹, Gómez-Ballesteros María¹, Cristobo Javier¹, Parra Santiago¹, Prado Elena¹, Lourido Antia¹, Patrocinio Teodoro¹, Ríos Pilar¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: francisco.sanchez@ieo.es

Abstract

The area of the Cantabrian sea continental shelf located in the headwaters of the Avilés Canyon System (ACS) is characterized by rocky outcrops. This is mainly due to the sedimentary transport mechanisms associated with the ACS oceanographic dynamics. This area is currently declared as Site of Community Importance (SCI) in the context of the Natura 2000 network. In this area operates some artisanal fisheries so that it is compulsory to know the vulnerable habitats spatial distribution in order to identify potential conflicts of use. The LIFE+ INDEMARES and SponGES projects took place a series of multidisciplinary surveys in the area using different samplers for both sedimentary and rocky grounds. In this study, we have identified, characterized and mapped the different habitats and the communities that occupy them. The study of the main environmental variables that explain the settlement of sessile organisms was performed using the Benthic Terrain Modeler tool, implemented in a GIS software, and using derivative variables from the bathymetry (depth, slope, rugosity, BPI and aspect) and backscatter, together with the geomorphological interpretation. The sedimentary habitats surrounding the bedrock are characterizing at the biological level studying infaunal communities abundance in relation to the granulometry and organic matter content. For the study of the communities of the rocky habitats we have been completed visual transects using a photogrammetric sled and stations accomplished with a rocky dredge which has allowed the estimation of the spatial distribution and density of the different species. The most frequent species are encrusting sponges, brachiopods or erect forms like *Phakellia ventilabrum*, *Desmacion fruticosum*, *Dendrophyllia cornigera* and the echinoids *Echinus esculentus*, *E. melo*, *Ophiotrix fragilis* and *Leptometra celtica*.

Key words: habitat suitability models, rocky bottoms, benthic communities, circalittoral habitats, biodiversity, ecosystem functioning

Deep water fish ontogenic changes in habitat preferences in several NE Atlantic ecosystems

Presentation: Oral

Speaker: Serrano Alberto

Serrano Alberto¹, Punzón Antonio¹, Sánchez Francisco¹, Blanco Marián¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: alberto.serrano@ieo.es

Abstract

Seamounts, caps, banks and canyons have been described as essential habitat for several fish species. In this paper, ontogenic changes in habitat preferences of fish are analyzed in different ecosystems: Le Danois Bank, Galicia Bank, Avilés Canyon and the northern Spanish shelf break and upper slope. Data were obtained from 15 multidisciplinary surveys carried out in 2003, 2004, 2008, 2009, 2010 and 2011. Fish species matrix was reduced only to those species with biomass higher than 1% in one of the ecosystems. These species have been separated in 10 cm size classes. To study the combined effect of environmental variables on fish assemblages, a Canonical Correspondence Analysis (CCA) was performed. Variables used in the analysis were depth, near-bottom temperature and salinity, sedimentary characteristics (weight percentage of gravel and coarse sands, medium and fine sands, silt, and weight percentage of organic matter), and biogenic complexity (as biomass of large sessile species). Most of fish species follow a bigger-deeper strategy. When they are juveniles live in shallower depths and when they grow up, move to deeper waters, mainly in canyons and seamounts. Most of these species are eurybathyal. Other species inhabit only on the shelf. They are slope stenobathyal species. Our results highlight the importance of canyons, seamounts and banks are essential fish habitats, offering nursery areas and shelter for reproducers.

Key words: deep sea, size structure, habitat complexity, seamounts, canyons, upper slope

***Grandidierella japonica* along the French Basque Coast: preliminary assessment of local establishment and possible impacts on estuarine systems**

Presentation: Poster

Speaker: Arraud Alison

Arraud Alison¹, Foulquier Clémence², D'Amico Frank³

1 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

2 - CASAGEC INGENIERIE (France)

3 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

Contact: alison.arraud@gmail.com

Abstract

Grandidierella japonica Stephensen, 1938 is an Aorid amphipod species native to the Japan Sea. A total of 45 soft-bottom stations were sampled on the Adour, Nivelle and Bidassoa estuarine systems and their opening, in a replicate way, four seasons per year during two years (from August 2014 to June 2016) in the Nivelle and Bidassoa estuaries and three years (from August 2014 to June 2017) in Adour estuary. The non-native species *G.japonica* was reported for the first time along the French Basque Country in 2015. Specimens of this species were collected only during six field campaigns and on eight stations: four located in the Nivelle estuary, one in the Figuiet Bay and three in the Adour estuary. If the invasion success of *G.japonica* is well documented, however, factors of its significant range expansion are still poorly known. Traditional statistical models that ignore autocorrelation and spatial hierarchies can result in misidentification of important ecological covariates. Here, we aim at demonstrating the utility of the bayesian hierarchical modeling framework for testing hypotheses about the importance of abiotic factors at different spatial scales for shaping *G.japonica* distribution and abundance, then to verify its impacts on these estuarine communities.

Key words: french basque country, adour estuary, nivelle estuary, figuiet bay, invasive species, amphipod, *Grandidierella japonica*, distribution, impact, hierarchical bayesian framework

Multi-isotopic analysis of baleens from Mediterranean Sea and Atlantic Ocean fin whales: focus on nitrogen and mercury isotopes as biomonitors of dietary, contaminants and movement

Presentation: Poster

Speaker: Bentaleb Ilham

Bentaleb Ilham¹, Amouroux David², Speller Camilla³, Guglielmo Letterio⁴, Lynda Boukhelif⁵, Sylvain Bérail², François Fourel⁶

1 - Université de Montpellier (France)

2 - CNRS/ UNIV PAU & PAYS ADOUR, Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux, UMR5254, Pau, (France)

3 - BioArCh, Environment Building, University of York, Heslington (United Kingdom)

4 - Dip. Scienze Biologiche e Ambientali, Università di Messina (Italy)

5 - L.R.S.E (Laboratoire du Réseau de Surveillance Environnementale) Université d'Oran1, (Algérie)

6 - UMR CNRS 5023 LEHNA, Université Claude Bernard, Lyon (France)

Contact: ilham.bentaleb@umontpellier.fr

Abstract

Investigating top predators foraging strategies within an ecosystem is an important step towards understanding the functioning of the entire ecological community, on both spatial and temporal scales. Fin whales (FW; *Balaenoptera physalus*) are an emblematic globally distributed species, listed by the IUCN as "Endangered" worldwide and "Vulnerable" in the Mediterranean Sea. In this study we will assess the FW ecology (feeding strategy and movement between Mediterranean and Atlantic Ocean) by using isotopic and genetic markers. We apply a multi-isotopic approach (ie. N,Hg) to modern baleen plates (BP) of FWs stranded in the Mediterranean and Atlantic coasts over the last 30 years and their potential prey (Euphausiids). We hypothesize that the different isotopic markers differ between the Atlantic and Mediterranean waters and that the elements are transferred to the top predators through the trophic chain with constant isotopic fractionation. If this hypothesis is true Atlantic and Mediterranean individuals should have distinct isotopic values. We demonstrate the utility of checking the genetic identity of the stranded individuals and of tracking multiple isotopes within BP (composed primarily of keratin, synthesized throughout the life of the animal, and metabolically inert following formation). We measured the Hg levels in BP tissues, and we show that FW mean Hg concentrations are ranging from 0.03 to 5.96 mg/Kg and are mainly accumulated as MeHg in organic solid tissue. Also, Hg isotopes have been successfully performed along BP and demonstrating proof-of-concept for this "non-traditional" isotopic system in further studies. The highest Hg concentration, lowest $\delta^{15}\text{N}$ and $\delta^{202}\text{Hg}$ are found in the Mediterranean individuals. We discuss that in order to assess the trophic interactions in the marine environment and animal movement at a regional scale it is important to apply a multi-isotopic approach. C and N isotopes alone are not sufficient to discriminate the Mediterranean and Atlantic individuals.

Key words: stable isotopes (hgcnh), *Balaenoptera physalus*, trophic ecology, contaminants, migration, mediterranean sea, atlantic ocean

Climate change impacts on top predators: first evidence of regime shifts in the south of the Bay of Biscay

Presentation: Poster

Speaker: Castège Iker

Castège Iker¹, Milon Emilie¹, D'Elbée Jean², Milpied Jean-Marc³, D'Amico Frank⁴

1 - Centre de la Mer de Biarritz (France)

2 - LAPHY (France)

3 - Météo France Station de Biarritz (France)

4 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

Contact: iker.castege@centredelamer.fr

Abstract

Regime shifts are characterized by sudden, substantial and temporally persistent changes in the state of an ecosystem. Evidence of past regime shifts are well documented in the Atlantic North East mainly in the northern part and on planktonic and fish communities. In this study, we examine the impact of climate changes on top predator populations in the south of the Bay of Biscay performing a multivariate oceanic and climatic index called SBC (South Biscay Climate Index). We used long-term data from a seabird and cetacean standardized monitoring based on line transects from ship between 1979 and 2014. Our first results show that boreal species (e.g. *Alca torda*, *Hydrobates pelagicus*, *Rissa tridactyla*) declined significantly in the study area whereas species with affinities to hotter waters increased. We also detected two synchronous regime shifts between our climatic index and some species. A first shift is identified in the 1980s for boreal species. A second period in early 2000s was detected for some meridional species (e.g. *Ichthyætus melanocephalus*, *Tursiops truncatus*). Our results are consistent with evidence of the 1980s regime shift observed in many studies marine regions of the North Hemisphere. Understanding the human pressures and the impacts of climate changes in the south of the Bay of Biscay is fundamental to ongoing species conservation in the context of MPAs management.

Key words: climatic index, regime shifts, seabirds, climate change, cetaceans, Bay of Biscay

Molecular confirmation of the presence of *Marphysa sanguinea* (Montagu, 1803) along the Atlantic coasts of France

Presentation: Poster

Speaker: Daffe Guillemine

Daffe Guillemine¹, Lavesque Nicolas², Grall Jacques³, Zanol Joana⁴, Gouillieux Benoit²,
Hutchings Pat⁵

1 - Observatoire aquitain des sciences de l'univers (France)

2 - Environnements et Paléoenvironnements Océaniques et Continentaux (France)

3 - Institut Universitaire de la Mer (France)

4 - Laboratório de Polychaeta (Brazil)

5 - Australian Museum (Australia)

Contact: guillemine.daffe@u-bordeaux.fr

Abstract

The common bait worm *Marphysa sanguinea* (Montagu, 1813), originally described from the south coast of Devon (UK), is the type species of the genus. This species has been widely reported from all around the world and has been considered as cosmopolitan until recently. This is partly because the original description was very brief and poorly illustrated, and also because mostly all species superficially look similar. In order to clarify the situation, *M. sanguinea* was redescribed and a neotype was designated by Hutchings and Karageorgo-poulos in 2003. In this study, authors suggest that records of this species from outside the type locality should be checked, and that many records have been misidentified as they may represent species new to science. Indeed, *Marphysa victori* Lavesque, Daffe, Bonifácio & Hutchings 2017 that was recently described from Arcachon Bay has always been confused with *M. sanguinea*. In order to compare *Marphysa* specimens from north-eastern Europe, fresh material was recently sampled from Plymouth Sound (Cornwall - UK) close to the type locality from which sequences of COI were successfully obtained, together with sequences from other material from western French coasts. Our results permit to confirm the presence of *M. sanguinea* in the English Channel (Roscoff) and in the Bay of Biscay (Bay of Brest and Arcachon Bay). At the latter sites only, specimens of *M. sanguinea* live inter-tidally in rocks which are easily split, suggesting high dependency of this genus to habitat typology. To conclude, we suggest that all records of *Marphysa* from northern Europe and from different habitats within a same ecosystem need to be carefully checked both with taxonomic and molecular tools. COI sequences obtained in this study will permit to figure out whether new specimens belong to *M. sanguinea* or if they may be undescribed species.

Key words: molecular, *Marphysa sanguinea*, coi, bait worms, polychaeta, taxonomy

Can we use trawled benthic invertebrates as a surrogate for estimating benthic production preyed by juvenile fish in nurseries?

Presentation: Poster

Speaker: Day Louise

Day Louise¹, Saulnier Erwan¹, Brind'amour Anik¹, Le Bris Hervé²

1 - Ecologie et Modèles pour l'Halieutique - Ifremer Nantes (France)

2 - Ecologie et Santé des Ecosystèmes - INRA Agrocampus Ouest Rennes (France)

Contact: louise.day@ifremer.fr

Abstract

Coastal and estuarine areas are essential for several exploited species to complete their life cycle. Hence, these habitats fulfil a nursery function with low predation, high density and high growth of juveniles. A remaining question concerns the role of the food limitation on the benthodemersal juveniles' production. Assessing the proportion of the resource preyed by juveniles can indicate the degree of food limitation. A recently developed bio-energetic direct approach uses grab data to estimate the benthic prey production available for juvenile fish. The Van Veen grab provides a good representation of the available prey for fish. However, grab analysis is highly time-consuming, limiting the number of samples and thus the sampling area. Trawl surveys also sample invertebrate species and are conducted periodically in France over a wide spatial coverage. The objective of the study is to test if trawled invertebrates could be used as a surrogate of grab invertebrates to estimate the benthic prey production. In this context, we analysed data from nursery surveys conducted along the Bay of Biscay coast and in the mouth of the Seine estuary using both grab and trawl data. We selected invertebrate organisms so that grab samples represent at best the prey community consumed by benthodemersal juvenile fish and trawl samples mirrored this prey selection. Mean biomass of invertebrates were then compared between trawl and grab at different spatial scales: the sampling station, the bathy-sedimentary strata and the nursery. Results underlined a significant relationship between the grab and the trawl samples at the strata scale, suggesting the possibility of using trawl data to assess food production available for fish. Time series analyses will be conducted to verify the temporal variability of benthic production in coastal nurseries.

Key words: coastal nurseries, prey community, fish juveniles, sampling, trawl, grab

Why not monitoring circalittoral reef habitat of the south of the Bay of Biscay with INDEX-COR approach?

Presentation: Poster

Speaker: de Casamajor Marie-Noëlle

De Casamajor Marie-Noëlle¹, Lalanne Yann², Sartoretto Stéphane³, Huguenin Laura^{4,5},
Mourguiart Bastien¹, Lissardy Muriel¹

1 - Laboratoire Environnement Ressources Arcachon/Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

3 - Laboratoire Environnement Ressources Provence-Azur-Corse (France)

4 - University of the Basque Country (Spain)

5 - Institut Pluridisciplinaire de Recherche sur L'Environnement et les Matériaux (France)

Contact: mndecasa@ifremer.fr

Abstract

The purpose of this work was to experiment a sampling protocol (INDEX-COR method) used to evaluate the conservation status of coralligenous habitat in Mediterranean Sea, in order to define an index for the circalittoral reef habitat of the southern Bay of Biscay. The first objective was to characterize benthic assemblages from survey on 4 sites in the Natura 2000 area named "Rocky Basque coast and offshore extension". In front of the complexity of this habitat and the gaps in knowledge about the local biodiversity, an analysis of the protocol was necessary to test its efficiency. In parallel, metrics optimization was necessary for the relevance of information provided and for apprehending a possible conservation status. In this context, the two main metrics used were the index of sensitivity (Organic Matter/Sedimentation) of the species observed and the observable taxonomic richness. The structural complexity metric used in INDEX-COR index has not yet been able to be apprehended locally considering the strong swells that are spreading in the southern Bay of Biscay. Indeed, these environmental constraints make it difficult the understanding of the upper layer on the rocky bottom. The ways of improvement are presented on the basis of results obtained to optimize relevance of the indicators and the knowledge on reef communities functioning of the southern Bay of Biscay.

Key words: benthic assemblages, basque coast, habitat, rocky shore, circalittoral, Bay of Biscay

Recent MSFD assessment for the commercial (D3) and fish & cephalopods species (D1): Conclusions for the Bay of Biscay

Presentation: Poster

Speaker: Delaunay Damien

Delaunay Damien¹, Brind'amour Anik¹, Foucher Eric¹, Baudrier Jérôme¹

1 - Institut français de recherche pour l'exploitation de la mer (France) Service Valorisation de l'Information pour la Gestion Intégrée et la Surveillance

Contact: damien.delaunay@ifremer.fr

Abstract

The Marine Strategy Framework Directive recommends that Member States achieve a good environmental status (GES) of their marine waters by 2020. The definition of the GES is described by 11 descriptors, including descriptors assessing (commercial or not) species biodiversity (D1 and D3). D1 stipulates that biological diversity of the fish and cephalopod components is maintained and D3 stipulates that populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock. The French assessment of the GES was conducted in 2018 in the Bay of Biscay. The evaluation consisted in a quantitative and qualitative assessments. For the D3, the quantitative evaluation was based on results from the stock assessment using the fishing mortality and the spawning stock biomass as the two criteria. Whereas, the D1 evaluation was based on time series analyses (i.e. breakpoint analysis) of the abundance of populations of demersal species sensitive to fishing pressure, using data from the French scientific surveys. Qualitative analyses were done for fish species for which either data or methodological aspects were lacking. For the D3, the evaluation was based on 17% of the stocks assessed by the EU. Thirty percent of those stocks were estimated in GES (i.e. defined by the MSY) whereas 70% were not. For the D1, the evaluation was done on 10% of the diversity of the demersal fish species of the continental shelf. Forty one percent of the populations were estimated in GES, whereas 10% were not. Nearly 50% of assessed population displayed no evolution in the studied time series. Qualitative assessment for the other groups of species (e.g. pelagic species, coastal and deep water species) gave general information of global diversity patterns, fisheries essential habitats, and abundance and biomass temporal evolutions.

Key words: msfd, french assessment, good environmental status, fish and cephalopod, commercial species

Seasonal dynamic of zooplankton abundance and biodiversity in the Southern Bay of Biscay. Micropolit program - Preliminary results (summer 2017- spring 2018)

Presentation: Poster

Speaker: D'Elbée Jean

D'Elbée Jean¹, Gueux Aurore², Cazes Jean-Baptiste³, Lauga Béatrice², Monperrus Mathilde²

1 - Laboratoire d'Analyses de Prélèvements Hydrobiologiques (France)

2 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

3 - Institut des Milieux Aquatiques (France)

Contact: laphy@wanadoo.fr

Abstract

The zooplankton compartment is an essential part of the marine food web. As such, it allows the transfer and accumulation of all micropollutants introduced into the pelagic environment by human activities. As part of the Micropolit program start in 2017 on the Basque coast, samples of zooplankton were collected monthly in the southern sector of the Bay of Biscay at two points, one off the Adour estuary (depth=-30 m) and another near the Capbreton canyon (depth=-150 m). Samples were collected using a plankton net (200 µm mesh vacuum) according vertical profiles over the entire water column from the bottom to the surface. About 60 taxonomic units were identified on the whole zooplankton, with a more in-depth census of copepod species, the dominant group of plankton throughout the year. The first results show higher abundances and less diversity for the southernmost Adour point compared to the other point located about twenty kilometers further north. These qualitative and quantitative differences are discussed in terms of the particular hydrological and geomorphological environment of the two sampling points.

Key words: Bay of Biscay, capbreton canyon, planktonic biodiversity, zooplankton ecology

Response of subtidal rocky benthic assemblages to pollution mitigation

Presentation: Poster

Speaker: Díez Isabel

Diez Isabel¹, Bustamante Maria¹, Quintano Endika¹, Tajadura Javier¹, Muguerza Nahara¹,
Saiz-Salinas Iñaki¹, Gorostiaga José Maria¹

1 - University of the Basque Country (Spain)

Contact: nahiara.muguerza@ehu.eus

Abstract

Increasing human pressure is heavily threatening the biodiversity and the ecological processes of coastal ecosystems in the last decades. Urban sewage discharges produce several changes in the water column leading to shifts in marine assemblages and affecting the structure and the functioning of coastal ecosystems. In the last two decades efforts in wastewater treatment have been intensified due to the establishment of the Water Framework Directive (WFD, 2000/60/EC). Identifying the effects of sewage treatments in mitigating potential impacts on marine assemblages deriving from urban sewage discharge turns essential to the environmental policy and management of wastewater treatment plants. However, few attempts have been made to assess the efficiency of wastewater treatments. The present study seeks to investigate whether subtidal benthic assemblages (macroalgae and invertebrates) recovered in response to the onset of different sewage treatments, using a "beyond BACI" experimental design. Temporal differences in subtidal benthic assemblages structure between the outfall and two control sites over a 19 year period (8 surveys between 1997-2016) were assessed under the influence of: 1) no treatment, 2) wastewater physico-chemically treated, 3) wastewater with physical-chemical and biological treatment, and 4) elimination of the discharge. Our results show evidence that the wastewater treatment upgrade significantly reduced the impact of sewage on subtidal benthic assemblages, especially after the onset of biological treatment. This study demonstrates that powerful experimental designs combined with univariate and multivariate analytical approaches are fundamental in distinguishing the subtle effects of human impact from those of natural processes.

Key words: recovery stages, wastewater discharge, Bay of Biscay, benthic communities, macroalgae, invertebrates

Salt marshes microbial mats in French Atlantic coast: microbial diversity and biotechnological resources

Presentation: Poster

Speaker: Duran Robert

Duran Robert¹, Cagnon Christine¹, Agogué Hélène², Cravo-Laureau Cristiana¹, Dupuy Christine², Sablé Sophie², Hervé Corentin², Lanneluc Isabelle², Fruitier-Arnaudin Ingrid²

1 - Equipe Environnement et Microbiologie, MELODY group, Université de Pau et des Pays de l'Adour, IPREM UMR CNRS 5254 (France)

2 - UMR LIENSs (Littoral Environnement et Sociétés) 7266, CNRS-Université de La Rochelle (France)

Contact: robert.duran@univ-pau.fr

Abstract

Along coastlines, in many locations around the world from estuaries to hypersaline ponds, highly productive photosynthetic microbial mats develop at the water-sediment interface. They consist in laminated structures where microorganisms are organized according to micro-gradients of oxygen and sulfur species, redox potential and light. It is now admitted that microbial mats have influenced Earth's evolution, at the origin of the oxygenation event and Eukaryote colonization. Nowadays, modern microbial mats provide important ecosystem services including oxygen production, sulfur depletion, sediment stabilisation and carbon sinks. The high microbial diversity also represents biological resources (i.e. metabolites, enzymes and microbial strains) yet unexplored. The exploration of the microbial mats can also reveal metabolic capabilities with high biotechnological potential. The aim of the study was to describe the microbial diversity of microbial mats and their functioning, including the production of biotechnological potential molecules. We characterized the molecular (SSU-rRNA gene) microbial diversity (Bacteria, Archaea and Eukarya) of microbial mats developing on the French Atlantic coast and described the diversity of the main predators, larger organisms such as the meiofauna (nematodes, copepods). The biotechnological potential of microbial mats was investigated by eco-extractions of different bioactive molecules: antimicrobial activities (culture screening on different pathogenic microorganisms), antioxidant, bioadhesive and biosurfactant activities (molecular and cellular). Microbial mats constitute original biological matrixes where diverse microorganisms coexist resulting on complex metabolic networks yet untapped for their biotechnological potential.

Key words: microbial mats, benthic community, salt marshes, biomolecules

Life history of *Cleonardopsis carinata* (Crustacea, Amphipoda): a 'canyon indicator species' from the Capbreton Canyon (SE Bay of Biscay)

Presentation: Poster

Speaker: Frutos Inmaculada

Frutos Inmaculada¹, Sorbe Jean Claude²

1 - University Hamburg, Zoological Museum (Germany)

2 - Station Marine Arcachon (France)

Contact: inma.frutos@uni-hamburg.de

Abstract

The amphipod *Cleonardopsis carinata* (Amathillopsidae, Cleonardopsinae) is the single species known in genus *Cleonardopsis*. Originally described by K.H. Barnard in 1916 from Atlantic bathyal bottoms off South Africa, it was subsequently recorded in E Indonesia, W Greenland and SE Iceland. In the last decades, this species has been reported on bathyal bottoms of the southeastern Bay of Biscay (depth range: 366-3020 m). During several surveys, *Cleonardopsis carinata* was sampled by means of multi-net suprabenthic sledges, in the Cap Ferret area (canyon and southern margin), in the Capbreton area (canyon and adjacent open slope) and on the Le Danois Bank. The highest abundance of this amphipod was recorded within the upper Capbreton Canyon, on the bathyal thalweg site E' (232 ind./100 m²), whereas in the other investigated areas, abundances were considerably lower (≤ 6 ind./100 m²). Its near-bottom vertical distribution shows that 96.1% of the individuals live in close contact with the sea floor. Although its morphology suggests that it could be an inquiline species (unknown support), it is also a good swimmer (powerful pleopods), able to perform horizontal/vertical migrations. A demographic study was carried out on the most abundant Capbreton Canyon sample (site E'; December 1998). Brooding females (5.9-8.5 mm BL) were bigger than mature males (5.7-6.4 mm BL) and showed a relatively low fecundity (maximum recorded: 15 ind./marsupium). Juveniles were dominant (68.4% of total abundance), demonstrating a strong autumnal recruitment in the canyon population. As previously observed for some other shelf and bathyal peracarids from the southern Bay of Biscay, the reproduction of this amphipod is probably a continuous process all year round. The main biological/ecological features of this amphipod population could be related to the turbidity events known to periodically occur in the upper Capbreton Canyon.

Key words: demographic study, canyon indicator species, amphipoda, *Cleonardopsis carinata*, capbreton canyon, se Bay of Biscay

The occurrence of *Uromunna* (Crustacea, Isopoda, Munnidae) in Arcachon Bay and Hossegor Lake (SW French Atlantic coast): a putatively new species

Presentation: Poster

Speaker: Frutos Inmaculada

Gouillieux Benoit¹, Frutos Inmaculada²

1 - Station Marine (France)

2 - University Hamburg, Zoological Museum (Germany)

Contact: inma.frutos@uni-hamburg.de

Abstract

The isopod genus *Uromunna* was established by Menzies in 1962. Currently, it is composed by twenty-six valid species distributed in shallow waters of temperate and tropical areas around the world. Only three of them have been reported in European waters: *Uromunna mediterranea* (Pierantoni, 1916) from the Gulf of Naples; *Uromunna petiti* (Amar, 1948) from Mediterranean waters nearby Marseille and the Atlantic side of Strait of Gibraltar; and *Uromunna naherba* Esquete and Wilson, 2014 from the NW Iberian Peninsula. During several samplings carried out in Arcachon Bay and the Hossegor Lake between 2013 and 2017, one hundred specimens ascribed to the genus *Uromunna* were collected. Samples were mainly taken by scraping on hard bottoms. The combination of some morphological characteristics of this *Uromunna* species (head anterior margin; mandibular palp setation, pleotelson lateral and distolateral dentation and pleotelson suburopodal shelf) allows it to be distinguished from all the other European species. In Arcachon Bay, individuals were sampled on different subtidal types of substrates: on floating pontoons at the marina, on seagrass (*Zostera marina*), on bivalves (*Mytilus spp.*) and on hydrozoans (*Amphisbetia operculata*); and on intertidal oyster reefs of *Magallana gigas* as well. In the Hossegor Lake, they were found on a navigation buoy between different algal substrates (*Ulva sp.* and Gracilariaceae unid.). Its ecology and littoral habitats are compared with the others European species.

Key words: *Uromunna*, isopoda, taxonomy, new species, ecology, sw france, se Bay of Biscay

Estimating predator abundance to ascertain key areas in the southern Bay of Biscay

Presentation: Poster

Speaker: Garcia-Baron Isabel

Garcia-Baron Isabel¹, Santos M. Begoña², Saavedra Camilo², Valeiras Xulio², Garcia Salvador³, Louzao Maite¹

1 - AZTI-Tecnalia (Spain)

2 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Vigo (Spain)

3 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Málaga (Spain)

Contact: isgarcia@azti.es

Abstract

Monitoring programmes, such as multidisciplinary oceanographic surveys, are being used increasingly to assess spatial and temporal trends of biological diversity and, nowadays, these surveys are shifting towards an ecosystem-based approach. In Europe, the EU Marine Strategy Framework Directive (MSFD) requires assessing the environmental status of the European waters and to achieve or maintain the Good Environmental Status (GES) of the Member States' waters by 2020. One of the descriptors of GES is the maintenance of biological diversity, through the protection of the habitats and species, where marine top predators are included and need to be assessed and monitor regularly. Therefore, it is essential to regularly monitor the spatial and temporal abundance and distribution of top predators' community to document the location of key areas for their conservation and management, as well as patterns of change. The aim of the present work is to obtain spatial abundance estimations of the top predator community of the southern Bay of Biscay (BoB) including seabird and cetacean species. We took advantage of the annually established PELACUS monitoring program, which is carried out every spring over the northern Spanish continental shelf. We analysed data for the 2007-2016 period collected by Distance Sampling methodology modelling the relative abundance of several species by means of density surface models to identify key areas of highest predicted abundance for all species analysed. The top predators' community of the Spanish continental shelf is formed both by oceanic and coastal species being the north-western area the one that supports the higher density of species. Our study contributes to the identification of important concentration areas in the southern BoB, which should be the focus of management efforts for the conservation of these species to achieve or maintain the GES established by the MSFD.

Key words: oceanographic surveys, distance sampling, marine predator, predators, monitoring programme

Pressures facing marine top predators in the Bay of Biscay: insights from rehabilitation centres

Presentation: Poster

Speaker: Garcia-Baron Isabel

Garcia-Baron Isabel¹, Santos M. Begoña², Albisu Joxan³, Escribano José⁴, Intxausti Iñaki⁴,
Fayos Manena⁵, Oleaga Ruiz De Escudero Alvaro⁶, Louzao Maite¹

1 - AZTI-Tecnalia (Spain)

2 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Vigo, (Spain)

3 - Wildlife Rehabilitation Centre of Gipuzkoa Arrano-Etxea, Donostia-San Sebastián, (Spain)

4 - Wildlife Rehabilitation Centre of Bizkaia, Gorniz, (Spain)

5 - Wildlife Rehabilitation Centre of Cantabria, (Spain)

6 - Wildlife Rehabilitation Centre of Asturias, SERIDA, (Spain)

Contact: isgarcia@azti.es

Abstract

The intensity of threats that marine habitats are suffering is increasing and they are mostly driven by anthropogenic pressures (e.g. overfishing or pollution). In addition, non-directly anthropogenic driven threats are also becoming serious threats due to global changes (e.g. extreme weather events or increasing of temperatures). In Europe, the EU Marine Strategy Framework Directive aims to achieve or maintain Good Environmental Status (GES) of the Member States' waters by 2020. One of the descriptors of GES is Biological diversity is maintained, the quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing conditions. For this descriptor, the status of several functional groups, including marine predators, need to be assessed against agreed criteria and monitor regularly. The Bay of Biscay (BoB) hosts numerous seabird and cetacean species of which at least five are included in threatened categories of the IUCN. Therefore, it is crucial to assess the threats facing these predators in the BoB. We performed a review on threats operating on top predators to synthesize the available information and to identify those threats that need to be urgently managed. Analysis of records of admissions to Wildlife Rehabilitation Centres (WRCs) can provide essential information for an initial assessment of the pressures exerted on these species. We analysed 4,023 admissions of seabirds recorded from 4 WRCs during the period 2004-2016 along the Cantabric coast as a proxy of the pressures facing seabirds in the marine habitat. We identified 29 species of nine families being the most affected: Alcidae (41.2%), Laridae (39%) and Sulidae (13.3%). Main threats identified were: cachexia (52.3%), contact with crude oil (10%) and interactions with fishing gear (5.3%). Although this information has limitations, it provides a framework in which to start a risk assessment of the threats facing seabirds in the BoB.

Key words: Bay of Biscay, wildlife rehabilitation centres, predators, cetacean, seabird, threats

Copepod trends in the coastal area of the southeastern Bay of Biscay during the period 1999-2015

Presentation: Poster

Speaker: Iriarte Arantza

Iriarte Arantza¹, Uriarte Ibon¹, Villate Fernando¹, Martin Cristian¹, Fanjul Alvaro¹

1 - Department of Plant Biology and Ecology, University of the Basque Country (Spain)

Contact: arantza.iriarte@ehu.es

Abstract

Trends in the abundance of the main copepod species from nearshore coastal sites of the southeastern Bay of Biscay, and the influence of environmental factors (temperature, salinity, chlorophyll a, and upwelling index) on those trends were assessed from time-series for the 1999-2015 period. Significant trends of increase were observed for the early-spring peaking *Acartia clausi* and *Oithona similis*, and upwelling index (particularly from winter and spring) and salinity (winter and summer) were the environmental factors that showed the highest positive correlation with the abundances of both species. Additionally, a negative correlation with summer water temperature for *Acartia clausi* abundance was detected. In contrast, the early summer peaking *Ditrichocorycaeus anglicus*, and the late-summer-early-autumn peaking *Oithona plumifera* and *Temora stylifera*, evidenced significant trends of decrease. In general, summer (in some cases also spring) chlorophyll a and summer water temperature were the factors that showed the highest positive correlation with the abundance of these species that evidenced decreasing trends. The early autumn peaking *Oithona nana* and the early spring peaking *Temora longicornis* also showed significant increasing trends, but no correlation was found with any of the environmental factors tested. *Centropages typicus*, *Calanus* sp., *Paracalanus* sp., *Euterpina acutifrons* and *Oncaea media* showed no significant trends during the study period.

Key words: zooplankton, copepods, time series, trends, interannual, coastal

Spatiotemporal changes in surface sediment characteristics, benthic macrofauna composition and sediment profile images in the West Gironde Mud Patch (Bay of Biscay, SW France)

Presentation: Poster

Speaker: Lamarque Bastien

Lamarque Bastien¹, Grémare Antoine¹, Lavesque Nicolas¹, Romero Ramirez Alicia¹, Bernard Guillaume¹, Poirier Dominique¹, Schmidt Sabine¹, Garabetian Frédéric¹, Deflandre Bruno¹

1 - UMR 5805 EPOC - Université de Bordeaux (France)

Contact: bastien.lamarque@u-bordeaux.fr

Abstract

The West Gironde Mud Patch (WGMP) is a muddy belt surrounded by sands located 25 km off the mouth of the Gironde Estuary in the Bay of Biscay. WGMP is the primary depository of the sediment particles originating from the Gironde Estuary. It is considered as a typical mobile mudbelt where sedimentation and resuspension both contribute to control the structuration and the functioning of benthic ecosystems. Surface sediment characteristics, benthic macrofauna composition and sediment profile images characteristics were assessed in October-November 2016 at 8 stations (30-75 m in depth) located along 2 inshore-offshore transects (JERICObent-1 cruise; EU/JERICO-Next program). The so-obtained results were compared with: (1) the spatial mapping of the WGMP recently proposed by Cirac et al. (2016), and (2) comparable data collected in July 2010 at only 3 stations by Massé et al. (2016). Our results clearly showed major changes in the external delimitation of the WGMP in comparison to the 2 above mentioned studies, which highlighted the need for the establishment of a synoptic map of the WGMP. For most assessed parameters, they were clear inshore-offshore gradients. Except for the 2 shallowest stations, which were characterized by the presence of superficial sands, surface sediments consisted of muds with organic carbon concentrations between 0.6 and 1.5 %DW. Macrofauna compositions also showed discrepancies between the two shallowest stations and the other ones. Macrofauna abundances were between 92 and 941 ind.m⁻². They tended to decline offshore together with species richness. Conversely, the number and depth of oxic-voids within the sediment column tended to increase with depth. Overall, there were major differences in macrofauna composition and sediment profile image characteristics, between 2010 and 2016, which were put in relation with an exceptionally energetic 2013-2014 winter.

Key words: west gironde mud patch, surface sediment characteristics, benthic macrofauna, sediment profile images

Dynamics of microbial communities across the three domains of life in the Bay of Biscay with emphasis on marine mucilage

Presentation: Poster

Speaker: Lauga Béatrice

Rouaud Vanessa¹, Susperregui Nicolas², Guyoneaud Rémy¹, Gaudin Philippe³, Duran Robert¹, Lauga Béatrice¹

1 - Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - IPREM - MIRA (France)

2 - Institut des Milieux Aquatiques (France)

3 - Ecologie Comportementale et Biologie des Populations de Poissons (France)

Contact: Beatrice.Lauga@univ-pau.fr

Abstract

Microorganisms are widely distributed in all marine habitats, from subseafloor to sunlit surfaces and throughout the entire water column. They are associated in more or less complex communities comprising bacteria, archaea, protists and fungi. Despite recent methodological advances our view of microbial diversity of marine ecosystems across time and space is still fragmented. Since all microorganisms of any domain may be intimately linked, it is important to consider communities as a whole. However integrated approaches considering the three domains of life are scarce and preclude a comprehensive and holistic understanding of the functioning of marine ecosystems. In coastal areas marine microbial communities are impacted by human activities and submitted to important environmental variations that may affect the natural equilibrium between the memberships of the communities. Thus over the oceans, various mucilaginous materials have been repeatedly observed in coastal areas, whether or not they reflect natural population cycling is not clear. In the South of the Bay of Biscay such phenomenon, termed the "Liga" has been observed recurrently over the last years. To get a better understanding of the causes of appearance, the dynamics, and the respective role of microorganisms in mucilage formation we targeted the microbial component across the three domains of life and compare the mucilage community with that of surrounding environmental compartments. We use molecular fingerprinting to characterize over one year the microbial community dynamics in the mucilage and in two additional compartments: the seawater where marine mucilage arose and the Adour River water a few kilometers upstream of the mouth, in order to evaluate the role of continental inputs. We demonstrate that the Liga constitutes an ecological niche for some microorganisms in the Basque coastal ecosystem. It is a transitory ecosystem that derived from marine communities in response to nutrients input from the Adour River.

Key words: microbial communities, molecular fingerprinting, mucilage, seasonal dynamic

Ecological quality and food profitability of coastal nurseries: are they linked?

Presentation: Poster

Speaker: Le Bris Hervé

Le Bris Hervé¹, Pinsivy Lucas², Saulnier Erwan¹, Chaalali Aurélie¹, Le Berre Thomas¹,
Brind'amour Anik²

1 - Institut national supérieur des sciences agronomiques, agroalimentaires, horticoles et du paysage (France)

2 - Institut Français de Recherche pour l'Exploitation de la Mer (France)

Contact: herve.le.bris@agrocampus-ouest.fr

Abstract

Coastal areas face various anthropogenic pressures that can alter their ecosystem services. This is the reason why their ecological quality is nowadays closely monitored notably by means of indicators based on the characteristics of the benthic macroinvertebrate communities. Some of these areas play a role of nursery for the young stages of many marine organisms including benthodemersal species of commercial interest. The trophic capacity of these areas is often mentioned as a determining factor of their nursery role. This capacity can be assessed through the food profitability (production of macrobenthic prey available to juveniles, Tableau et al., 2015(*)). Thus, one can question whether this profitability is related to the ecological status. Particularly could it be of low values in areas of low ecological status? To do this, we spatially sampled and analysed macro-benthic communities of three nurseries of the Bay of Biscay and one of the English Channel. Then, we evaluated the ecological status (M-Ambi, Muxika et al., 2007(**)) and the profitability at the macro-benthos sampling stations. Finally, we explored the evolution of the mean and variance of the food profitability data according to four ecological status of M-Ambi (from poor to high) recorded in the surveys. It appears that profitability is very variable in areas of poor ecological status but systematically higher in areas of high ecological status. (*) Tableau, A., Le Bris, H., & Brind'Amour, A. (2015). Available Benthic Energy Coefficient (ABEC): a generic tool to estimate the food profitability in coastal fish nurseries. *Marine Ecology Progress Series*, 522, 203-218. (**) Muxika, I., Borja, A., & Bald, J. (2007). Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive. *Marine pollution bulletin*, 55(1-6), 16-29.

Key words: coastal nurseries, macrobenthos, food profitability, ecological quality

Characterizing the pelagic fish and crustacean community of the Bay of Biscay

Presentation: Poster

Speaker: Louzao Maite

Louzao Maite¹, Uranga Jon¹, Martinez Udane¹, Rubio Anna¹, Boyra Guillermo¹

1 - AZTI-Tecnalia (Spain)

Contact: maite.louzao@gmail.com

Abstract

Pelagic fishes and crustaceans represents a key component of the pelagic realm from an ecological point of view. This pelagic community plays a crucial role in ecosystem functioning due to its intermediate trophic position between plankton and marine top predators. In addition, inter-specific interactions might influence the population dynamic of these pelagic species and, therefore, it is essential to determine their spatial and vertical distribution to understand community-level interactions. Within this context, the objective of the present study is to characterize the pelagic community of the Bay of Biscay (BoB) including species present in both continental shelves and oceanic areas. To that end, we used multidisciplinary data from the JUVENA annual oceanographic surveys, which cover partially the BoB in the late summer, for the period 2013-2016. We identified 12 pelagic species (11 fish and 1 crustacean) corresponding to neritic (50% of species), bathypelagic (20%), demersal (20%) and oceanic species (10%), following their vertical distribution by identifying the depth of the maximum acoustic signal. The European anchovy *Engraulis encrasicolus* showed the shallowest depth preference while Euphausiids, the silvery lightfish *Maurollicus muelleri* and blue whiting *Micromesistius poutassou* showed the deepest. Regarding the horizontal distribution, most species were present mainly within the continental shelf with higher abundances close to river mouths, but specific species were more abundant in the slope and oceanic areas. Species biomass was especially high for European anchovy, followed by the silvery lightfish, the horse mackerel *Trachurus trachurus* and European sardine *Sardina pilchardus*, even whether species biomass displayed an important inter-annual variability. Further analysis was performed in order to link the vertical and spatial distribution of pelagic species with the physical oceanic processes and hydrographical conditions observed during the JUVENA surveys.

Key words: oceanographic surveys, vertical arrangement, spatial distribution, community assemblage, pelagic community

Interaction between seabirds and trawlers in the Bay of Biscay

Presentation: Poster

Speaker: Louzao Maite

Louzao Maite¹

1 - AZTI-TECNALIA (Spain)

Contact: arkaitz.pedrajas@gmail.com

Abstract

Fishing discards have a significant impact in marine ecosystems due to the high amount of species that are thrown overboard especially by trawl fisheries. Marine predators such as seabirds are an especially sensitive community affected by discards. Recently, several works have shown the importance of this resource for these species. In fact, some of them depend exclusively on the abundance of this food resource. Therefore, assessing the influence of discarding rates and discard composition on seabirds will provide insights on the impact of different fishing policies, such as the Landing Obligation. Within this framework, we conducted seabird counts on board commercial demersal trawlers operating in the Bay of Biscay (ICES subdivision VIIIabd), during the period 2016-2017. Seabird counts allowed establishing the spatial and temporal abundance variation of the seabird community associated to trawlers, the association between the different variables (environmental and fishing) and species; and characterising the community of seabirds associated to trawlers in the surrounding area. Furthermore, the characterisation of the discard allows establishing the relation between this and the different species. This work will provide an essential tool to evaluate future management strategies related to discard reduction and the conservation of seabirds populations.

Key words: fishing policies, trawlers, discards, seabirds, Bay of Biscay

Spatio-temporal abundance patterns of northern gannets in the Central Cantabrian Sea inferred from coastal at-sea surveys

Presentation: Poster

Speaker: Louzao Maite

Louzao Maite^{1,2}, Fernández-Martín Pilar¹, Weidberg Nicolas^{2,3}, Santos M. Begoña⁴,
González-Quirós Rafael¹

1 - Instituto Español de Oceanografía, Centro Oceanográfico de Xixón, (Spain)

2 - Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo (Spain)

3 - Arctic Marine Biology Department, UiT The Arctic University of Norway, Tromsø (Norway)

4 - Instituto Español de Oceanografía, Centro Oceanográfico de Vigo (Spain)

Contact: maite.louzao@gmail.com

Abstract

Continental shelves are regions of remarkable biological productivity influenced not only by mesoscale physical processes (e.g. upwelling, along-shore currents and riverine inputs) but also by their interaction with topographical features (e.g. shelf-break, submarine canyons and capes). These interactions enhance primary production that results in high abundances across different trophic levels, from phytoplankton to marine top predators such as seabirds. Taking advantage of the RADIALES long-term oceanographic monitoring scheme, we established an observer programme using standard strip-transect methodologies between 2007 and 2012 in the Central Cantabrian Sea. Specifically, we studied the abundance patterns of the northern gannet *Morus bassanus* following its annual cycle and evaluated the importance of coastal topographic features driving the spatial patterns. This species, widely distributed in Atlantic waters, is the largest pelagic seabird in the Central Cantabrian Sea. Highest concentrations of northern gannets were found in spring (March) and autumn (October), corresponding to the northward (pre-winter) and southward migration (post-winter) movements, respectively of this species in the NE Atlantic. In addition, the abundance of different age classes (juveniles, immature and adults) were analysed, revealing seasonal and spatial differences within the annual cycle.

Key words: continental shelves, annual cycle, topographical features, northern gannets, central cantabrian sea

First record of *Chiroteuthis veranii* (Férussac, 1834) in the Bay of Biscay

Presentation: Poster

Speaker: Modica Larissa

Modica Larissa¹, Polo Julia¹, Lanuza Paloma¹, Rodriguez-Cabello Cristina², Sánchez Francisco², Garcia-Castrillo Gerardo¹

1 - Museo Marítimo del Cantábrico (Spain)

2 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: larissa.modica@gmail.com

Abstract

Chiroteuthis veranii is a rare bathypelagic squid apparently widespread as its presence has been reported in different areas worldwide. Its global distribution still remains a matter of discussion due to the long-distance foraging nature of some of *C. veranii*'s predators. In some cases, due to the presence of this species in their predators's stomach contents, these cephalopods have been included in local biodiversity inventories. The use of these data could have lead to inaccuracies in the definition of their distribution, since they might have been consumed outside of the waters where their predators were caught. For instance its presence in the Bay of Biscay was never reported before, except for the records of some beaks in the stomach contents of *Thunnus alalunga*, which are long distance migrant predators. Data mining through the most important scientific data sets in the area (DEMERSALES experimental bottom trawl survey and ECOMARG) resulted in no record for this species, despite some of these surveys being multidisciplinary and specific for the deep sea. In this note we report its accidental catch by a commercial bottom trawl vessel in the western Bay of Biscay in 2016. We also report some biometrical features as Mantle Length (ML), Tentacle Stalk Length (TSL), Fin Length and Width (FL, FW), Head Length and Width (HL, HW), all documented by photos. The current knowledge of *Chiroteuthis veranii*'s distribution is hindered by both a lack of specimens and the low quality of available specimen's preservation that makes difficult their identification. This record widens the current occurrence of this species which is known to have been recorded from Mediterranean to Pacific and Southern and Northern Atlantic. The specimen has been placed in the collection of the Cantabrian Sea Maritime Museum (MMC).

Key words: *Chiroteuthis veranii*, bathypelagic squid, northeast atlantic distribution, deep sea, first record.

Assessment of circalittoral reef benthic assemblages along a distance gradient to the coast in N2000 Basque coast (southern Bay of Biscay)

Presentation: Poster

Speaker: Mourguiart Bastien

Mourguiart Bastien¹, Lalanne Yann², Huguenin Laura^{3,4}, Bru Noëlle⁵, de Casamajor Marie-Noëlle¹

1 - Laboratoire Environnement Ressources Arcachon/Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

3 - IPREM ECABIE - Institut pluridisciplinaire de Recherche sur L'Environnement et les Matériaux (France)

4 - Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country (Spain)

5 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

Contact: bastien.mourguiart@gmail.com

Abstract

The reef habitat of the French Basque coast is an integral part of the Natural 2000 area. It presents a biogeographic interest for the French fauna. These rocky substrata are exposed to natural pressures (eg. swells, freshwater inputs) in addition to anthropogenic ones (eg. urban runoff, sewage or chemicals spilled). Thus, benthic communities may be impacted in coastal areas. Disturbance could lead to a decrease in benthic species richness and abundance with a consequent simplification of the community structure. Inversely, the abundance of opportunistic species with high reproductive capacity and a wide tolerance range to disruption could increase.

The monitoring of the Basque coastal reefs is made in compliance with the Water Framework Directive (WFD) using only macroalgae as indicator. Since 2014, surveys consider macrofauna also but not as descriptor of the ecological status. Integrate macrofauna is necessary to meet the requirements of the Marine Strategy Framework Directive (MSFD), especially in circalittoral where macroalgae communities are becoming scarce.

This work aims to fill the lack of knowledge concerning the benthic assemblage structure of the circalittoral reefs in the southeastern Bay of Biscay. The challenge is also to investigate a possible distance gradient to the coast considering macrofauna. The data used was collected in 2017, at seven sites at equivalent depths corresponding to the circalittoral level separate in two distance categories (offshore and coastal reefs). The use of multivariate statistical tools makes it possible to visualize the differences in the taxonomic composition between sites in relation to their proximity to the coast. A higher taxonomic richness discriminates offshore reefs from those on the coast but no distinction in sensitivity is detected.

Key words: distance gradient, community structure, circalittoral, basque coast, sensitivity, benthic assemblages, reef

Temporal patterns of canopy loss: coherent groups of associated benthic species that covary across years

Presentation: Poster

Speaker: Muguerza Nahiara

Muguerza Nahiara¹, Bustamante Maria¹, Diez Isabel¹, Quintano Endika¹, Tajadura Javier¹,
Saiz-Salinas Iñaki¹, Gorostiaga José Maria¹

1 - University of the Basque Country (Spain)

Contact: nahiara.muguerza@ehu.eus

Abstract

Canopy-forming algae are facing severe declines worldwide with unforeseeable consequences for ecosystem processes and services. The present investigation analyses in a 20 years period (1996-2015) the retreat of shallow subtidal rocky benthic communities in the south-eastern Bay of Biscay where the foundation species *Gelidium corneum* has suffered a significant decrease. The effects of the decline on the taxonomic and functional structure of canopy-dependent organisms (other algae and invertebrates) are studied. The results show the existence of coherent groups constituted by flora and fauna species that covary across years during the studied period (*Cryptopleura ramosa*-*Scrupocellaria* spp.-*Aetea anguina*, *Cystoseira baccata*-*Crisia* spp, *Haematocelis rubens*-*Obelia geniculata*, *Herposiphonia* sp.-*Haplopoma graniferum*, *Dictyopteris polypodioides*-*Aglaophenia pluma*). The retreat of the canopy forming species *G. corneum* also promoted changes in functional forms with a significant decrease in heavily corticated algae (those presenting a cortex with more than two layers) as well as in colonial and epiphytic invertebrate forms. Other changes observed since 2008 in response to the loss of biogenic habitat resource provided by this canopy-forming alga are significant increases in (1) taxa richness, (2) diversity, (3) simple thallus algae forms, (4) articulated corallines, (5) crustose species and (6) non-colonial invertebrates. Furthermore, the relationship of canopy decline with patterns in species turnover is examined. The results presented here address community patterns between algae and invertebrate species, and help to understand the consequences of the loss of canopy-forming macrophytes for the benthic ecosystem.

Key words: invertebrates, macroalgae, decline, foundation species, Bay of Biscay

Ecological network analysis reveals the impact of bottom trawling on food web structure

Presentation: Poster

Speaker: Preciado Izaskun

Preciado Izaskun¹, Arroyo Nina Larissa¹, López-López Lucia²

1 - Instituto Español de Oceanografía (IEO) (Spain)

2 - Imperial College London (United Kingdom)

Contact: izaskun.preciado@ieo.es

Abstract

Ecological theory indicates that the spatial complexity of habitats is important to enhance food web stability and maintain biodiversity. Bottom trawling is one of the main pressures on seabed habitats worldwide, and may reduce the structural complexity of soft-bottom habitats considerably. However, its consequences on the structure of food-webs are still not well understood. Here, we use an ecological network approach to study how bottom trawling may affect the stability of the benthic-demersal food web in the Cantabrian Sea continental shelf. We constructed a quantitative food-web model based on predator-prey relationships empirically determined for over 40 fish species. The diet of these species was studied during scientific trawl surveys carried out by the Spanish Institute of Oceanography in autumn (2007-2010). Fishing effort (FE) data, obtained from the fleet's Vessel Monitoring System, were binned into five FE levels and used to delimit areas with different fishing pressure. We computed topological network indices for these five FE levels to understand the structural changes in the benthic-demersal food web across the pressure gradient. We observed a significant decrease in the number of nodes (from 189 to 148) with increasing fishing effort and a strong decline in the number of links (from 1353 in very low FE, to 703 in very high FE). No clear trends in the connectance index (CI) were detected. The analysis of node centralities and cumulative distribution of number of links showed a scale-free network (many interactions of few links) in all FE levels. Centrality indices were additionally used to identify taxa of little commercial interest but high structural and functional importance. The observed response of topological network indices to bottom trawling is of paramount importance to understand the propagation of this anthropogenic impact through the food-web and its overall effect on ecosystem status.

Key words: anthropogenic pressure, benthic, demersal communities, bottom trawling, centrality indices, ecological network analyses, food web topology, links

Food web functioning of benthic-demersal assemblages in the southern Bay of Biscay based on diet and stable isotope analyses

Presentation: Poster

Speaker: Preciado Izaskun

Huerta Maria¹, Arroyo Nina Larissa¹, López-López Lucia², Rabanal Irene¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

2 - Imperial College London (United Kingdom)

Contact: maria.biomar@gmail.com

Abstract

Trophic interactions in the benthic-demersal community on the continental shelf of the southern Bay of Biscay were studied using a combination of stomach content analyses (SCA) and stable isotope analyses (SIA). Sampling was performed during autumn 2017 in the Cantabrian Sea (southern Bay of Biscay) during scientific trawl surveys. We identified taxonomically the diet of 18 abundant fish species and identified their isotopic signature based on samples from dorsal muscle tissue. We studied the spatial and diet overlap among species, detecting a significant diet overlap between juvenile hake (*Merluccius merluccius*) and blue whiting (*Micromesistius poutassou*). Based on diet analysis, vertically migrating macrozooplankton (mainly euphausiids) were identified to play a key role in the ecosystem linking benthic and pelagic compartments. Using multivariate analyses of predator-prey relationships two main guilds were established: i) benthic-pelagic feeding, where euphausiids constituted the main food source, and ii) benthic feeding, with polychaetes and small suprabenthic prey as main resources. In addition, we estimated the trophic levels of these species based on the SCA and the SIA data. According to both methods, *Merluccius merluccius* >18 cm and *Conger conger* were identified as top predators. Some discrepancies were found when estimating trophic levels using SCA and SIA, being consistently higher those obtained based on diet. We inferred changes in the diet of previous months, most probably due to seasonal variations in prey availability. These discrepancies demonstrate the importance of using both approaches when undertaking food web studies.

Key words: stomach contents, stable isotopes, demersal fish, benthic, trophic levels.

Implementation of MARXAN spatial planning approach for the management of El Cachucho MPA (Cantabrian Sea)

Presentation: Poster

Speaker: Rodríguez Augusto

Rodríguez Augusto¹, Punzón Antonio¹, Gomez Maria¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: augusto.rodriguez@ieo.es

Abstract

Located in the Cantabrian Sea (NE Atlantic), at 30 nm far from the Asturian coast, "El Cachucho" is the first off-shore Marine Protected Area (MPA) in Spain. The area included Le Danois Bank and its intraslope basin. It joined the OSPAR Network of MPAs in 2009 and, thereafter, was included in 2000 Nature Network in 2011. The main reason of its declaration as MPA was the presence of 1170-reefs habitat included in the Annex I of EU Habitats Directive. Under the definition of "1170 Reefs" we can find a complex and diverse hard-bottom habitats, which origin can be biogenic or geogenic. As the Management Plan is under revision in the year 2018, MARXAN software has been used to support the reserve design criteria. For that purpose, conservation features targets have been defined on one side, while the cost was minimized on the other. Thus, MARXAN selects planning units that represent these targets for a minimum total cost. First of all, 1170-reef habitat was characterized as main environmental value. For that purpose, we have taken into account six large size target species such as the sponges *Asconema setubalense*, *Geodia megastrella* and *Phakellia robusta*, the anthipatarian *Leiopathes glaberrima*, and the gorgonians *Paramuricea cf. placomus* and *Callogorgia verticillata*. A spatial distribution map was produced for each species using Generalized Additive Models (GAM). It has also been considered the presence of spawning stocks of fishing species which are present in the area as an important conservation value. Conversely, fishing cost has been measured considering the profit that was obtained before the area was closed to the fisheries. First results of Marxan are now being tested to present them in future public consultation to help the decision making of the Management Plan.

Key words: mpa, spatial planning, marxan, habitat mapping

Dermal denticles as discriminant criteria in the identification of elasmobranch species (Gen. *Deania*; Fam. Centrophoridae)

Presentation: Poster

Speaker: Rodríguez-Cabello Cristina

Grasa Irene¹, Rodríguez-Cabello Cristina¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: cristina.cabello@ieo.es

Abstract

Three elasmobranch species of the genus *Deania* are reported from NE Atlantic waters: *D. calcea*, *D. hystricosa* and *D. profundorum*. Whereas *D. profundorum* is easily recognized by the presence of a sub-caudal keel on the lower caudal peduncle, the other two species are mainly discriminated by the size of the dermal denticles and body color. In this study we explore the feasibility of this criterion by examining several individuals of diverse size and sex caught in different areas (Le Danois Bank, Aviles Canyon, continental slope) of the Cantabrian Sea. Morphometric measurements of 40 characters, denticle size and genetic analysis were undertaken for each individual. Multivariate analysis was used to check differences among samples. A priori the size of dermal denticles is related to fish length and body region, so other morphometric characters should be considered. Reliable and consistent discrimination of *Deania* species is essential for conservation and sustainable management of these deep-water elasmobranchs which are regularly by-catch of deepwater fisheries.

Key words: elasmobranchs, dermal denticles, morphometric characters, genetic

Main results of demersal elasmobranch tagging surveys in the Cantabrian Sea

Presentation: Poster

Speaker: Rodríguez-Cabello Cristina

Rodríguez-Cabello Cristina¹, Sánchez Francisco¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: cristina.cabello@ieo.es

Abstract

Since 1993 elasmobranch tagging has been conducted during the annual bottom trawl surveys carried out in North of Spain waters (southern Bay of Biscay). Conventional plastic tags type T-bar were used. Additionally some tagging surveys using longline gear targeting deep-waters sharks were also performed in the MPA of El Cachucho (Le Danois Bank). In these surveys also a few electronic tags (9 Pop-up tags) were also applied. A total of 15360 elasmobranchs from trawls surveys and 1154 from longline surveys have been tagged comprising 12 species. The majority of specimens tagged correspond to *S. canicula*, which is the most abundant elasmobranch in the continental shelf however also other sharks such as *S. stellaris*, *Galeus melastomus* and rays *Raja clavata*, *R. montagui* and *L. naevus* have occasionally been tagged. Recaptures up to date account for 488 being *S. canicula* the most recaptured species, nevertheless a few correspond to the other mentioned species providing first interesting data regarding time at liberty, movements or growth. For example time at liberty reached 15.4 years for one *S. stellaris* followed by 14.4 y for a *S. canicula*. The record of distance travelled is for a *Centrophorus squamosus* that covered 2300 km whereas the few *Galeus melastomus* recaptured show very short movements (< 12 miles) except one that covered 116 miles,

Key words: movements, tagging, elasmobranch

Assessing impact of sewage outfalls on intertidal rocky shores along the Basque coast (southeastern Bay of Biscay): assemblage structure analysis of benthic communities

Presentation: Poster

Speaker: Salerno Manon

Salerno Manon¹, Huguenin Laura^{1,4}, de Casamajor Marie-Noëlle³, Lalanne Yann², Gorostiaga José Maria⁴, Bisch Amaëlle¹, Monperrus Mathilde¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

3 - IFREMER - Laboratoire Environnement Ressources Arcachon/Anglet (FED 4155 MIRA) (France)

4 - Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country UPV/EHU (Spain)

Contact: manonsalerno@hotmail.fr

Abstract

Rocky shores habitats are among the most productive environment in terms of ecosystem functioning. They are also strongly subject to anthropogenic pressures like coastal Wastewater Treatment Plant (WTP) discharges. The Marine Strategy Framework Directive offers a comprehensive and integrated approach to the protection of all European coasts, creating a framework for the sustainable use of marine waters. This EU legislation has been progressively implemented in many areas: for instance, the control of input of nutrients and chemicals into the water body through the Water Framework Directive (WFD). In this context, and to consider local specificities of the south eastern Bay of Biscay, this study aims to identify and characterise potential effects of sewage discharges on the biotic diversity of intertidal rocky shores along the Basque coast. In 2017, five locations were sampled in France and Spain. Three sampling locations considered as "impacted" were selected due to the presence of intertidal outfalls connected to WTP: (Saint-Jean-de-Luz, Hendaye and Ondarroa). Two others locations were used as "control": (Socoa and Bakio). A sampling strategy was designed to assess the effect of sewage discharges and to characterize the disturbance gradients. Three sites at each location were selected along a gradient from the outfall and at two levels of the middle tide zone. Into each site, 0.1m² quadrats were used and randomly positioned on sloped shelving platforms. Differences in community distribution between France and Spain were highlighted and the response of benthic communities to WTP outfalls was determined in terms of assemblage structure, diversity and ecological features of the species.

Key words: sewage outfall, rocky shore, benthic communities, Bay of Biscay

Fifteen years of data from the PELGAS integrated survey (2000-2015): what have we learned on the Bay of Biscay pelagic ecosystem?

Presentation: Poster

Speaker: Sanchez Florence

Doray Mathieu¹, Petitgas Pierre¹, Romagnan Jean-Baptiste¹, Huret Martin², Duhamel Erwan³, Dupuy Christine⁴, Spitz Jérôme⁵, Authier Matthieu⁵, Berger Laurent⁶, Dorémus Ghislain⁵, Bourriau Paul¹, Grellier Patrick¹, Massé Jacques¹, Sanchez Florence⁷

- 1 - Unité Ecologie et Modèles pour l'Halieutique (France)
- 2 - Laboratoire de Biologie Halieutique (France)
- 3 - Laboratoire de Technologie et Biologie Halieutique (France)
- 4 - Université de la Rochelle-CNRS (UMR 7266) (France)
- 5 - Université de la Rochelle-CNRS (UMS 3462) (France)
- 6 - Service Acoustique Sous-marine et Traitement de l'Information (France)
- 7 - Ifremer - Laboratoire Environnement Ressources Arcachon/Anglet (France)

Contact: florence.sanchez@ifremer.fr

Abstract

The initial focus of the PELGAS integrated survey was to assess the small pelagic fish biomass in the Bay of Biscay in springtime, for fisheries management purposes. Sampling has been extended to produce long-term time-series of spatially-explicit data and indices, describing the main pelagic ecosystem components: hydrology, phytoplankton, mesozooplankton, fish and megafauna. A collaborative analysis of these datasets has brought new insights on the Bay of Biscay pelagic ecosystem summarized here. New results on single ecosystem components include an analysis of water samples to groundtruth the results of an ocean color algorithm aiming at detecting phytoplanktonic coccolithophores. New insights on mesozooplankton spatio-temporal distribution and energy content have been derived from the analysis of net samples. Adult anchovy and sardine energy content have been studied along a latitudinal gradient, and across different age stages. Changing patterns in the relative abundance of marine megafauna have been evidenced at a community level. Cross-ecosystem component studies are also presented. Actual dates of the annual survey have been corrected, with respect to a surface temperature climatology, allowing for an improved interpretation of anchovy and sardine spawning. Spring habitats of small pelagic fish communities in the Bay of Biscay have been characterised. Fluctuations in habitat preferences of five mobile top predators species have been assessed. Predation of cetaceans on small pelagic fish has been investigated, based on stomach contents. The spatial structure of the ecosystem has been characterised, to map consistent ecosystem seascapes and study their variability in time. Dominant ecological processes in the Bay of Biscay have been identified based on series of potential pelagic ecosystem indicators derived from the survey, and the effects of external forcing on the ecosystem dynamics tested. Perspectives for the survey are discussed in the context of the European Marine Strategy Framework Directive and the Common Fisheries Policy.

Key words: integrated ecosystem monitoring survey, pelagic ecosystem, ecosystem variability, Bay of Biscay

Spatial and temporal patterns in prokaryotic community composition in the Adour estuary (SW France)

Presentation: Poster

Speaker: Veloso Sandrine

Veloso Sandrine¹, Cravo-Laureau Cristiana¹, Cagnon Christine¹, Amouroux David¹, Lancelleur Laurent¹, Monperrus Mathilde¹, Tessier Emmanuel¹, Deborde Jonathan¹, Duran Robert¹

1 - CNRS / Univ Pau & Pays Adour, Institut des Sciences Analytiques et de Physico-Chimie pour L'Environnement et les Matériaux - MIRA, UMR5254, 64600, Anglet (France)

Contact: sandrine.veloso@univ-pau.fr

Abstract

Estuaries are amongst the most impacted coastal environments, threatened by continuously increasing urban and agricultural pressures. Microorganisms play a critical role in energy flow and nutrient cycling, particularly on the remineralisation of organic matter. Environmental variables such as temperature, salinity and organic matter (nature, dynamics and accessibility) are the main drivers for the organization of microbial communities. The Adour estuary is characterized by agricultural activities upstream and by the combination of a thick urban network and industrial activities downstream. It is thus an adequate site to determine the microbial community structures in response to multiple contaminants. Spatial and seasonal variability of microbial communities was examined in sub-surface water in twelve stations distributed along the Adour estuary. The composition of prokaryotic (Bacteria and Archaea) communities was determined by sequencing (Illumina MiSeq) the V4-V5 region of the 16S rRNA gene. Microbial abundance was determined by flow cytometry and 16S rRNA gene real-time quantitative PCR (qPCR). The relation between microbial community structure and physical-chemical parameters of collected waters was assessed by multivariate statistical analysis. Original results obtained in this study explored the potential interaction between prokaryotic community structure and environmental parameter fluctuations, a first step in understanding the microbial capacity to survive in an ecosystems under anthropogenic pressure.

Key words: environmental variables, estuary, next generation sequencing, microbial ecology, anthropogenic impacts

S4: Fisheries and Aquaculture

Assessment of the reproductive cycle and presence of parasites in molluscs cultured in offshore waters of the southeastern Bay of Biscay

Presentation: Oral

Speaker: Aldalur Unai

Aldalur Unai¹, Zaldibar Benat², Zorita Izaskun¹

1 - AZTI-Tecnalia, Marine and Coastal Environmental Management (Spain)

2 - CBET Research Group (Spain)

Contact: ualdalur@azti.es

Abstract

Efforts to develop offshore oyster (*Crassostrea gigas* and *Ostrea edulis*) and mussel (*Mytilus galloprovincialis*) aquaculture have been made in the Basque region since 2007. It is well known that differences in the temporal pattern of gonad condition is found in molluscs from different origins. Thus, in new shellfish farming initiatives it is crucial to characterize the reproductive cycle to ascertain the optimal season for marketability of the best meat quality as well as to predict the timing for harvesting natural seeds. On the other hand, another relevant parameter that can also significantly affect bivalve production is the presence of parasites; therefore, the evaluation of the incidence of parasites in potential shellfish farming areas is essential to take adequate management decisions. In the present work, Pacific oysters (*Crassostrea gigas*), flat oysters (*Ostrea edulis*) and mussels (*Mytilus galloprovincialis*) were collected monthly during 18 months from a natural bed and offshore waters of the Basque coast. Tissue was routinely processed for histological examination in order to determine the gamete development and parasite burden of the three selected species. Results indicated that spawning started in June for Pacific oyster and continued until August while flat oyster exhibited a shorter spawning period in early summer. Spawning occurred from spring to summer in mussels. On the other hand, this study did not detect any pathogen of concern. Rickettsia-like prokaryotes, Ancistrocoma-like ciliates and copepods of the genus Mytilicola were detected in oysters, but no associated tissue level damage was observed. Bonamia sp. was found in the flat oyster, but at very low prevalence (0,6%). Overall, results indicated a possible difference in the optimal marketability and seed harvesting in the studied species. On the other hand, the pathogen prevalence was considered low, but as higher mollusk densities are foreseen, further studies should be continued.

Key words: oyster, mussel, aquaculture, offshore, gonad index, parasites, bonamia, spawning

Productivity and Susceptibility Analysis (PSA) of the species caught by the Basque demersal fleets in the Bay of Biscay

Presentation: Oral

Speaker: Altuna Etxabe Miren

Altuna Etxabe Miren¹, Ibaibarriaga Leire¹, Garcia Dorleta¹

1 - AZTI-Tecnalia (Spain)

Contact: maltuna@azti.es

Abstract

The Common Fisheries Policy (CFP) sets the objectives and rules for the management of the European fishing fleets and for fish stocks' conservation. One of the tools of the CFP are the multi-annual management plans. In 2015 multi-annual management plans for Bay of Biscay were evaluated in bio-economic terms. Most of these analyses were focused on the most important commercial stocks. However, there are other key species that although not economically important, they might have a key role in the ecosystem and whose conservation should also be warranted. In order to identify the most vulnerable species caught by the Basque demersal fleet in the Bay of Biscay, we performed a Productivity and Susceptibility Analysis (PSA). First, we selected the species that contribute up to the 95% of the total landings and of the total sampled discards by métier. Then, productivity scores for each species were calculated for 7 attributes representing age at maturity, size at maturity, maximum size, maximum age, fecundity, reproductive strategy and trophic level. Alternatively, susceptibility scores were calculated for 4 attributes representing availability, encounterability, selectivity and port capture mortality. The results allowed to rank the species according to their vulnerability and to identify the major gaps of information. Future work will address the inclusion of these species into the development and evaluation of multiannual management plan within the framework of data-poor methods for mixed fisheries.

Key words: stock assessment, vulnerability, data limited, productivity and susceptibility analysis, basque demersal fleets, Bay of Biscay

A methodology based on data filtering to identify reference fleets to account for the abundance of fish species: application to the Striped red mullet (*Mullus surmulletus*) of the Bay of Biscay

Presentation: Oral

Speaker: Caill-Milly Nathalie

Caill-Milly Nathalie¹, Lissardy Muriel¹, Bru Noëlle², Dutertre Marie-Adèle³

1 - Ifremer - Laboratoire Environnement Ressources Arcachon/Anglet (France)

2 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

3 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montaury) (France)

Contact: Nathalie.Caill.Milly@ifremer.fr

Abstract

For Data Limited Stocks, professional fishing data can be used as a potential source of information, especially in absence of appropriate scientific survey, to understand abundance evolution under realistic hypothesis on catchability of the resource. Two main approaches using fishing data are identified to select tuning fleets: the filtering approach and the statistical analysis of all the data. This communication focuses on the first one: the retain fishing effort must reflect vessels activity that is least dependent on their technical characteristics and as stable as possible over time. The variable of interest is landing by fishing sequence (landing for a given gear, mesh, day and statistical rectangle) called LPUE. In order to account for the abundance of the species, it was necessary to consider the discards. Then the method proceeds in 5 steps: (i) extraction and data cleaning; (ii) focus on LPUE variability and causes' prioritization; (iii) clusters definition; (iv) average LPUE per cluster analysis; (v) consideration of mesh classes and seasonal variations (quarters). The approach is detailed for the Striped red mullet of the Bay of Biscay which is currently in DLS category 5. Thereby, two tuning fleets are proposed: firstly the trawlers composed by small vessels (7.9 - 15.8 m) with a tonnage of 2 to 43.9 gt, a power between 44 and 256 kW and a gear mesh of 70 mm; secondly the gillnetters, which are defined by medium-sized vessels (8.2 - 14.8 m, 2 - 30.2 gt, 70 - 331 kW) whose gear mesh is either 50 - 59 mm (2nd and 3rd quarters), 60 - 69 mm (2nd quarter) or greater than 90 mm (2nd quarter). LPUE of these fleets show a downward trend, significant in two out of four cases which may reflect deterioration in the status of the red mullet stock.

Key words: lpue, tuning fleet, dls, fisheries

Assessment of Climate Change Impacts in the Bay of Biscay anchovy

Presentation: Oral

Speaker: Erauskin-Extramiana Maite

Erauskin-Extramiana Maite¹, Chust Guillem¹, Arrizabalaga Haritz¹, Alvarez Paula¹, Santos Maria¹, Uriarte Andrés¹, Ibaibarriaga Leire¹, Cotano Unai¹, Ferrer Luis¹, Irigoien Xabier¹, Cabré Anna²

1 - AZTI-Tecnalia (Spain)

2 - University of Pennsylvania, Department of Earth and Environmental Science (United States)

Contact: merauskin@azti.es

Abstract

Future scenarios of fish stocks and the impacts of climate variability and change on fisheries are critical to anticipate and minimize potential economic losses in this sector. In this study, we assessed the impact of recent sea warming and future climate change on anchovy in the Bay of Biscay, where sea surface temperature has increased in the last three decades. We analyzed the historical evolution of the anchovy spawning and built species distribution models that are projected under the RCP8.5 climate change scenario. The historical analysis of anchovy spawning showed that spawning peak advanced in a rate of 5.5 days/decade from 1987 to 2015, and the gonadosomatic index (as proxy of spawning activity) increased in general, which might be associated to changes in phytoplankton abundance. In addition, the spawning area expanded and contracted depending on the total egg production. In the future, the overall anchovy egg abundance in the Bay of Biscay is expected to increase between 1.05 and 2.66-fold under the RCP8.5 climate change scenario by the mid and end-of-the-21st-century, respectively, as projected environmental changes might induce an expansion of the spawning area (7.8% and 16.4% for mid- and end-of-the-century) and higher egg density.

Key words: Climate change, Bay of Biscay, anchovy, distribution shift, phenology

Assessing size and density dependent mortality of anchovy juveniles in the Bay of Biscay during winter

Presentation: Oral

Speaker: Escribano Aitor

Escribano Aitor¹, Aldanondo Naroa¹, Urtizberea Agurtzane¹

1 - Centro Tecnológico Pesquero y Alimentario (Spain)

Contact: aescribano@azti.es

Abstract

For small pelagic fish recruitment success is mainly determined by the degree of survival over the early stages of life. In the case of anchovies, this process takes place during spring and summer, and thus, the juvenile population in autumn is considered as an indicator of the next year recruitment. However, overwinter mortality could be an additional process regulating anchovy recruitment success in the Bay of Biscay. To investigate this, European anchovy juveniles winter mortality was studied over twelve years between 2003 and 2015 in the Bay of Biscay. Overwinter mortality rate was estimated each year using acoustic estimates of juvenile abundance (in autumn) and age-1 adults (the following spring) from two independent surveys. To evaluate whether mortality was size-dependent, the expected size distribution was projected from autumn to the following spring assuming different potential growth rates. The projected size frequencies were compared to the observed ones. The results showed that winter mortality was highly variable between 0.97 and 5.80 during this period. In addition, mortality rate was observed to be positively correlated with juvenile abundance in autumn and negatively with mean juvenile length. Moreover, mean juvenile length was also negatively correlated with juvenile abundance, suggesting that density-dependent growth may lead to size-selective overwinter mortality. The comparison between projected and observed spring size frequencies indicated that mortality was higher for small individuals. However, this pattern was not consistent in 2015, where mortality was high and independent of size. Our results suggest that besides juvenile size and abundance, there are other factors that also affect juvenile survival in winter.

Key words: recruitment, overwinter mortality, *Engraulis encrasicolus*, anchovy, juvenile, density dependent mortality, size selective mortality

Basque coast marine resources exploitation: does the cooperative management of resources work?

Presentation: Oral

Speaker: Garmendia Joxe Mikel

Garmendia Joxe Mikel¹, Bald Juan¹, Menchaca Iratxe¹, Borja ángel¹

1 - AZTI-Tecnalia, Marine and Coastal Environmental Management (Spain)

Contact: jgarmendia@azti.es

Abstract

The Spanish Basque coast shows a high variety of exploitable coastal marine resources (shellfish, algae and cnidarian). Traditionally, local fishers have shown interest in their exploitation. Currently seven target species have been subject of assessment by AZTI for the Fishery Directorate of the Basque Government for their sustainable exploitation. These species have different monitoring historical data: algae (*Gelidium corneum*), since 1986; grooved carpet shell (*Ruditapes decussatus*) and common cockle (*Cerastoderma edule*), since 1998; goose barnacle (*Pollicipes pollicipes*), since 2002; velvet crab (*Necora puber*), 2010-2014; purple sea urchin (*Paracentrotus lividus*); snakelocks anemone (*Anemonia viridis*). The decreasing trend of biomass of some traditionally exploited species (algae, clams, goose barnacles), the generational change of fishers and the interest on new species previously not exploited (sea urchin, anemone) have drawn an adequate scenario to propose a new management approach, for which the fishery sector should be highly involved in a cooperative management of the resources. The participation of fishers in the identification and selection of suitable zones for resource exploitation and the declaration of their fishing activity is a relevant issue in this new approach: fishers contribute with their capture data and scientists assess yearly the existing resource once the extractive season has finished. Cooperation of both parts and the supervision by the competent authority have a motivating and encouraging initial phase. However, the contribution of fishers has declined in few years due to different reasons: dissatisfaction because of the high presence of poaching (clams, cockles and goose barnacles); fall in demand (velvet crab), etc. In this contribution, the current status of each species and discussion about the success of this cooperative management will be presented.

Key words: fisheries, comanagement, sustainable exploitation, marine resources

Spatial and temporal variability of albacore predation upon small pelagics in the Bay of Biscay

Presentation: Oral

Speaker: Goñi Nicolas

Goñi Nicolas¹, Arregi Igor¹, Bonnin Axelle², Fraile Igaratza¹, Arrizabalaga Haritz¹

1 - AZTI-Tecnalia (Spain)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

Contact: ngoni@azti.es

Abstract

North Atlantic juvenile albacore migrate every summer to the European shelf-break waters, where its relative presence in the Bay of Biscay versus Southwestern Irish waters seems to undergo an interannual variability. In this study we propose to analyze the variations in albacore foraging habitat along its migration and distribution along the shelf break, and to discuss their implications in terms of predation on juveniles of three important small pelagic species: anchovy, blue whiting and Atlantic saury.

Stomachs of 1454 albacore originated from fisheries operating by day (trolling line, baitboat, rod-and-reel) and by night (pelagic trawling) were collected in the temperate Eastern North Atlantic in the years 2004 to 2007 and 2010 to 2011. In addition, 297 stomachs originated from baitboat and trolling line vessels were collected in the same area during the years 2012 to 2015. The stomach contents were analyzed through correspondence analyses, and a predation rates (daily number of individuals or biomass ingested) were estimated for anchovy, blue whiting and Atlantic saury.

Albacore diet displays a high plasticity and an important spatial variability both latitudinally and in terms of oceanic vs shelf-break waters. Consumption of the three species displays an important interannual variability, probably related to interannual recruitment variations. Atlantic saury consumption also shows a latitudinal variability, appearing more important in the northern part of albacore distribution. Blue whiting consumption appears related to the shelf-break of the Bay of Biscay and Celtic Sea but not significantly to latitude. Anchovy consumption displays an important seasonal and latitudinal variability, being higher in the late summer and autumn in the southern Bay of Biscay. The implications of this spatial and temporal variability, in terms of feeding success for albacore and in terms of predation impacts on these three small pelagic species in their pre-recruitment stages, are discussed.

Key words: Albacore, Anchovy, Blue whiting, saury, predation, Bay of Biscay

Using spatially balanced sampling designs to optimise cost-efficiency of long term monitoring programs: application to Manila clam in Arcachon Bay

Presentation: Oral

Speaker: Kermorvant Claire

Kermorvant Claire¹, Caill-Milly Nathalie², D'Amico Frank¹, Bru Noëlle¹

1 - CNRS / Univ Pau & Pays Adour/ E2S UPPA, Laboratoire de Mathématiques et de leurs Applications de Pau – MIRA, UMR5142 64600, Anglet (France)

2 - Laboratoire Environnement Ressources Arcachon/Anglet (France)

Contact: claire.kermorvant@univ-pau.fr

Abstract

Sustainable management of natural populations requires an efficient standardized long term monitoring program, which is often difficult to implement, especially for resources characterized by high spatiotemporal variability in their distribution such as Clams. It exist a trade off between improving efficiency obtained by increasing sample size and lowering costs by, conversely, reducing sample size. Today, thanks to rapidly evolving statistical theory, new survey designs are developed, some with the characteristic of well balancing samples in the study area. This presentation aims at demonstrating that theses advanced sampling designs (here BAS and GRTS) perform better than the usual ones (here SRS) for marine benthic exploited resources, with the benefices of saving money and also increasing results accuracy. We choose to apply such methods to Manila clam's stock monitoring in Arcachon Bay. This stock provides a livelihood for some seventy fishermen and is thus under high scrutiny. For the last two years the scientific surveys to obtain data to estimate the stock did not hold due to financial difficulties of the project holder (around 50 000,-/survey). We used a simulation study based on real data to assess and compare performances of new and current sampling designs on this survey. Three sampling designs (SRS, GRTS and BAS) were tested on each of the 6 last monitoring campaigns data. Firstly, we found that for a same achieved accuracy in results, spatially balanced sampling designs (i.e. BAS and GRTS) are so cost-effective that is 30% of each campaign price could be saved if they were used instead of simple random sampling. Secondly, the three sampling designs need a constant sample size thought years to achieve a fixed accuracy in results. This allows fixing one sample size that could be done for future campaigns despite the existence of spatial and temporal variations in clam's distribution.

Key words: spatially balanced sampling, Manila clam, virtual ecology, arcachon bay

The Pacific and the Portuguese cupped oysters, two semi-isolated species as genomic resources for shellfish farming

Presentation: Oral

Speaker: Lapègue Sylvie

Lapègue Sylvie¹, Heurtebise Serge¹, Lamy Jean-Baptiste¹, Cornette Florence¹, Dégremont Lionel¹, Flahauw Emilie¹, Chapat Mélodie¹, Boudry Pierre², Bierne Nicolas³, Gagnaire Pierre-Alexandre³

1 - Ifremer-Unité Santé Génétique et Microbiologie des Mollusques (France)

2 - Ifremer-Laboratoire des Sciences de l'Environnement Marin (France)

3 - Institut des Sciences de l'Evolution de Montpellier (France)

Contact: Sylvie.Lapegue@ifremer.fr

Abstract

The existence of marine semi-isolated species pairs evolving in the "grey zone" of the speciation continuum provides interesting opportunities to contribute to some highly debated questions in the field of speciation genomics. Because genetic divergence does not easily maintain in the face of gene flow in the absence of genetic barriers, high gene flow species such as broadcast-spawning marine invertebrates offer valuable study systems for disentangling the mechanisms at play during speciation. In this context we have focused our interest on the Pacific cupped oyster, *Crassostrea gigas*, and the Portuguese cupped oyster, *C. angulata*, representing worldwide important resources for shellfish farming. They are parapatrically distributed in their native range in the north-western Pacific and introduced recently in Europe. Furthermore, whether *C. gigas* and *C. angulata* truly represent biological species, semi-isolated species or populations of the same species also remains unclear. Therefore, thanks to new genomic resources we (1) tested the existence of genetic barriers between *C. angulata* and *C. gigas* by searching for genomic regions that remain differentiated in the presence of gene flow, (2) developed a dedicated SNP panel allowing to discriminate both genomic backgrounds and their hybrids, and (3) investigated more thoroughly the distribution of both genomic backgrounds in Europe and their level of recent introgressions more particularly in Portugal and Southern Atlantic coast of France. Our results suggest that the environmental transition caused by the co-introduction of the two species in Europe did not affect the genomic architecture of partial reproductive isolation, and that these semi-species are still evolving in the so-called "speciation grey zone". Furthermore the recent reciprocal introgressions observed in contact zones in Portugal and France highlight the need to question about a deeper characterization and potentially conservation of those genomic resources of importance for shellfish farming.

Key words: cupped oysters, shellfish farming, genomic resources

Does glass eels migration propensity depends on metabolism and autophagy?

Presentation: Oral

Speaker: Liu Hengtong

Liu Hengtong¹, Seiliez Iban², Coste Pascale¹, Rives Jacques¹, Huchet Emmanuel¹, Plagnes-Juan Elisabeth², Bolliet Valérie¹

1 - UMR Ecologie Comportementale et Biologie des Populations de Poisson (France)

2 - UMR 1419 Nutrition Métabolisme Aquaculture (France)

Contact: valerie.bolliet@univ-pau.fr

Abstract

European eel, a catadromous species, has encountered a sharp population decline in the last few decades. Glass eels migrate up estuaries using flood, and probably hide in the substratum during ebb tide. However, migration is known to be facultative and its determinism is far from being understood. Based on the fact that most glass eels starve during estuarine migration, energy might be an essential factor, which shapes glass eel's propensity to migrate. In this regard, how energy store drives the species migratory movement, how various energy expenditure rate between individuals play a role in their different patterns of colonization and how different strategies for the energy mobilization emerge between migratory and non-migratory groups are central questions in our study. To address these questions, we collected 148 wild marine (Moliets) and estuarine (Urt) glass eels in November and March, presenting different energetic status. All fish were weighed, measured and tagged with Visible Implant Elastomer. Their individual swimming activity level and tactic (swimming with and/or against the current) were observed in experimental installations that mimic the water current reversal of tide. Then, the metabolism of all glass eels was assessed by measuring oxygen consumption as well as the expression of 61 genes, involved in metabolism and autophagy, a major energy mobilization process. The relationships between swimming activity and metabolic markers were analyzed depending on the season and the sampling site.

Key words: autophagy, metabolism, migration, glass eel

Pressure and impacts of fisheries on the Bay of Biscay fish communities: patterns and trends

Presentation: Oral

Speaker: Rochet Marie-Joelle

Rochet Marie-Joëlle¹

1 - Institut Français de Recherche pour l'Exploitation de la Mer (France)

Contact: mjrochet@ifremer.fr

Abstract

Fishing has a long history on the shelf of the Bay of Biscay. A wide diversity of fleets exerts direct pressures on many target species, as well as on bycatch species, both in the pelagic and demersal fish communities. Fishing also generates direct pressures on the seabed and benthic communities, and indirect cascading effects on ecosystem components which depend on or are eaten by these communities. These pressures may, or may not, generate impacts, that is, changes in target or non-target ecosystem components. The Bay of Biscay fish communities are changing, but are these changes due to fishing pressure or to other changes, e.g. water warming or other anthropogenic drivers? I will present an overview of patterns and trends in fishing pressure and impacts. Much work has been carried out over the last decades, based on fisheries statistics, onboard observer data, trawl and acoustic surveys, and other data. I will provide an attempt to synthesize these studies. Which links can be found between fleet dynamics, changes in gears, catches and bycatches, on the one hand, and fish community dynamics on the other hand? To what extent are fisheries manageable, that is, which economic or management drivers of fleet dynamics have had detectable consequences in the water?

Key words: pressure, fisheries, impact

Target strength and frequency response of Mueller's pearlside (*Maurolicus muelleri*)

Presentation: Oral

Speaker: Sobradillo Beatriz

Sobradillo Beatriz¹, Boyra Guillermo¹, Carrera Pablo¹, Peña Marian¹, Irigoien Xabier¹

1 - AZTI-Tecnalia (Spain)

Contact: bsobradillo@azti.es

Abstract

Acoustic methods were used in this study to determine the main parameters useful to perform an abundance estimation of Mueller's pearlside (*Maurolicus muelleri*, Sternoptychidae): frequency response and target strength at five frequencies (18, 38, 70, 120 and 200 kHz). In addition, specific spatial analyses were performed on the distribution of pearlside at a regional scale (Bay of Biscay), to design a precise survey scheme that ensures the minimum sampling error. Data associated to species specific catches were collected during early autumn of years from 2014 to 2017 and were used to (1) determine pearlside's spatial distribution in the Bay of Biscay, (2) characterize its frequency response and (3) estimate a target strength versus length relationship and the target strength values (TS; dB re 1m²) at 18, 38, 70, 120 and 200 kHz frequencies. TS was estimated, using a multifrequency simultaneous filter to minimize the potential bias associated to multiple targets. Then, the filtered TS and sampled L data were used to estimate b₂₀: -64, -70, -73, -73 and -73 dB (re 1 m²), respectively, using the method of least squares. A backscattering model based on a gas-filled prolate spheroid was used, parameterized with measures of pearlside length, swimbladder length, height and width from X-radiographs, fish depth and assumed incidence angle and material properties. This model was used to compare the frequency response and TS results to theoretical values across a frequency range between 0 and 250 kHz. Finally, some local scale geostatistical analyses were made to analyze the spatial structure of pearlside in the Bay of Biscay and define the optimal parameters to be used for a future survey focused on pearlside biomass estimation in this area, ensuring the minimum interpolation error.

Key words: marine acoustics, *Maurolicus muelleri*, multifrequency, target strength, frequency response, prolate spheroid, spatial autocorrelation

Counting and sizing bluefin tuna schools using medium range sonars of baitboats in the Bay of Biscay

Presentation: Oral

Speaker: Uranga Jon

Uranga Jon¹, Arrizabalaga Haritz², Goñi Nicolas¹

1 - AZTI-Tecnalia (Spain)

2 - University of the Basque Country (Spain)

Contact: juranga@azti.es

Abstract

Automated counting and sizing bluefin tuna schools using medium range sonar data extracted from an acoustic systematic sampling survey in the Bay of Biscay is addressed. With the image analysis program, morphometric data of observed bluefin tuna schools is obtained, then the morphometric classification model (MCM) is applied and "Tuna" or "No-Tuna" labels are obtained. Next, using the optical character recognition application, vessels operational data is extracted for each instance of the database. With these data, a novel methodology for counting and sizing schools is developed. Counting results validation is done by contrasting the number estimated schools with observed ones. Estimated areas affection from variable sonar gain changes is standardized and the possible sonar range variations are also controlled. The estimated number of tuna schools and their relative size given by present methodology can be used for fisheries independent abundance estimation evaluations. Thus, factors that introduce bias in the inter-annual abundance indices calculation, such as food availability, feeding behavior and stomach repletion are avoided and the methodology can be applied in two ways: replacing the currently used captures per unit effort (CPUE) index by a detection per unit effort (DPUE) index based on acoustic bluefin tuna school detection or performing systematically sampled acoustic surveys to monitor the presence of this species at the BoB year after year.

Key words: sonar, fishing vessel data, automated analysis, school counting and sizing, bluefin tuna.

Spatio-temporal dynamics of European seabass population: seasonal migrations, site fidelity and population structure inferred from large scale electronic tagging

Presentation: Oral

Speaker: Woillez Mathieu

Woillez Mathieu¹, Drogou Mickael¹, Le Goff Ronan¹, Martin Stéphane¹, Garren François¹, Le Ru Loïc¹, Le Roy Didier¹, Heerah Karine¹, De Pontual Hélène¹

1 - IFREMER - Unité de recherche Sciences et Technologies Halieutiques (France)

Contact: mathieu.woillez@ifremer.fr

Abstract

European sea bass, *Dicentrarchus labrax*, an iconic species in the North East Atlantic targeted both by professional and recreational fishers, has recently shown strong declines due to poor recruitment and overfishing in the northern stock. As a data poor species, we aimed to better understand sea bass spatio-temporal dynamics. Large-scale DST tagging programs were recently executed from Capbreton in the south of the Bay of Biscay to Dunkirk in the southern North Sea. Of 1466 deployed DSTs, 422 have been recovered to date, approximately half of which have yielded time-series long enough to cover the spawning migration. Individual tracks were reconstructed using a Hidden Markov geolocation models that infer sea bass positions from the sole use of high-resolution temperature and depth histories. Track analysis confirms sea bass to be a partial migratory species, as individuals exhibited either long distance migrations or localised residency. Migrants exhibited a strong fidelity to summer feeding areas while fidelity to winter spawning areas was also confirmed by the majority of recovered tags covering the full annual cycle. North and west Brittany appeared to be locations where sea bass undertake distinct long distance migrations; sea bass migrate towards either the Bay of Biscay or the Celtic Sea. The south of the Bay of Biscay is another location of mixing subpopulations with sea bass migrating towards either the Iberian peninsula or off the Bay of Biscay. Our results suggest that the sea bass population is spatially structured, the underlying mechanisms for which will require further investigation. In the meantime, however, our data provide an evidence base through which fisheries managers can explore the consequences and implications of considering population substructure either by EU managers in the ICES assessment, or by local managers looking to achieve regional conservation outcomes.

Key words: movement ecology, biologging, data storage tags, temperature, depth, migration, site fidelity, population structure, seabass

John Dory: environmental and fishing drivers along 3 decades in the northern Spanish shelf

Presentation: Poster

Speaker: Blanco Marián, Alberto Serrano

Marian Blanco¹, Alberto Serrano¹, Itxaso Salinas², Olaya Fernández¹, Hortensia Araujo²,
Susana Ruiz¹, Izaskun Preciado¹, Antonio Punzón¹

1 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Santander (Spain)

2 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Vigo (Spain)

Contact: marian.blanco@ieo.es

Abstract

Spatial distribution patterns of John Dory (*Zeus faber*, L.) were examined in relation to depth, substrate type, near-bottom temperature and salinity and geographical location as environmental variables, and fishing effort and discard rate as anthropogenic variables. Data were collected during a more than 30-year period (1983-2017) of autumn sampling using IBTS demersal trawl surveys in the northern Spanish shelf. No clear patterns have been observed along the time series. Regarding spatial distribution, John Dory appears in hotspots of abundance, showing a preference for shallower and warmer habitats. Relationships between distribution and trawl fishing activities are evaluated together with the possible effects of climate change in increasing its frequency of occurrence.

Key words: demersal, john dory, environmental effects, trawling impacts, bottom trawl surveys

Acoustic-based fishery-independent abundance index of juvenile bluefin tunas in the Bay of Biscay: first results and challenges

Presentation: Poster

Speaker: Goñi Nicolas

Goñi Nicolas¹, Uranga Jon¹, Onandia Iñigo¹, Arregi Igor¹, Godard Iann², Boyra Guillermo¹,
Melvin Gary³, Arrizabalaga Haritz¹, Santiago Josu¹

1 - AZTI-Tecnalia (Spain)

2 - Université de Pau et des Pays de l'Adour - Collège STEE (Campus de Montauray) (France)

3 - Fisheries and Oceans Canada (Canada)

Contact: ngoni@azti.es

Abstract

In the Eastern temperate North Atlantic, the Bay of Biscay is a well-known summer feeding area for juvenile bluefin tunas (ages 1 to 4). An acoustic survey was performed in the Bay of Biscay during July 2015, 2016 and 2017 on-board a baitboat fishing vessel, using a long-range 90kHz sonar and a SIMRAD EK60 38kHz scientific echosounder. The survey followed systematic transects throughout the fishing ground defined according to bluefin tuna catch locations by baitboats in the summers 2000 to 2011. Along these transects, all bluefin tuna detections by sonar and echosounder were recorded. In each aggregation, no-kill fishing events or direct observations through stereoscopic camera were conducted in order to verify the species as well as to sample the sizes of the bluefin individuals. The spatial distribution of detected bluefin schools is shown, and the estimated number and size of individuals in the detected schools is provided. The spatial distribution of detected potential prey schools (anchovy, krill, myctophids) and of albacore (competitor species) is also shown.

The goal of this survey is to produce an acoustic, fishery independent abundance index in the Bay of Biscay as an alternative to the current one, based on catch rates, that is being used in the stock assessment of the East Atlantic and Mediterranean bluefin tuna. In addition, the simultaneous observation of anchovy, krill, myctophids and albacore allows us to analyze their possible influences on bluefin tuna distribution.

The detected abundance and distribution of bluefin tuna is analyzed in terms of size-related variability and of influence of preys and competitors on perceived bluefin tuna abundance.

Key words: Bay of Biscay, abundance index, acoustics, bluefin tuna, prey, competition

Megrim (*Lepidorhombus whiffiagonis*) in northern Iberian waters: corroboration the age determination and estimation of mortality by year-class analysis

Presentation: Poster

Speaker: Landa Jorge

Jorge Landa¹, Jorge Fontenla², Enrique Rodríguez-Marín¹

1 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Santander (Spain)

2 - Instituto Español de Oceanografía (IEO) Centro Oceanográfico de Vigo (Spain)

Contact: jorge.landa@ieo.es

Abstract

Megrim (*Lepidorhombus whiffiagonis*) is an important European commercial flatfish and reliable age and growth information is needed for the stock assessment. The Atlantic Iberian megrim stock (ICES Div. 8.c and 9.a) is annually sampled and aged in IEO, and assessed by age-structured models in ICES.

Otoliths (n = 9909) collected in 25 annual bottom trawl surveys in Cantabrian Sea and Galician waters were aged and yearly age-length-keys (ALKs) were built using the respective age estimates. A matrix of abundance indices by age and year was obtained after applying each ALK to the respective length distribution. The current age estimation criterion using otoliths of megrim was corroborated by tracking year-class abundance indices in the surveys. The strength of the cohorts was well tracked and significant correlations between age classes from the same year-classes up to the age 5 (~ 94% of the individuals caught) were obtained. The analysis of the cohorts and their catch curves also allowed finding out interesting aspects of the year-classes mortalities and the relationship with their abundance indices, evidencing that the mortality of megrim may depend on its abundance. Von Bertalanffy growth parameters were estimated for the time-series, and the growth performance indices estimated were within the range previously found for megrim in Bay of Biscay and nearby waters.

Key words: age estimation, groundfish surveys, growth, megrim, *Lepidorhombus whiffiagonis*, northeast atlantic, northern spanish shelf, otolith

Estimation of set fishing gear effort for use as a pressure indicator

Presentation: Poster

Speaker: Rodríguez-Basalo Augusto, Ceballos Elvira

Punzón Antonio¹, Rodríguez-Basalo Augusto¹, Ceballos Elvira¹, Serrano Alberto¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

Contact: antonio.punzon@ieo.es

Abstract

One of the main objectives in Descriptor 6 of Seabed Integrity of the Marine Strategies Framework is the evaluation of the fishing pressure on the benthic habitats. So far, internationally, most of the analytical efforts have been directed towards obtaining a pressure indicator for trawling. This is due to the fact that it is one of the most widely used gear, and it is probably the fishing gear that has the most impact on mainly sedimentary bottoms. But in the south of the Bay of Biscay (Cantabrian Sea), there is an important fishing activity with other types of fishing gears, such as the set longline and set gillnet, and that exploit important fishing resources. In addition, this type of gear interacts spatially with benthic habitats of the RN2000 in the study area. The evaluation of the impact on these habitats is one of the objectives of Action A4 of the LIFE INTEMARES Project. Therefore, having a spatial quantification of the fishing effort of this gears is fundamental both for the evaluation of the Good Environmental Status (GES), but it is also important for the management of areas of important environmental value. In this work we will analyze the spatial distribution of the effort of longlines and gillnets, as a proxy for the pressure exerted in a given space. For the spatial estimation of the effort, the VMS information (Vessel Monitoring by Satellite) will be used. Fishing books will be used to identify fishing gear and target species.

Key words: set fishing gear, effort, spatial distribution

Rise and fall of *Nephrops norvegicus* in the Southern Bay of Biscay

Presentation: Poster

Speaker: Serrano Alberto

Punzón Antonio¹, Cartes Joan², Serrano Alberto¹, Preciado Izaskun¹, Rueda Lucia¹,
Rodríguez-Basalo Augusto¹, Blanco Mari Angeles¹, Massuti Enric¹

1 - Instituto Español de Oceanografía (IEO) (Spain)

2 - Institut de Ciències del Mar (Spain)

Contact: antonio.punzon@ieo.es

Abstract

This work begins in the autumn of the year 2009. During the IBTS survey in Galician waters, we arrived to the harbor of Muros. We met an old fisherman who was going to give us new positions to trawl. I told him that Norway lobster had almost disappeared. Then he corrected me and told me that there was no Norway lobster in those fishing grounds in the 60s. Many questions came up from that conversation, and this poster shows the first steps to solve these questions. When we try to assess the status of a commercial species, our analysis are based on the oldest available information that can be used in different models. This means that in most cases our data refer to the time when the species were fully exploited or in a state of overexploitation. In the case of the Bay of Biscay, almost all assessments of demersal species begin in the early 1980s. So the question is: What is the actual state of the resources? What is the real role of the pressure exerted by the fishing activity in the state of resources? For this poster we are going to use two time series of data. On one hand we have recovered a historical series of catches and fleet by harbor from 1933 to 1986. This series will allow us to analyze the effects of environmental variables on the yields. And on the other hand we are going to analyze the information of the research survey in the south of the Bay of Biscay (from 1983 until now). With these data we will analyze what are the changes in the population from the moment it is considered fully exploited or shows the first signs of overexploitation, up to the present where his state is of severe depletion.

Key words: fihseries, *Nephrops norvegicus*, time series, survey

List of participants

Lastname	Firstname	Institution	Country
Abadie	Stéphane	UPPA	France
Aldalur	Unai	AZTI - Tecnalia	Spain
Altuna Etxabe	Miren	AZTI - Tecnalia	Spain
Alvarez	Paula	AZTI - Tecnalia	Spain
Amouroux	David	UPPA	France
Andre	Gaël	Shom	France
Anschutz	Pierre	University of Bordeaux	France
Arraud	Alison	UPPA	France
Asensio	Jose Luis	AZTI - Tecnalia	Spain
Ayouche	Adam	Ifremer	France
Azaroff	Alyssa	UPPA	France
Baills	Julien	CASAGEC	France
Bald	Juan	AZTI - Tecnalia	Spain
Bareille	Gilles	UPPA	France
Bellafont	Florian	UPPA	France
Bentaleb	Ilham	University of Montpellier	France
Beudin	Alexis	University of Bordeaux	France
Billard	Manon	UPPA	France
Bisch	Armaëlle	UPPA	France
Bolliet	Valérie	UPPA	France
Bru	Noëlle	UPPA	France
Buquet	Damien	University of Bordeaux	France
Burgeot	Thierry	Ifremer	France
Bustamante	Paco	University of La Rochelle	France
Caill-Milly	Nathalie	Ifremer	France
Calleja	Felipe	Universidad de Cantabria	Spain
Castège	Iker	Centre de la Mer de Biarritz	France
Chouvelon	Tiphaine	Ifremer	France
Chust	Guillem	AZTI - Tecnalia	Spain
Cognat	Mathis	EPOC	France
Cresson	Pierre	Ifremer	France
Daffe	Guillemine	CNRS / Université Bordeaux	France
D'Amico	Frank	UPPA	France
Davila	Xabier	AZTI - Tecnalia	Spain
Day	Louise	Ifremer	France
de Casamajor	Marie-Noëlle	Ifremer	France
de Diego	Alberto	University of the Basque Country UPV/EHU	Spain
de Pontual	Hélène	Ifremer	France
Debavelaere	Alexis	UPPA	France
Deborde	Jonathan	UPPA	France
Declerck	Amandine	SUEZ Eau France	France
Defontaine	Sophie	UPPA	France
Delaunay	Damien	Ifremer	France

Lastname	Firstname	Institution	Country
D'Elbée	Jean	Laphy	France
Delpey	Matthias	SUEZ Eau France	France
Derrien	Pierre-Yves	UPPA	France
Díez	Isabel	University of the Basque Country UPV/EHU	Spain
Dulaquais	Gabriel	Institut Universitaire Européen de la Mer	France
Dupré	Stéphanie	Ifremer	France
Duran	Robert	UPPA	France
Erauskin-Extramiana	Maite	AZTI - Tecnalia	Spain
Escribano Madina	Aitor	AZTI - Tecnalia	Spain
Fernández-Nóvoa	Diego	University of Vigo	Spain
Fontán	Almudena	AZTI - Tecnalia	Spain
Foulquier	Clémence	CASAGEC	France
Franco	Javier	AZTI - Tecnalia	Spain
Frutos	Inmaculada	University of Hamburg	Germany
Galparsoro	Ibon	AZTI - Tecnalia	Spain
Ganthy	Florian	Ifremer	France
Garmendia	Marina	University of the Basque Country UPV/EHU	France
Garmendia	Joxe Mikel	AZTI - Tecnalia	Spain
Gassie	Claire	UPPA	France
Gaudin	Philippe	UPPA	France
Gauthier	Victor	Ifremer	France
Gazzolli	Léa	University of Bordeaux	France
Gillet	Hervé	University of Bordeaux	France
Goni	Maria Soledad	UPPA	France
Gorostiaga	José-Maria	University of the Basque Country UPV/EHU	Spain
Gouriou	Laure	Ifremer	France
Granado	Domínguez	AZTI - Tecnalia	Spain
Gueux	Aurore	UPPA	France
Guiastrennec-Faugas	Léa	University of Bordeaux	France
Guyoneaud	Rémy	UPPA	France
Hafez	Tamer	University of the Basque Country UPV/EHU	Spain
Huguenin	Laura	UPPA	France
Iriarte	Arantza	University of the Basque Country UPV/EHU	Spain
Kermorvant	Claire	UPPA	France
Lalanne	Yann	UPPA	France
Lamarins	Amaia	UPPA	France
Lamarque	Bastien	CNRS / Université Bordeaux	France
Lanceleur	Laurent	UPPA	France
Landa	Jorge	IEO	Spain
Lapègue	Sylvie	Ifremer	France
Lauga	Béatrice	UPPA	France
Lavesque	Nicolas	CNRS / Université Bordeaux	France
Lissardy	Muriel	Ifremer	France
Liu	Hengtong	INRA-UPPA	France
Lopez Conde	Ander	AZTI - Tecnalia	Spain

Lastname	Firstname	Institution	Country
Louzao	Maite	AZTI - Tecnalia	Spain
Mader	Julien	AZTI - Tecnalia	Spain
Marigomez	Ionan	Centre for Experimental Marine Biology and Biotechnology	Spain
Masselink	Gerd	University of Plymouth	England
Mauffret	Aourell	Ifremer	France
Milon	Emilie	Centre de la Mer de Biarritz	France
Miossec	Carole	UPPA	France
Monperrus	Mathilde	UPPA	France
Morandeu	Gilles	Ifremer	France
Morichon	Denis	UPPA	France
Mourguiart	Bastien	Ifremer	France
Muguerza	Nahiara	University of the Basque Country UPV/EHU	Spain
Nicolae Lerma	Alexandre	BRGM	France
Oms	Pierre-Emmanuel	Institut de Radioprotection et de Sûreté Nucléaire	France
Pascual	Ana	University of the Basque Country UPV/EHU	Spain
Pedrero Zayas	Zoyne	UPPA	France
Pinarbasi	Kemal	AZTI - Tecnalia	Spain
Pinsivy	Lucas	Ifremer	France
Polo	Julia	Museo Maritimo del Cantábrico	Spain
Poncet	Pierre-Antoine	UPPA	France
Preciado	Izaskun	IEO	Spain
Proença	Barbara	University of Bordeaux	France
Puillat	Ingrid	Ifremer	France
Ramos	Elvira	Environmental Hydraulics Institute, Universidad de Cantabria	Spain
Renedo Elizalde	Marina	University of La Rochelle/ UPPA	France
Rigouin	Loic	Ifremer	France
Rochet	Marie-Joëlle	Ifremer	France
Rodríguez	Augusto	IEO	Spain
Rodriguez-Diaz	Laura	University of Vigo	Spain
Rodriguez-Ezpeleta	Naiara	AZTI - Tecnalia	Spain
Rodriguez-Valera	Francisco	University Miguel Hernández de Elche	Spain
Romero Rama	Andrea	UPPA	France
Ruiz	Irene	AZTI - Tecnalia	Spain
Salerno	Manon	UPPA	France
Sanchez	Florence	Ifremer	France
Sánchez	Francisco	IEO	Spain
Schler	Morgan	UPPA	France
Serrano-García	Humberto	University of the Basque Country UPV/EHU	Spain
Sobradillo	Beatriz	AZTI - Tecnalia	Spain
Sorbe	Jean Claude	CNRS	France
Sottolichio	Aldo	University of Bordeaux	France
Sous	Damien	University of Toulon	France
Stoichev	Teodor	University of Porto	Portugal
Tessier	Emmanuel	UPPA	France
Uranga	Jon	AZTI - Tecnalia	Spain

Lastname	Firstname	Institution	Country
Valencia	Victoriano	AZTI - Tecnalia	Spain
Valencia	Ainara	University of the Basque Country UPV/EHU	Spain
Veloso	Sandrine	UPPA	France
Wessel	Nathalie	Ifremer	France
Woillez	Mathieu	Ifremer	France
Zorita	Izaskun	AZTI - Tecnalia	Spain

Authors Index

Abadie Stéphane	21, 34, 39
Agogué Hélène	110
Akcha Farida	67
Alberto Serrano	148
Albisu Joxan	114
Aldalur Unai	134
Aldanondo Naroa	81, 138
Almeida C. Marisa	77
Almudena Fontán	37
Altuna Etxabe Miren	135
Alvarez Paula	81, 137
Amouroux David	60, 68, 74, 75, 77, 78, 79, 102, 132
Ander López	37
André Gaël	18, 21
Anschutz Pierre	38
Antonio Punzón	148
Arana Gorka	69
Aranda Jose Antonio	40
Arnoux Florian	39
Arraud Alison	101
Arregi Igor	140, 149
Arrizabalaga Haritz	137, 140, 146, 149
Arroyo Nina Larissa	96, 125, 126
Artigas Luis Felipe	44, 49
Asensio Jose Luis	40
Astarloa Amaia	82
Auby Isabelle	42, 46, 67, 71, 87
Authier Matthieu	131
Ayache Bruce	33
Ayoub Nadia	19
Ayouche Adam	19
Azaroff Alyssa	53, 64
Baills Julien	20
Bailly Du Bois Pascal	57
Bald Juan	48, 55, 63, 139
Baltzer Agnès	27
Bănaru Daniela	56, 88
Bardonnnet Agnes	76
Bareille Gilles	83
Barraquand Frédéric	87
Barre Julien	74
Basto M. Clara	77
Basurko Oihane	24, 31, 58
Battani Anne	27

Baudrier Jérôme	56, 107
Bellafont Florian	18, 21
Bentaleb Ilham	102
Bérail Sylvain	74
Berger Laurent	131
Bernard Guillaume	116
Bernon Nicolas	33
Beudin Alexis	41
Bhairy Nagib	43
Bierne Nicolas	142
Bisch Amaëlle	65, 130
Blanco Mari Angeles	152
Blanco Marián	100
Bode Antonio	95
Bolliet Valérie	73, 76, 143
Bonnin Axelle	140
Borja Angel	48, 55, 63, 139
Boudry Pierre	142
Bouquieaux Marie-Catherine	84
Bourriau Paul	131
Boyer Patrick	57
Boyra Guillermo	81, 82, 119, 145, 149
Brach-Papa Christophe	66
Breitenstein Johann	54
Briand Marine	88
Briant Nicolas	66
Brind'amour Anik	105, 107, 118
Bru Noëlle	123, 136, 141
Brun Mélanie	62
Bruzac Sandrine	67
Bueno Maité	75
Bujan Stéphane	22
Bulteau Thomas	33
Buquet Damien	22
Bustamante Maria	109, 124
Bustamante Paco	56, 74, 88
Caballero Ainhoa	40, 44, 49
Caballero Pablo	83
Cabezas-Basurko Oihana	44, 49
Cabré Anna	137
Cagnon Christine	110, 132
Caillaud Matthieu	57
Caill-Milly Nathalie	136, 141
Calleja Apéstegui Felipe	85
Cancio Ibon	61

Carravieri Alice	74
Carrera Pablo	145
Carstensen Jacob	86
Cartes Joan	152
Carton Xavier	19
Castège Iker	103
Cazes Jean-Baptiste	108
Cearreta Alejandro	59
Ceballos Elvira	151
Chaalali Aurélie	118
Chapat Mélodie	142
Charbonnier Céline	38
Charria Guillaume	19
Cherel Yves	74
Chiffolleau Jean-François	66
Chouvelon Tiphaine	56, 66, 67, 88
Chust Guillem	82, 86, 137
Cobo Fernando	83
Coelho J. Pedro	60
Cognat Mathis	42, 45, 46, 87
Cornette Florence	142
Coste Pascale	73, 76, 143
Costoya Xurxo	23, 28
Cotano Unai	84, 137
Cravo-Laureau Cristiana	110, 132
Cresson Pierre	56, 88
Cristobo Javier	99
Cugier Philippe	89
D'Amico Frank	91, 101, 103, 141
D'Elbée Jean	103, 108
Daffe Guillemine	104
Dailloux Damien	20
Damien Sous	43
Danglade Nikola	26
David Carmen	89
Dávila Xabier	44
Day Louise	105
de Casamajor Marie-Noëlle	65, 90, 93, 106, 123, 130
de Castro Maite	28
de Diego Alberto	68, 69
de Pontual Hélène	147
de Santiago Iñaki	26, 40
Deborde Jonathan	53, 70, 79, 93, 132
Decastro Maite	23
Declerck Amandine	24

Deflandre Bruno	50, 116
Defontaine Sophie	25, 43
Dégremont Lionel	142
Del Campo Andrea	40
Delarbre Jessica	44
Delaunay Damien	107
Delpey Matthias	24, 26
Dennielou Bernard	32
Depellegrin Daniel	48
Derrien Pierre-Yves	54, 70
Derrien-Courtel Sandrine	90
Derriennic Hervé	51
Deville Eric	27
Diaz De Cerio Oihane	61
Diez Isabel	109, 124
Doray Mathieu	131
Dorémus Ghislain	131
Drogou Mickael	147
Dubois Stanislas	89
Dugor Jérémy	20
Duhamel Erwan	131
Dulaquais Gabriel	54
Dumas Franck	57
Dupré Stéphanie	27
Dupuy Christine	110, 131
Duran Robert	72, 79, 110, 117, 132
Dutertre Marie-Adèle	136
Duval Bastien	68, 74
Ehrhold Axel	27
Enrique Rodríguez-Marín	150
Epelde Irati	26
Erauskin-Extramiana Maite	137
Escribano Aitor	138
Escribano José	114
Escudero Raquel	94
F. De La Hoz Camino	97
Fanjul Alvaro	115
Fayos Manena	114
Fdez-Ortiz De Vallejuelo Silvia	68
Fernandes Jose	31
Fernández Ruth	95
Fernández-Martín Pilar	121
Fernández-Nóvoa Diego	23, 28
Fernández-Ortiz De Vallejuelo Silvia	69
Ferreira Sophie	51

Ferrer Luis	24, 31, 40, 58, 137
Flahauw Emilie	142
Fontán Almudena	55, 63
Fostier Anne	78
Foucher Eric	107
Foulquier Clémence	91, 101
Fraile Igaratza	140
Franco Javier	55, 63
François Fourel	102
Frédérique Eynaud	22
Fruitier-Arnaudin Ingrid	110
Frutos Inmaculada	111, 112
Gagnaire Pierre-Alexandre	142
Galparsoro Ibon	48, 92
Ganthy Florian	35, 42, 45, 46, 87
Garabetian Frédéric	116
Garcia Dorleta	135
Garcia Salvador	113
Garcia-Baron Isabel	95, 113, 114
Garcia-Castrillo Gerardo	122
Garmendia Joxe Mikel	139
Garmendia Marina	69
Garren François	147
Gassie Claire	53
Gaudin Philippe	117
Gauthier Victor	29, 44
Gautier Emeric	27
Gazzoli Léa	30
Gigault Julien	78
Gillet Hervé	30, 32, 50
Godard Iann	149
Gomez Maria	127
Gómez-Ballesteros María	99
Gómez-Gesteira Moncho	23, 28, 36
Goñi Nicolas	140, 146, 149
Gonzalez Jean-Louis	67
Gonzalez Manuel	40
Gonzalez Patrice	67
González-Irusta José Manuel	96
González-Quirós Rafael	121
Gorostiaga José Maria	65, 90, 93, 109, 124, 130
Gouillieux Benoit	104, 112
Gouriou Laure	71
Gourves Pierre-Yves	67
Grall Jacques	104

Granado Igor	31
Grasa Irene	128
Gredilla Ainara	68, 69
Grellier Patrick	131
Grémare Antoine	50, 116
Gueux Aurore	108
Guglielmo Letterio	102
Guiastrennec-Faugas Léa	30, 32
Guinda Xabier	97
Guyoneaud Rémy	53, 64, 117
Hafez Tamer	72
Hanquiez Vincent	32
Harmelin-Vivien Mireille	56, 88
Haro-Moreno Jose M.	98
Heerah Karine	147
Hervé Corentin	110
Heurtebise Serge	142
Holub Alexandre	83
Hortensia Araujo	148
Howa Hélène	38
Huchet Emmanuel	76, 143
Huerta Maria	126
Huguenin Laura	65, 90, 93, 106, 123, 130
Huret Martin	131
Hutchings Pat	104
Ibaibarriaga Leire	135, 137
Imbert Patrice	27
Iñarra Bruno	81
Intxausti Iñaki	114
Irabien Maria Jesús	59
Irati Epelde	40
Iriarte Arantza	86, 94, 115
Irigoién Xabier	84, 86, 137, 145
Itxaso Salinas	148
Izaskun Preciado	148
Jorge Fontenla	150
Jorge Landa	150
Juanes De La Peña José Antonio	85, 97
Kermorvant Claire	141
Knoery Joël	54, 66, 67
Kojadinovic Ivan	39
Lalanne Yann	65, 90, 93, 106, 123, 130
Lamarins Amaïa	73
Lamarque Bastien	116
Lamouroux Mélina	71

Lamy Jean-Baptiste	142
Lanceleur Laurent	43, 64, 70, 75, 79, 132
Lanneluc Isabelle	110
Lanson Méline	45
Lanuza Paloma	122
Lapègue Sylvie	142
Larreta Joana	55, 63
Larroque Benoit	34
Lauga Béatrice	108, 117
Lavesque Nicolas	104, 116
Lazure Pascal	44, 49, 57
Le Berre Thomas	118
Le Bris Hervé	105, 118
Le Corre Cédric	57
Le Gal Aodren	90
Le Goff Ronan	147
Le Roy Didier	147
Le Ru Loic	147
Lebleu Pascal	50
Leckler Fabien	18
Liquet Benoit	34
Liria Pedro	26, 40
Lissardy Muriel	90, 106, 136
Liu Hengtong	73, 143
Londeix Laurent	22
López-López Lucia	96, 125, 126
López-Pérez Mario	98
Loubrieu Benoît	27
Louchart Arnaud	44
Lourido Antia	99
Louzao Maite	82, 95, 113, 114, 119, 120, 121
Lynda Boukhlif	102
Mader Julien	24, 26, 40, 58
Maire Donovan	57
Mallet Cyril	33
Manso Ivan	44
Manuel González	37
Marian Blanco	148
Marina Chifflet	37
Martin Cristian	115
Martin Stéphane	147
Martinez Udane	81, 82, 119
Martinez-Garcia Blanca	47
Marty Samuel	83
Marzloff Martin	89

Massé Jacques	131
Massuti Enric	152
Mauffret Aourell	56, 62, 88
Melvin Gary	149
Menchaca Iratxe	139
Mendibil Iñaki	84
Mendicoa Jone	47
Méteigner Claire	67
Mialet Benoit	56, 88
Michalet Richard	35
Michel Guillaume	27
Milon Emilie	103
Milpied Jean-Marc	103
Miossec Carole	64, 65, 70, 79
Modica Larissa	122
Monperrus Mathilde	43, 53, 64, 65, 70, 73, 76, 79, 93, 108, 130, 132
Morichon Denis	18, 21, 26, 43
Morillon Mehdi	57
Mouret Aurelia	38
Mourguiart Bastien	106, 123
Muguerza Nahiara	109, 124
Muñoz Isabel	96
Murcia José Luis	95
Nachon David	83
Naessens Fabien	22
Nerea Goikoetxea	37
Nicolae Lerma Alexandre	33
Nogueira Enrique	95
Nogues Mikel	40
Nowaczyk Antoine	51
O'brien Todd	86
Oger-Jeanneret Hélène	67, 71
Olaya Fernández	148
Oleaga Ruiz De Escudero Alvaro	114
Oms Pierre-Emmanuel	57
Onandia Iñigo	149
Ondiviela Eizaguirre Bárbara	85
Ortiz-Zarragoitia Maren	61
Paris François	33
Parisot Florian	62
Parra Santiago	99
Pascual Ana	47
Patrocínio Teodoro	99
Péchevran Christophe	83
Pedrero Zoyne	74

Peña Marian	145
Pereira M Eduarda	60
Perrière-Rumèbe Myriam	67
Petitgas Pierre	131
Pierce Graham	95
Pierre Catherine	27
Pigot Thierry	70
Pinarbasi Kemal	48, 92
Pinsivy Lucas	118
Plagnes-Juan Elisabeth	143
Poirier Dominique	116
Polo Julia	122
Poncet Pierre-Antoine	34
Prado Elena	99
Preciado Izaskun	96, 125, 152
Proenca Barbara	35
Puente Araceli	97
Puillat Ingrid	49
Punzón Antonio	96, 100, 127, 151, 152
Quintano Endika	90, 93, 109, 124
Rabanal Irene	126
Ramos Elvira	97
Renedo Marina	74
Revilla Marta	55, 63
Rey Anaïs	84
Richter Larissa	78
Rigouin Loic	42, 45, 46, 67, 87
Rihouey Didier	20, 91
Ríos Pilar	99
Ripaud Yann	41
Riso Ricardo	54
Rives Jacques	73, 143
Rochet Marie-Joëlle	144
Rodriguez Augusto	127
Rodriguez-Basalo Augusto	99, 151, 152
Rodriguez-Cabello Cristina	122, 128, 129
Rodriguez-Diaz Laura	36
Rodriguez-Ezpeleta Naiara	84
Rodriguez-Valera Francisco	98
Romagnan Jean-Baptiste	131
Romero Rama Andrea	75, 79
Romero Ramirez Alicia	116
Rouaud Vanessa	117
Rozuel Emmanuelle	67
Rubio Anna	24, 31, 40, 44, 49, 58, 82, 119

Rueda Lucia	152
Ruffine Livio	27
Ruiz Irene	44, 58
Saavedra Camilo	95, 113
Sabidussi Jonathan	22
Sablé Sophie	110
Saibi-Yedjer Lynda	56
Saiz-Salinas Iñaki	109, 124
Salerno Manon	130
Salvo Vanessa-Sarah	58
Sanchez Florence	131
Sánchez Francisco	99, 100, 122, 129
Santiago Josu	149
Santos M. Begoña	95, 113, 114, 121
Santos Maria	137
Santos Mokoroa Maria	84
Sartoretto Stéphane	106
Saulnier Erwan	105, 118
Savoye Nicolas	66, 67
Scalabrin Carla	27
Schler Morgan	76
Schmidt Sabine	50, 116
Seilliez Iban	73, 143
Serrano Alberto	96, 100, 151, 152
Serrano Humberto	59
Silva Jacinto Ricardo	32
Simplet Laure	32
Sireau Teddy	67
Sirieix Colette	22
Sobradillo Beatriz	81, 145
Solaun Oihana	55, 63
Solier Luc	57
Somdecoste Tom	26
Sonke Jeroen	66
Sorbe Jean Claude	111
Soto Manu	69
Sottolichio Aldo	35, 41, 42, 51, 87
Sous Damien	34
Speller Camilla	102
Spitz Jérôme	56, 88, 131
Stoichev Teodor	60, 77
Susana Ruiz	148
Susperregui Nicolas	117
Sylvain Bérail	102
Tabouret Hélène	83

Tajadura Javier	109, 124
Ter Halle Alexandra	78
Tessier Emmanuel	53, 60, 64, 68, 74, 75, 77, 78, 79, 132
Theetten Sébastien	19
Thierry Burgeot	62
Trut Gilles	71
Ulvoas Beatrice	33
Uranga Jon	119, 146, 149
Uriarte Adolfo	40
Uriarte Ainhize	58
Uriarte Andrés	137
Uriarte Ibon	86, 94, 115
Urtizberea Agurtzane	138
Valeiras Xulio	95, 113
Valencia Ainara	61
Valencia Victor	55, 63
Valencia Victoriano	37
Valenzuela M. Gabriela	60
Vasconcelos Vitor	77
Vázquez Jose	95
Veloso Sandrine	75, 79, 132
Villarino Ernesto	86
Villate Fernando	86, 94, 115
Voiseux Claire	57
Waeles Matthieu	54
Weidberg Nicolas	121
Wessel Nathalie	56, 62, 88
Woillez Mathieu	147
Zaldibar Benat	134
Zanol Joana	104
Zaragosi Sébastien	22
Zarragoitia Maren	72
Zervoudaki Soutana	86
Zorita Izaskun	55, 63, 134