ICES/PICES

6TH ZOOPLANKTON PRODUCTION SYMPOSIUM

"NEW CHALLENGES IN A CHANGING OCEAN"

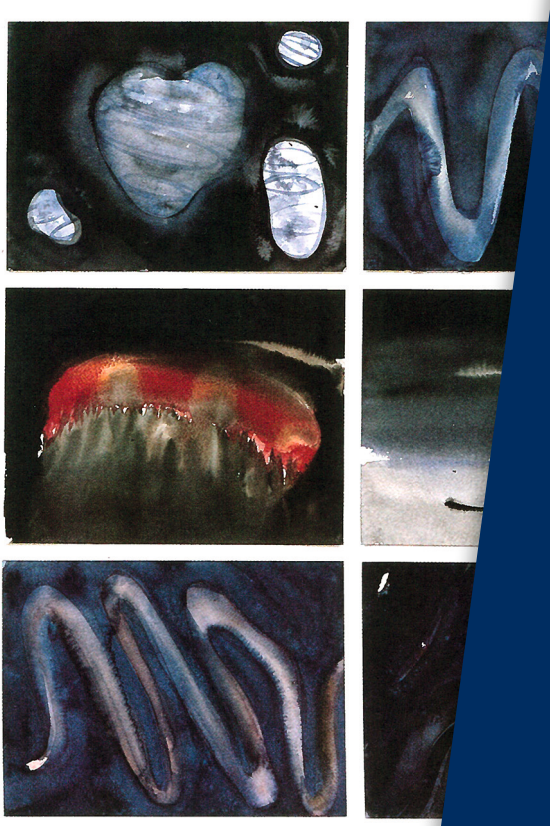
SCANDIC BERGEN CITY, **BERGEN, NORWAY**

9–13 MAY **2016**

ICES CIEM International Council for the Exploration of the Sea / Conseil International pour l'Exploration de la Mer

North Pacific Marine Science Organisation (**PICES**)

INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET



WORKSHOPS

WELCOME

On behalf of the conveners, organizers, and scientific steering committee, we welcome you to beautiful Bergen, surrounded by the Seven Mountains. Close to 400 scientists from more than 40 countries will gather here this week to share their knowledge and experiences in the study of zooplankton ecology. The theme of the symposium 'New Challenges in a changing Ocean' reflects our concern about climate change and global warming. Eight sessions and seven workshops will explore the use of new technologies in zooplankton studies, responses of zooplankton communities to climate change, zooplankton diversity and role in the marine food web, the potential for zooplankton fisheries, and much more. The number of contributions received gives a clear indication of the great activity and quality of biological oceanographic research worldwide.

The previous symposia in this series, held in Copenhagen, Denmark (1961), Plymouth, UK (1994), Gijon, Spain (2003), Hiroshima, Japan (2007) and Pucón, Chile (2011) proved to be excellent fora to discuss state-of-the art research on marine zooplankton and their role in the global ecosystem. The 6th International Zooplankton Production Symposium will be no exception, and the best contributions of the symposium will be published in a special volume of the *ICES Journal of Marine Science* in 2017.

We would like to thank ICES, PICES, IMR Norway, Norwegian Research Council, and numerous other people who have worked with us over the past three years to bring this symposium together. Without the efforts of the local and international organizers, professionals at the ICES Secretariat, your participation, and the generous financial support from our sponsors, it would not have been possible to convene a symposium of such broad scope.

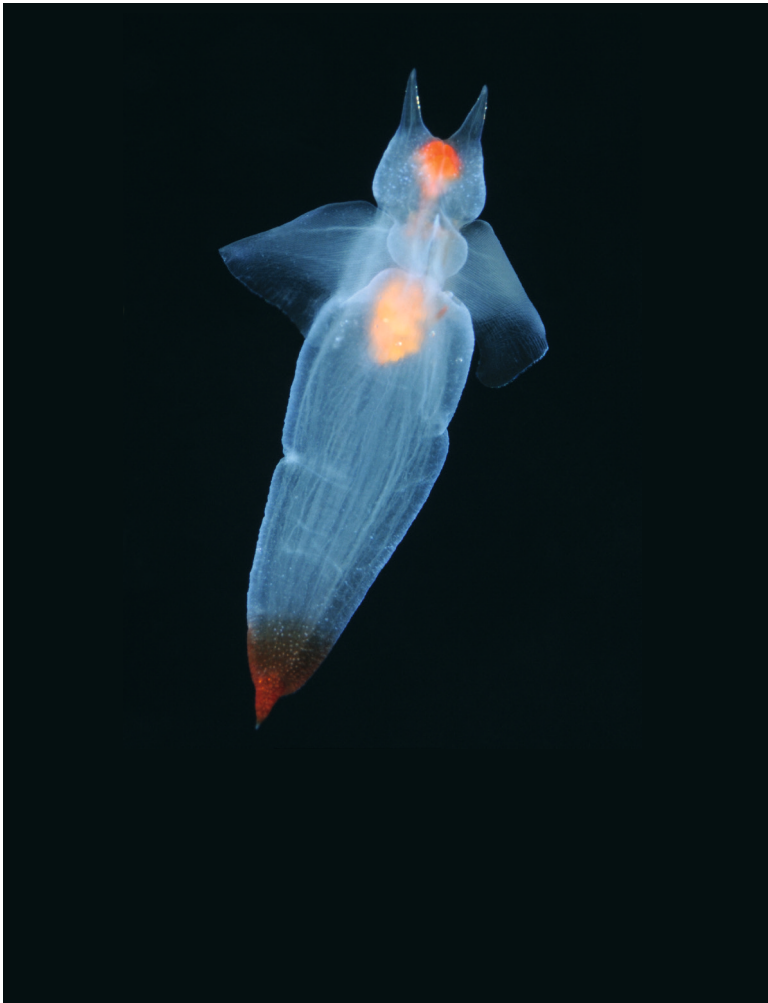
Bergen is Norway's second largest city and its idyllic setting and stunning natural harbour has cemented its reputation as one of Norway's most popular tourist spots. We hope the friendly and beautiful region will encourage productive scientific discussions. We also hope that you will use the opportunity to explore Bergen and the attractive surrounding areas during your stay.

We wish you a productive and enjoyable meeting.

Padmini Dalpadado
Symposium convener and Chair of the Local organizing committee

Astthor Gislason and Atsushi Tsuda
Symposium conveners

Photo: Nils Aukan



MONDAY 9 MAY 2016

	DRAGEFJELLET	SYDNESHAUGEN
09:00	Opening Ceremony	
09:35	**Keynote speaker** Hein Rune Skjoldal (Norway)	
10:15	**Keynote speaker** Stein Kaartvedt (Norway)	
10:55	Tea/coffee break	
11:20	**Session 2** Response of zooplankton communities to changing ocean climate	**Session 7** Zooplankton in high-latitude ecosystems
11:25	**Invited speaker** Erica Head (Canada)	**Invited speaker** Ksenia Kosobokova (Russia)
11:50	*Session 2 continues*	**Invited speaker** Bettina Meyer (Germany)
12:15		*Session 7 continues*
12:35	Lunch break	
14:00	*Session 2 continues*	*Session 7 continues*
15:40	Tea/coffee break	
16:10	*Session 2 continues*	*Session 7 continues*
17:50	End of day	
19:00 – 20:30	**Welcome Reception,** Scandic Bergen City	

TUESDAY 10 MAY 2016

	DRAGEFJELLET	SYDNESHAUGEN
09:00	Keynote speaker Ruben Escribano (Chile)	
09:40	Keynote speaker Sanae Chiba (Japan)	
10:20	Tea/coffee break	
10:50	*Session 2 continues*	*Session 7 continues*
12:30	Howard Browman (Editor-in-Chief, IJMS)	
12:45	Lunch break	
14:00	*Session 2 continues*	*Session 7 continues*
15:40	*End of session 2*	*End of session 7*
15:40	Tea/coffee break	
16:10	Session 1 Application of optical and acoustical methods in zooplankton studies	Session 3 The diversity and role of macrozooplankton in marine ecosystems
16:15	Invited speaker Egil Ona (Norway)	Invited speaker Peter Wiebe (USA)
16:40	Invited speaker Klas Ove Möller (Germany)	Invited speaker Lucas Brotz (Canada)
17:05	*Session 1 continues*	*Session 3 continues*
17:45	End of day	
17:45 – 19:45	Poster session	

WEDNESDAY 11 MAY 2016

09:00	**DRAGEFJELLET** Workshop 1 Use of zooplankton indicators to characterize state of pelagic ecosystems
	TEATERGATEN Workshop 2 ICES/PICES cooperative research initiative: towards a global measurement of zooplankton production
	HØDDEN Workshop 3 Zooplankton as a potential harvestable resource
	MUSEPLASS Workshop 4 Effects of microplastics on zooplankton
	GALGEBAKKEN Workshop 5 Zooplankton as the "to" in end-to-end models
	SYDNESHAUGEN Workshop 6 A hands-on introduction to time series analysis, visualization, and inter-comparison of plankton survey data
	TÅRNPLASS Workshop 7 Toward a taxonomically-comprehensive global reference database for DNA barcodes of marine zooplankton
10:20	Tea/coffee break
10:50	*Workshops continue*
12:30	*End of Workshops*
12:30	Lunch break
14:00	Excursions
18:00 – 20:00	Poster Session

THURSDAY 12 MAY 2016

	DRAGEFJELLET	SYDNESHAUGEN
09:00	Keynote speaker Eileen Hofmann (USA)	
09:40	Keynote speaker Erica Goetze (USA)	
10:20	Tea/coffee break	
10:50	*Session 1 continues*	*Session 3 continues*
12:30	Lunch break	
14:00	*Session 1 continues*	*Session 3 continues*
15:40	*End of session 1*	*End of session 3*
15:40	Tea/coffee break	
16:10	Session 4 Zooplankton diversity in the oceans by integrative morphological and molecular techniques	Session 6 Individual level responses of zooplankton to environmental variability and climate change
16:15	Invited speaker Junya Hirai (Japan)	Invited speaker Josefin Titelman (Norway)
16:40	Invited speaker Naiara Rodriguez-Ezpeleta (Spain)	Invited speaker Jeffrey Runge (USA)
17:05	*Session 4 continues*	*Session 6 continues*
18:05	End of day	
19:00	**Symposium dinner,** Scandic Bergen City	

FRIDAY 13 MAY 2016

	DRAGEFJELLET	SYDNESHAUGEN
09:00	Session 5 The role of microzooplankton in marine food webs	Session 8 New technologies and approaches in zooplankton trophic studies
09:05	Invited speaker Michael R. Landry (USA)	Invited speaker Edward G. Durbin (USA)
09:30	Invited speaker Hongbin Liu (China)	*Session 8 continues*
09:55	*Session 5 continues*	
10:35	Tea/coffee break	
11:05	*Session 5 continues*	*Session 8 continues*
12:45	*End of session 5*	*End of session 8*
12:45	Lunch break	
14:00	*Session 4 continues*	*Session 6 continues*
15:40	Tea/coffee break	
16:10	*Session 4 continues*	*Session 6 continues*
17:10	*End of session 4*	*End of session 6*
17:30 – 18:00	Closing Ceremony	

PLENARY SESSIONS

MONDAY 9 MAY 2016 – OPENING PLENARY SESSION

09:00 Performance of the Bergen Cultural School Saxophone Quartet

09:10 Welcome and opening remarks
Astthor Gislason (ICES Co-convener)
Sissel Rogne (Director IMR)
Marta Mjøs Petersen (Mayor of Bergen)
Thomas Therriault (Chair of PICES Science Board)
Cornelius Hammer (ICES President)

09:35 Keynote speaker
Hein Rune Skjoldal (Institute of Marine Research, Norway)
Calanus species in the Arctic Mediterranean: from life history to ecosystem dynamics

10:15 Keynote speaker
Stein Kaartvedt (University of Oslo, Norway)
Echosounders: Non-intrusive observations of the pelagic

TUESDAY 10 MAY 2016 – PLENARY SESSION

09:00 Keynote speaker
Ruben Escribano (Centro FONDAP-COPAS, Chile)
Does climate change matter for zooplankton production in upwelling systems?

09:40 Keynote speaker
Sanae Chiba (Japan Agency for Marine-Earth Science and Technology, Japan)
Discovery of the new through scrutiny of the old: Odate Collection and future of zooplankton monitoring in the global observation initiatives

12:30 Everything that you need to know about the special symposium issue of the ICES Journal of Marine Science
Howard Browman (Editor-in-Chief, ICES Journal of Marine Science)

THURSDAY 12 MAY 2016 – PLENARY SESSION

09:00 Keynote speaker
Eileen Hofmann (Center for Coastal Physical Oceanography, USA)
Modeling Southern Ocean foodwebs – approaches and challenges

09:40 Keynote speaker
Erica Goetze (University of Hawai'i at Manoa, Honolulu)
On the adaptive potential of marine zooplankton to global change

FRIDAY 13 MAY 2016 – CLOSING PLENARY SESSION

17:30 Closing remarks
Hal Batchelder (Deputy Executive Secretary PICES)
Best presentations awards (posters and talks)
Closing scientific remarks
Svein Sundby (Norway) Michelle Jungbluth (USA)
Closure of symposium
Hal Batchelder

18:00 End

SOCIAL EVENTS

MONDAY 9 MAY

19:00–20:30 **Welcome Reception**
Scandic Bergen City

TUESDAY 10 MAY

17:45–19:45 **Evening poster session**

WEDNESDAY 11 MAY

14:00–18:00 **Afternoon sightseeing**
Sign up at the registration desk

Trip 1 **Excursion to 'Lysøen',**
home of the famous Norwegian musician, Ole Bull, followed by a visit to the monastery ruins nearby.
Bus & boat | Price 250 NOK

Trip 2 **Excursion to the Coastal Museum**
in Øygarden with visit to a fish farm.
Bus | 250 NOK

Trip 3 **A walk through Bergen**
with a local guide.
50 NOK

Trip 4 **A walk to the KODE museum**
for a guided tour of the masterpieces of Astrup and Munch.
100 NOK

Trip 5 **A visit to Fløyen,**
the rooftop of Bergen. Enjoy the view and take a walk through the forest.
150 NOK

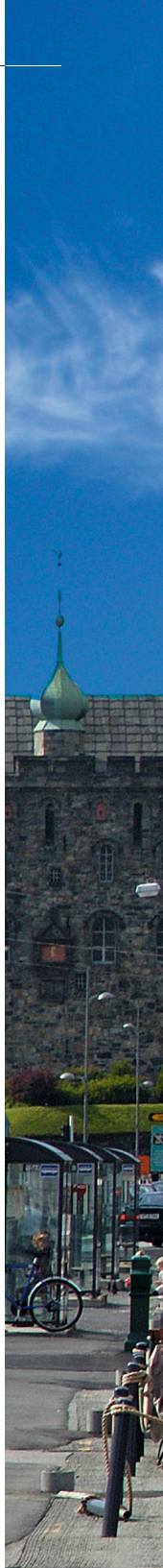
18:00–20:00 **Evening poster session**

THURSDAY 12 MAY

19:00 **Symposium dinner**
Scandic Bergen City

MONDAY 9 MAY–FRIDAY 13 MAY

Plankton images exhibition by Per R. Flood (former professor of zoology at the University of Bergen) takes place all week on the ground floor (H on the floor plan).



NOTES FOR GUIDANCE

REGISTRATION

The registration desk will be located on the ground floor (C on the floor plan) at the Scandic Bergen City. Next to the registration desk, there will be notice boards for announcements and messages. Registration is open on Sunday from 17:00–20:00 and from 08:00–17:00 for the rest of the week.

PRESENTATIONS

In order to allow the sessions to run smoothly, and in fairness to other speakers, please note that all presentations should adhere strictly to the time allocated. Authors should designate at least three minutes for questions. Your presentation time can be found in the agenda.

Presentations should preferably be uploaded online:
bit.ly/6ZPS-upload

When submitting your presentation please note the following:

- All presentations MUST be uploaded or handed in the day before your presentation.
- Presentations should preferably be in PDF format. However, those who have animations, movies, etc., can use other formats, e.g. Power Point.
- Presentations on individual laptops is not an option.
- Presentations scheduled for Monday should be uploaded or handed in at the presentations desk (15 on the floor plan) from 17:00–20:00 on Sunday 8 May at the Scandic Bergen City.
- Presentations for the rest of the week should also be uploaded or handed in at the presentations desk no later than 16:00 the day before your presentation. The presentations desk will be open during session breaks and at the beginning and end of each day.
- All presentations should be named with session, time, and name of the presenter (e.g. s4_1705_smith.pdf).

POSTERS

Posters will be displayed on the ground floor (E on the floor plan).

Poster Sessions will be held here from 17:45-19:45 on Tuesday 10 May and 18:00-20:00 on Wednesday 11 May. All poster contributors are requested to be present to answer questions.

Due to limited space, not all posters can be displayed simultaneously.

Posters will be on display according to the following plan:

Poster Session	Sessions displayed	Put up	Take down
Tuesday 10 May 17:45-19:45	S2, S7, S1, S3	Tuesday morning	Wednesday at lunch time
Wednesday 11 May 18:00-20:00	W1-7, S4, S5, S6, S8	Wednesday after lunch	Thursday at lunch time

INTERNET ACCESS

Wireless internet access will be available at the Scandic Bergen City. The network is called Scandic Easy. Participants can log on to the network using name and phone number. Remember to change the country code to your countries code.

REFRESHMENTS

Complimentary refreshments (coffee, tea, and snacks) will be served during coffee breaks on the ground floor (H on the floor plan).

SESSION 1

APPLICATION OF OPTICAL AND ACOUSTICAL METHODS IN ZOOPLANKTON STUDIES

Tuesday 10 May 2016 | 16:10–17:45
Thursday 12 May 2016 | 10:50–15:40

Conveners: Mark Benfield (USA) Ian H. McQuinn (Canada)
Invited speakers: Egil Ona (Norway) Klas Ove Möller (Germany)

Monitoring zooplankton communities in the ocean presents important spatial sampling challenges, not the least of which is our reliance on samplers and sensors to yield precise and unbiased measures of what we cannot see directly. Traditional net samplers have limited spatial and sample-volume resolution with respect to many ecological processes under investigation. This is especially problematic given the inherent patchiness, differential avoidance, and fragility that some zooplankton display. Both acoustical and optical systems provide a means of reducing or overcoming some of these challenges.

Acoustical methods are presently used to study zooplankton *in situ* at scales relevant to ecologically important behaviourally- and physically-driven dynamic processes, such as predator–prey interactions, vertical migrations, and aggregation dynamics. Although acoustics is a remote-sensing technique and therefore requires direct sampling to confirm species identification, rapidly evolving processing methods for multifrequency and broadband data continue to enhance the precision and accuracy of remote species classification. Optical systems such as the VPR, ISIIS LOPC, and others are emerging as powerful tools for documenting the distribution, abundance, species identification, and behaviour of zooplankton on fine- to basin-scales, demonstrating particular advantage by their ability to image fragile taxa. Moreover, optical approaches such as the ZooScan/ZooImage are improving the rate and manner that samples are processed.

The primary aim of this session is to assemble zooplankton scientists from a wide range of disciplines to explore the advantages and limitations of acoustics and optics in zooplankton ecology.

S1 PRESENTATIONS

TUESDAY 10 MAY 2016

16:10		Introduction by conveners
16:15	ID 317	Invited speaker: Egil Ona Observing zooplankton layers with acoustics at close range
16:40	428	Invited speaker: Klas Ove Möller Undersampled and underrated? Observing the role of marine snow in aquatic ecosystems
17:05	251	Sophie Fielding On-shelf predation pressure smooths out the wrinkles in krill swarms
17:25	392	Rolf J. Korneliussen Acoustic identification and measurements of weak targets such as jellyfish and zooplankton in mixed aggregations

THURSDAY 12 MAY 2016

10:50	ID 82	Barbara Remond A simple unsupervised echoes classification to detect different types of sound scattering layers in multispecific ecosystems
11:10	311	Patrick H. Ressler What we're learning from acoustic surveys of euphausiids in the Bering Sea, the Barents Sea, and the Gulf of Alaska (a tale of the once and future ping)
11:30	526	Rudy Kloser New insights into mesopelagic macrozooplankton using a profiling lagrangian acoustic optical system
11:50	141	Kendra Daly Deepwater Horizon oil spill response and McMurdo Sound, Antarctica: case studies using acoustic and camera imaging systems
12:10	216	Helena Hauss Dead zone or oasis in the open ocean? Zooplankton distribution and migration in low-oxygen modewater eddies
12:30		Lunch
14:00	470	Serdar Sakinan Enhancing the functionality of the net sampling using action cameras: jellyfish observations in the Black Sea during an acoustic survey
14:20	549	Mark C. Benfield Insights from an underwater imaging system: ZOOVIS deployments in the northern Gulf of Mexico and the Chesapeake Bay
14:40	115	Lars Stemmann World Wide Whole Plankton community inferred using a series of imaging instruments
15:00	512	Henk-Jan Hoving A novel ocean observation instrument for the characterization of epi-and mesopelagic macrozooplankton and micronekton communities
15:20	327	Marc Hufnagl Machine learning, classification, or clustering? Can we make use of the massive data sets obtained from Laser Optical Particle Counters for assessing biodiversity or species distribution?

S1 POSTERS

ID	
91	Richard Ricardo Horaeb Zooplankton Distribution in the Namibian Upwelling Region: A comparison of net catches with ADCP measurements
106	Xiaoxia Sun Zooplankton community structure in the continental slope of the South China Sea in Autumn, 2014
117	Carmen García-Comas Prey size diversity hinders biomass trophic transfer and predator size diversity promotes it in planktonic communities
153	Barbara Niehoff Comparing multi-net sampling with optical measurements: how efficient is LOKI (Lightframe In situ Key species Investigations) in analysing zooplankton communities in the Fram Strait?
158	Jason Everett Mapping zooplankton size spectra over large ocean regions
159	Jason Everett The missing link in our oceans: How zooplankton size spectra couple phytoplankton with fisheries
175	Marian Peña Spatial distribution and migrating behavior of mesopelagic species in the southern Bay of Biscay
183	Iván Pérez-Santos Oceanographic processes that favor the zooplankton distribution and aggregation in Puyuhuapi fjord and Jacaf channel (44.7° s)
205	Emilia Trudnowska The spatial variations in biomass size spectra between 0.1 µm and 10 mm based on optical measurements in the Fram Strait
279	Yuichiro Nishibe Degradation of discarded appendicularian houses by oncaeid copepods: evidence from *in situ* observations using a video plankton recorder
290	Cyrielle Bandura Distribution of mesozooplankton assemblages based on optical analysis of samples collected during an ichthyoplankton monitoring in the southern North Sea
301	Katty Donoso Zooplankton distribution and community structure in the Northwestern Mediterranean Sea during the Deep Water formation Experiment (DEWEX, February–April 2013)
308	Akash Sastri Evaluation of fixed-point echosounder multi-year time-series: An example from cabled, single, and multifrequency echosounders in coastal British Columbia, Canada
312	Kris Hostens Advantages and disadvantages of automation: a comparison of traditional, optical and acoustic techniques for zooplankton monitoring in shallow coastal and estuarine systems

316	Rosana Di Mauro MacroCam, a FlowCam prototype to process zooplankton samples.
318	Egil Ona Density and target strength measurements of the arctic copepod *Calanus borealis* measured *in situ* at short range
353	Kazutaka Takahashi *In situ* observations of a doliolid bloom in a warm water filament using a video plankton recorder: bloom development, fate, and effect on biogeochemical cycles and planktonic food webs
364	Maksim Koval Application of hydroacoustics for studying of the estuarine ecosystem (On the example of the Penzhina and Talovka Hypertidal Estuary, Northwest Kamchatka)
416	Lian E. Kwong Estimating active carbon flux using the biomass size spectra
421	Chaolun Li Zooplankton abundance, biovolume and size spectra at western boundary currents in the subtropical North Pacific
424	Katia Julissa Aronés Flores Estimating zooplankton biomass through conventional and acoustic methods in the Northern Humboldt Current System
436	Klas Ove Möller Scaling down from populations to individuals – Observing and modeling individual copepod behavior in response to predation risk
460	Boris Espinasse Detecting habitats considering the mesozooplankton size structure and environmental conditions in the Gulf of Lion, NW Mediterranean Sea
472	Margaux Noyon Variability of zooplankton size structure in mesoscale eddies in the Southwest Indian Ocean
474	Houssem Smeti Spatial and temporal variability of zooplankton off New Caledonia (Southwestern Pacific) from acoustics and net measurements
479	Maxime Geoffroy AUV-based acoustic observations of the distribution and patchiness of zooplankton
516	Ramiro Riquelme-Bugueño Integrating zooplankton measurements from ADCP acoustic backscatter and net sampling in an upwelling area of the northern Humboldt Current System
537	Sünnje L. Basedow Inflow of Zooplankton into the Arctic Ocean through the Fram Strait
538	Fredrick D. Marin Multivariate analysis of short term spatial and temporal variation of plankton communities and marine snow in the offshore Gulf of Mexico as estimated by the Video Plankton Recorder and MOCNESS
539	Maria Manuel Angélico Atlantic Iberian zooplankton size spectra and taxonomic structure derived from image analysis.

SESSION 2

RESPONSE OF ZOOPLANKTON COMMUNITIES TO CHANGING OCEAN CLIMATE

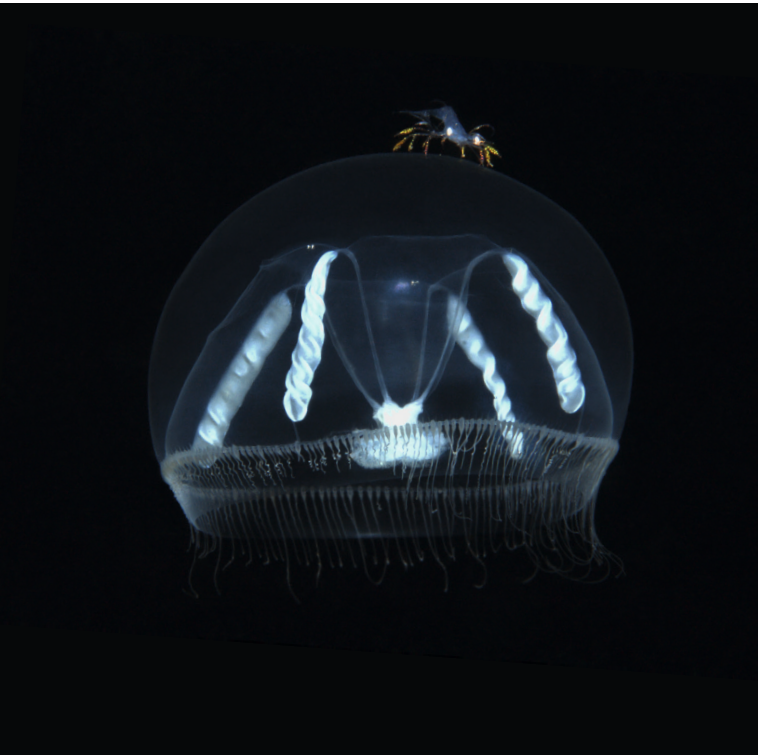
Monday 9 May | 11:20–17:50
Tuesday 10 May | 10:50–15:40

Conveners: Todd O'Brien (USA) Tone Falkenhaug (Norway)
Invited speaker: Erica Head (Canada)

Climate-related changes in the physical and chemical oceanic environment have been considered as major drivers of significant fluctuations in zooplankton production, community structure, and phenology. These changes propagate up the foodweb and potentially have large implications for ocean ecosystem functioning. In order to manage and mitigate the effects of climate change on marine resources, a more thorough understanding and prediction of its potential impacts on zooplankton communities is needed.

In this session, presentations will examine observed and projected responses of zooplankton communities to climate variability and change.

Photo: Nils Aukan



S2 PRESENTATIONS

MONDAY 9 MAY 2016

11:20		Introduction by conveners
11:25	ID 172	**Invited speaker: Erica Head** Trends and variability in environmental conditions and zooplankton communities in the Northwest Atlantic 1960–2013
11:50	487	Rubao Ji Testing a new hypothesis on the persistence of Calanus finmarchicus in the Gulf of Maine: Coastal Amplification of Supply and Transport (CAST)
12:15	255	**Catherine Johnson** Zooplankton community variability and resilience on the northwest Atlantic shelves
12:35		Lunch
14:00	342	**Ryan Morse** Climate driven linkages between trophic levels in marine communities - changing distributions of zooplankton and fish on the U.S. Northeast Continental Shelf Large Marine Ecosystem
14:20	388	**Stéphane Plourde** *Calanus* species in a warmer northwest Atlantic: comparing projections performed with habitat models based on surface (CPR) and depth-integrated (plankton net) data
14:40	267	**Nicolas Dupont** Long-term trends and seasonal patterns for *Calanus finmarchicus* and *Calanus helgolandicus* in the coastal water off southwest Norway during 1996–2012
15:00	310	**Seòna Rebecca Wells** Environmental drivers of zooplankton community structure at Loch Ewe, Scotland
15:20	390	**Santiago Hernández-León** The effect of a warming ocean on subtropical zooplankton: The case of the Canary Current
15:40		Tea/coffee break
16:10	441	**Claudia Castellani** *Temora longicornis* and *T. stylifera* in a changing ocean climate: A macroecological perspective
16:30	124	**Tim Dudeck** Long-term (1988–2014) dynamics in the winter zooplankton size distribution and corresponding environmental drivers from a so far unconsidered data series taken in the southern North Sea
16:50	202	**Maiju Lehtiniemi** Increasing surface temperature causes changes in plankton communities of the Baltic Sea
17:10	84	**Riina Klais** Taxon-specific responses of small copepods to climate variability and top-down control in Pärnu Bay (Baltic Sea)
17:30	201	**Tobias Tamelander** A perfect match? Climate control of zooplankton phenology and potential feedbacks to eutrophication in the northern Baltic Sea

TUESDAY 10 MAY 2016

	ID	
10:50	548	Todd O'Brien International efforts in marine ecological time series research
11:10	139	Sonia Batten The effects of the recent anomalous warming on zooplankton in the Northeast Pacific, from Continuous Plankton Recorder sampling
11:30	18	Julie E. Keister Climate and local variability influence zooplankton exchange between the coastal ocean and an estuarine fjord
11:50	215	Solva Jacobsen Zooplankton community structure and size spectra linked to phytoplankton and hydrographic features on the Faroe Shelf in spring
12:10	361	Jonathan Angello Correa Acosta Impact of the low frequency natural climate variability in the distribution and abundance of horse and jack mackerel ichthyoplankton in the Peruvian Upwelling Ecosystem
12:30		Lunch
14:00	294	Aiko Tachibana Response of neritic copepod, *Acartia omorii* to climate related changes in Tokyo Bay, Japan
14:20	196	Nina Keul Pteropod abundance in correlation to sea ice- finally some good news for Southern Ocean pteropods? Results from a 20-year sediment trap study
14:40	345	Elizaveta Ershova Evidence of long-term change in the summer Chukchi Sea zooplankton communities
15:00	309	Neil S. Banas Linking climate change to community-level impacts on copepods via a new, trait-based model: Life-history and metabolic mechanisms compared
15:20	435	Russell R. Hopcroft Understanding pattern and change in the Arctic: can we get there from here?

S2 POSTERS

ID	
7	Ali M. Al-Aidaroos High vulnerability of Red Sea zooplankton to ambient UVB radiation
21	Mohsen Mohamed El-Sherbiny Omar High temperature increases the vulnerability of Red Sea zooplankton to ambient UVB radiation
24	Hongjun Song Zooplankton Biogeography and Phenology in the Southern Yellow Sea (China)
33	Ico Martínez Sánchez A preview of the ocean acidification effect on potential respiratory activity
35	Ricardo Giesecke Zooplankton mortality and the potential contribution of carcasses to the autochthonous particulate organic carbon along the Valdivia estuary

369	Priscila Teixeira-Amaral ENSO influence on copepod production on Patos Lagoon estuary, southern Brazil
370	Desiree Tommasi Differential response of distinct copepod life history types to spring environmental forcing
396	Howard Browman End of the century CO2 concentrations do not have a negative effect on vital rates of *Calanus finmarchicus*, an ecologically critical planktonic species in North Atlantic ecosystems
400	Sandra Kitan Seasonal mortality trends for *Calanus* in the Northwest Atlantic: managing sampling variability and explaining regional differences
432	Juan-Carlos Molinero Climate driven winter variations of *Calanus sinicus* biomass in the southern East China Sea
433	Juan-Carlos Molinero Decadal variations of *Calanus helgolandicus* in the marine protected area of Mljet Island, South Adriatic Sea
446	Anette Maria Christensen Effects of lowered salinity on physiological responses of *Temora longicornis* in the Baltic Sea
461	Katja T. C. A. Peijnenburg Adaptive potential of pteropods along a latitudinal gradient of ocean acidification
521	Leonardo Roman Castro Zooplankton response of glacier lake outburst floods (GLOGFs) in a Northern Patagonia Fjord
524	Mark Ohman California Current mesozooplankton: sentinels of a changing ocean
531	Dafne Eerkes-Medrano The role of temperature as a proxy for prey availability

SESSION 3

THE DIVERSITY AND ROLE OF MACROZOOPLANKTON IN MARINE ECOSYSTEMS

Tuesday 10 May | 16:10-17:45
Thursday 12 May | 10:50-15:40

Conveners: Priscilla Licandro (UK) Se-Jong Ju (Republic of Korea) Stig Falk-Petersen (Norway)
Invited speakers: Peter Wiebe (USA) Lucas Brotz (Canada)

Macrozooplankton, i.e. zooplankton larger than 2 mm, encompass organisms characterized by very different size, features, and behaviour such as krill, amphipods, and jellyfish. Significant changes in the macrozooplankton have been observed in recent years. Changes in abundance and species composition of krill and amphipods have been recorded in some northern regions, while swarms of gelatinous macrozooplankton have been recurrently reported worldwide, causing concern due to their negative impact on different societal activities, such as tourism and fishery.

Even though macrozooplankton play a key role in the marine foodweb, their distribution, diversity, ecology, behaviour, and population dynamics are still largely unknown, due to challenges in their sampling and taxonomy.

In this session, presentations will further our understanding of their role in a changing ocean.

S3 PRESENTATIONS

TUESDAY 10 MAY 2016

16:10		Introduction by conveners
16:15	ID 232	Invited speaker: Peter H. Wiebe Response of macrozooplankton to Environmental variation
16:40	543	Invited speaker: Lucas Brotz Jellyfish fisheries of the world - past, present, and future
17:05	325	Mirna Batistić Changes in Adriatic non-crustacean zooplankton community - influence of hydroclimatic changes
17:25	408	Michael Blackett Biology and ecology of the siphonophore *Muggiaea atlantica* in the northeast Atlantic

THURSDAY 12 MAY 2016

10:50	ID 203	Thor Aleksander Klevjer Patterns in macrozooplankton and micronekton biomass distribution across four north Atlantic ocean basins

11:10	199	Espen Strand Spatiotemporal distribution, biomass and ecological role of chaetognaths in the Nordic and Barents Seas
11:30	193	Aino Hosia Including gelatinous zooplankton in plankton surveys – challenges, suggestions, and potential gain
11:50	454	Joshua Stone Time series of gelatinous zooplankton in Chesapeake Bay, USA: Environmental controls and interspecific interactions
12:10	259	Shin-ichi Uye Predominant jellyfish (Cnidaria: Scyphozoa) in the Inland Sea of Japan: a recent transition from *Aurelia aurita* to *Chrysaora pacifica*
12:30	Lunch	
14:00	467	Alice K. Burridge Diversity and distribution of zooplankton along a latitudinal transect in the Atlantic Ocean
14:20	93	Nancy M. Butler Swarm formation and cohesion by the marine crustacean *Mysidium gracile*
14:40	322	Cabrol Jory Differential feeding behavior of three coexisting krill species in the St. Lawrence estuary, Canada: a fatty acid and stable isotope approach
15:00	494	Lionel Eisenhauer A Model study of the holopelagic scyphozoan jellyfish *Periphylla periphylla* and its trophic impact on plankton production in the Trondheim fjord (Norway)
15:20	534	Martin Lilley Steep body mass scaling of biological rates in macrozooplankton supports a Surface Area dependent model

S3 POSTERS

ID	
10	Mohamed Moussa Soliman Dorgham Winter zooplankton in the ROPME Sea Area
25	Ping Liu Spatio-temporal distribution and long-term variability of the zooplankton community in the typical bays in Shandong coast of China
34	Jaime Gómez-Gutiérrez Integrative taxonomic-ecological perspective of parasites infecting krill, chaetognaths and their nektonic predators in the Gulf of California, Mexico
48	Alexandra Lischka Early cephalopod life stages in the Sargasso Sea: abundances and distribution patterns
92	Anna S. Orlova Dynamics of abundance, species and length composition of euphausiids in the Barents Sea under recent warm period
103	Yuichiro Yamada Importance of cold-water zooplankton as prey of chum salmon fry *Oncorhynchus keta* in Yamada Bay, Iwate, northern Japan
107	Se-Jong Ju The trophic role of chaetognaths (*Sagitta crassa* and *S. nagae*) in the pelagic ecosystem of the Yellow Sea using the gut contents and fatty acid trophic markers

109	Barbara Gangai Zovko Composition and vertical migration calyptopes stages (Crustacea: Euphausiacea) in open southern Adriatic Sea throughout the seasons
154	Yoshiyuki Abe Short-term changes in abundance and population structure of dominant pelagic chaetognaths in the Oyashio region during the spring phytoplankton bloom
245	Christine J. Cass Spatial and temporal variability of lipid and energy content of northern California Current euphausiids
257	Nicholas R. Record Consequences of a gelatinous body plan
273	Luz Ximena Orosco Montenegro Paralarvae as part of macrozooplankton and their relationship with the variability of oceanographic conditions
293	Song Sun The Role of Large Jellyfish in the Pelagic Food Web in China Coastal Waters
319	Ramanibai Ravichandran Echinoderm diversity in Pulicat lagoon of south east India
323	Priscilla Licandro Biogeography and biomass of North Atlantic jellyfish
330	Marloes Tump DNA barcoding of hyperiid amphipods along the 2012 Atlantic Meridional Transect
354	Amy E. Maas Transcriptomic analysis of the Northern Krill (*Meganyctiphanes norvegica*)
406	Sarah Lou Carolin Giering Salps are major contributors to carbon export in the UK Shelf Sea
417	Cabrol Jory Krill ingestion rates in the St. Lawrence estuary: feeding experiments with natural zooplankton and phytoplankton communities
458	Elda Luz Pinedo Arteaga Changes in zooplankton community in the Peruvian Sea: Species composition, abundance, biovolumenes, and size structure
481	Teresa Sofia Giesta Da Silva Effects of temperature on growth, egestion, mortality, and respiration of adult *Meganyctiphanes norvegica* collected south of Iceland
482	Brandon Conroy Macrozooplankton community composition in the Amazon River plume and western tropical North Atlantic Ocean
486	Aubert Anaïs Better knowledge of diversity and distribution of macro-gelatinous organisms: The need for common monitoring program
501	Patricia Ayon Jellyfish diversity and its role in the Peruvian Upwelling System
515	Kazutaka Takahashi Effect of feeding and maternal lipid on recruitment success in *Eucalanus bungi* during spring diatom bloom

SESSION 4

ZOOPLANKTON DIVERSITY IN THE OCEANS BY INTEGRATIVE MORPHOLOGICAL AND MOLECULAR TECHNIQUES

Thursday 12 May 2016 | 16:10–18:05
Friday 13 May 2016 | 14:00–17:10

Conveners: Ann Bucklin (USA) Ryuji Machida (Taiwan)
Invited speakers: Junya Hirai (Japan) Naiara Rodriguez-Ezpeleta (Spain)

The emerging field of integrative taxonomy is yielding new understanding of the taxonomy, systematics, and biodiversity of marine animals. Molecular methods have enormous potential for accurate and rapid assessment of pelagic diversity; environmental sequencing or metagenetic analysis (i.e. large-scale analysis of taxon richness via the analysis of homologous genes) of zooplankton assemblages can ensure consistent discrimination of species – even closely related, cryptic, and rare species – through comparison with a reference database of sequences for identified specimens. Although the taxonomy and phylogeny of some zooplankton groups may eventually be revised with the addition of molecular characters, traditional approaches based on morphology will not be replaced, only enhanced and augmented. Near-future prospects include sophisticated, powerful, and integrative analysis of morphological, molecular, biochemical, ecological, and geographic data to delineate species and test species hypotheses. This session will examine a broad range of methodologies, provide overviews of recent results using diverse types of data, and encourage discussion on how best to meet the challenges of integrative taxonomy of marine zooplankton.

S4 PRESENTATIONS

THURSDAY 12 MAY 2016

16:10		Introduction by conveners
16:15	ID 39	Invited speaker: Junya Hirai Metagenetic community analysis of marine planktonic copepods in the Pacific
16:40	157	Invited speaker: Naiara Rodriguez-Ezpeleta Benchmarking DNA metabarcoding for measuring biodiversity and assessing environmental status
17:05	45	Penelope Kate Lindeque What does standard plankton monitoring miss? Using meta-barcoding and an epibenthic sledge to reveal the hidden diversity of the shelf sea zooplankton

17:25	150	Ryuji Machida Distribution of zooplankton in ocean currents: high taxonomic resolution analyses using metatranscriptomic approach
17:45	190	David Abad Comparison of metabarcoding and microscopy for estuarine plankton monitoring: quantitative character and non-indigenous species detectability

FRIDAY 13 MAY 2016

14:00	ID 74	Silke Laakmann Integrated North Sea zooplankton identification: a combination of morphology, DNA and proteome analyses towards a cost and time-effective application
14:20	198	Rowena Fay Stern (presented by Willie Wilson) Can e-DNA help provide better represent zooplankton diversity? A comparison of net versus water sampling
14:40	262	Sanna Majaneva Morphological and molecular evidence reveal underestimated ctenophore species richness – peeking into the group of unidentified species
15:00	399	Glafira Kolbasova Two sympatric species of *Cyanea* (Scyphozoa) from Arctic seas distinguished by the molecular methods
15:20	220	Astrid Cornils Cosmopolitan, bipolar, or endemic? Phylogeography of polar copepod species-groups
15:40		Tea/coffee break
16:10	366	Mary Mar Noblezada Morphological and genetic analysis of *Oithona attenuata* (Copepoda, Cyclopoida) populations in the coastal waters of Southeast Asia, Japan and Pacific Ocean
16:30	404	Panagiotis Kasapidis Trying to resolve the taxonomic confusion of *Paracalanus parvus* species complex (Copepoda, Calanoida) in the Mediterranean and Black Seas through a combined analysis of morphology, molecular taxonomy and DNA metabarcoding
16:50	527	Stephanie L Bush Pteropod molluscs: Toward an understanding of population connectivity and species delimitations

S4 POSTERS

ID 64	Lidia Yebra Characterization of the plankton community composition in Málaga Bay (NW Alboran Sea) by means of integrative taxonomy.
86	Stamatina Isari Annual cycle of larval fish community in the central-north Red Sea: comparing offshore vs. coral reef waters
102	Ana Luisa Moran Ahern Monitoring spawning activity in Cabo Pulmo National Park using molecular identification of fish eggs and larvae
126	Holger Auel Evolution in 3 dimensions: Biodiversity of midwater and deep-sea zooplankton communities

129	Jasmin Renz Possibilities and challenges for using morphological and molecular methods to unravel mysteries in the phylogeny of typical benthopelagic deep-sea calanoids
131	Sergio Hernández-Trujillo Biodiversity of copepods in Bahia De La Paz, Mexico
142	Oliver Kersten Assessment of an abyssal near-bottom zooplankton community via metabarcoding
162	Erica Goetze Metagenetic sequencing of zooplankton communities in the high-diversity Central North Pacific
167	Iole Di Capua Multidisciplinary approach to *Oncaeidae* diagnostics in the Gulf of Naples: from Giesbrecht to the molecular era
170	Sergio Stefanni Use of metagenetic analysis to monitor mesozooplankton biodiversity: the Adriatic Sea as a case study
171	Tone Falkenhaug Inventory of marine Copepoda and Cladocera (Crustacea) in Norway: COPCLAD
180	Sergio Stefanni Large spatial scale metabarcode analysis of zooplankton of the western Mediterranean Sea
192	Aino Hosia HYPNO – Hydrozoan pelagic diversity in Norway
260	Dmitry Kulagin Diversity of the chaetognath *Pseudosagitta maxima* (Conant, 1896) in the Atlantic Ocean revealed by molecular and morphological approaches
276	Marvin Choquet New insight on the population structure of *Calanus finmarchicus* in the North Atlantic using Next-Generation Sequencing technologies
349	Leocadio Blanco-Bercial Metabarcoding zooplankton diversity in the Sargasso Sea – taxonomy and functionality
384	Maya Bode MALDI-TOF mass spectrometry as a novel tool for zooplankton biodiversity studies - Copepod distribution throughout the eastern Atlantic Ocean
410	Ann Bucklin Metabarcoding analysis of zooplankton diversity: applications for monitoring regional and interannual variation of the pelagic assemblage of the NW Atlantic continental shelf
434	Irina Smolina Resolving identification challenge of calanoid copepods *Calanus finmarchicus* and *C. glacialis*: molecular and morphological advances
466	Alice K. Burridge Species boundaries in *Diacavolinia* pteropods
525	Paola G Batta-Lona Diversity of zooplankton and ichthyoplankton in the Gulf of Mexico: a taxonomic and metagenomic approach

SESSION 5

THE ROLE OF MICROZOOPLANKTON IN MARINE FOODWEBS

Friday 13 May | 09:00–12:45

Conveners: Albert Calbet (Spain) Karen E. Selph (USA)
Invited speakers: Michael R. Landry (USA) Hongbin Liu (China)

Microzooplankton play pivotal roles in marine ecosystems. They act as the main primary consumers of phytoplankton in most planktonic foodwebs, from ultra-oligotrophic areas to upwelling regions, where they outcompete copepods and other larger zooplankton. They are also important contributors to the diet of mesozooplankton (e.g., in oligotrophic ecosystems, the microzooplankton-associated carbon supply for copepods surpasses that of phytoplankton), and play key roles as nutrient recyclers and CO_2 producers. These roles are not yet fully understood and seldom properly parameterized in ecological and predictive models. Therefore, in this session presentations will contemplate the significance of microzooplankton functional diversity and varying impacts in plankton communities and ecosystems, both as grazers and as prey of larger organisms, as well as any new insights into their individual behaviour, physiology (including mixotrophy), and temporal and spatial variability in diverse ecosystems.

S5 PRESENTATIONS

FRIDAY 13 MAY

09:00		Introduction by conveners
09:05	ID 359	Invited speaker: Michael R. Landry Getting it together: Quantifying the trophic connections between micro- and mesozooplankton in marine food webs
09:30	105	Invited speaker: Hongbin Liu Atypical inverse predator-prey links in marine planktonic food webs
09:55	240	Suzanne Strom Microzooplankton in the food web of the coastal Gulf of Alaska
10:15	403	Sarah Lou Carolin Giering Seasonal shifts in microzooplankton grazing in the UK Shelf Sea
10:35		Tea/coffee break
11:05	321	Nicole Aberle-Malzahn Microzooplankton in a changing environment: shifts in phenology and trophic relations

11:25	274	Michelle Jan Jungbluth Species-specific grazing impacts of copepod nauplii
11:45	121	Franziska Bils Large scale microzooplankton abundance and diversity in the North Sea in mid-Winter
12:05	52	Elaine Fileman Testing the "loophole hypothesis": understanding the role of microzooplankton grazing in phytoplankton bloom dynamics
12:25	99	Selina Våge Merging scales in food web model links microzooplankton to bacterial diversity and gives mechanistic framework for virus-to-bacteria ratios

S5 POSTERS

ID	
12	María Teresa Tamés Espinosa Evaluating zooplankton potential CO2 production: isocitrate dehydrogenase enzyme activity
23	Rodrigo A. Martínez (presented by Albert Calbet) Effects of small-scale turbulence on marine microzooplankton
31	Ramasamy Santhanam Community structure and abundance of microzooplanktonic tintinnids in the Bay of Bengal and Arabian Sea in relation to nanophytoplankton
61	Bingzhang Chen Estimating microzooplankton grazing functions from dilution experiments in the ocean
69	Mianrun Chen Mesozooplankton clearance rate on phytoplankton is reduced by increasing carnivory degree of omnivorous assemblage at coastal and estuarine water
144	Karen E. Selph Ciliate and dinoflagellate grazing rates in Kaneohe Bay, Oahu, HI, a subtropical mesotrophic embayment
269	Daniel J. Mayor Microbial gardening in the ocean's twilight zone: detritivorous metazoans benefit from fragmenting, rather than ingesting, sinking detritus
303	Kyle Mayers Does microzooplankton grazing influence the fate of coccolithophores in shelf seas?
315	Bernadette Pree On the pivotal role of ciliates in the structure of the marine microbial food web and its biogeochemical implications.
343	Laia Armengol Bové The time-course of dilution experiments: Implications for the assessment of grazing by microzooplankton
362	Carolyn L. Faithfull Can nauplii use bacteria as a phosphorus or energy source?
371	Lauren Mathews Nutrition and elemental stoichiometry of zooplankton life stages
374	Eun-Jin Yang, Young-Ju Lee, SonaHoon Lee Contribution of auto-and heterotrophic protozoa to the diet of copepods and krill in the Amundsen Sea, Antarctica
409	Giannakourou Antonia Planktonic ciliates move in the water column during the artificial night of a total solar eclipse

414	James Pierson Taxa-specific effects of polyunsaturated aldehydes in micro- and meso- zooplankton alter food web dynamics
431	Ulgen Aytan Grazing by microzooplankton in the South Eastern Black Sea
449	Saskia A. Otto Spatial patterns of microzooplankton diversity and composition along the Namibian coast
490	Mónica Susana Hoffmeyer Microzooplankton grazing on nanoplankton in Potter Cove (Western Antarctic Peninsula) under contrasting exposure to glacier melting
493	Jenny Ann Huggett Image analysis of microzooplankton in a cyclonic eddy off south-western Madagascar

SESSION 6

INDIVIDUAL LEVEL RESPONSES OF ZOOPLANKTON TO ENVIRONMENTAL VARIABILITY AND CLIMATE CHANGE

Thursday 12 May 2016 | 16:10–18:05
Friday 13 May 2016 | 14:00–17:10

Conveners: Eva Friis Møller (Denmark) Pamela Hidalgo (Chile)
Invited speakers: Josefin Titelman (Norway) Jeffrey Runge (USA)

In order to understand the functioning of marine ecosystems and predict their future variability under a changing climate, enhancing our knowledge of zooplankton responses to environmental variability at an individual level becomes critical. Individual responses can include altered physiological rates, changes in behaviour, and changes in distribution and age structure. All of these features can directly influence population dynamics and, ultimately, ecosystem dynamics. In this context, the session will explore the responses of zooplankton to a variety of key factors related to their habitat, e.g. temperature, oxygen, pH, quantity and quality of food, and predation pressure.

S6 PRESENTATIONS

THURSDAY 12 MAY 2016

16:10		Introduction by conveners
16:15	ID 492	Invited speaker: Josefin Titelman Individual level responses to predation risk and other environmental cues
16:40	423	Invited speaker: Jeffrey A. Runge Challenges for modeling zooplankton population dynamics in a changing world: phenotypic, genetic and epigenetic influences on vital rates
17:05	78	Hans van Someren Gréve Behavior-dependent predation risk in marine planktonic copepods: an experimental and modelling approach
17:25	83	Natasha Henschke Modelling global relationships between climate and jellyfish (*Aurelia aurita*) blooms
17:45	90	Margarita Zarubin The effect of hydrostatic pressure on grazing in three calanoid copepods

FRIDAY 13 MAY 2016

14:00	ID 110	Thomas Kiørboe The functional response in pelagic copepods
14:20	119	Peter Tiselius Trophic cascades over three trophic levels in a coastal food web: an 8-year study of the ctenophore *Mnemiopsis leidyi* in the Gullmar Fjord

14:40	329	Henrieke Tonkes Influence of food quality on carbon budget and digestive enzyme activities and patterns of *Calanus glacialis* (Copepoda)
15:00	356	Amy E. Maas The Response of the Thecosomatous Pteropod *Limacina retroversa* to CO2 in the Gulf of Maine: Seasonality and Sensitivity
15:20	442	Robert Wilson Diapause in a changing climate: the impact of oceanic warming on a key North Atlantic Calanoid copepod and the limits of adaptive responses
15:40	Tea/coffee break	
16:10	477	Jacqueline Lesley Maud Mortality of the copepod *Calanus helgolandicus*: seasonal patterns, causal agents and implications for population dynamics
16:30	497	Carmela Rosa, Nakazaki Lao Copepods as indicators of oxygen changes
16:50	206	Ingegjerd Opstad Effects of elevated pCO2 on Northern krill *Thysanoessa inermis*: survival, moulting, growth, grazing, and respiration

S6 POSTERS

ID	
27	Natalia Osma Predicting in vivo oxygen consumption rate from ETS activity and bisubstrate enzyme kinetics in cultured marine zooplankton
38	Wen-Tseng Lo Spatiotemporal distribution of the decapod Lucifer group in relation to hydrographic conditions in waters around Taiwan, western North Pacific Ocean
49	Soultana Zervoudaki Feeding performance of the copepod *Oncaea media* (Giesbrecht, 1891)
75	Vittoria Roncalli The insidious effect of the toxic alga *Alexandrium fundyense* on the physiology of the calanoid copepod *Calanus finmarchicus*
76	Vittoria Roncalli Application of high-throughput sequencing technology to investigate the effect of a toxic dinoflagellate on nauplii of the copepod *Calanus finmarchicus*
79	Enric Saiz Caloric restriction in marine calanoid copepods
88	Daniel Rickue Bondyale Juez Respiration of marine mysid, *Leptomysis lingvura*, measured by four different methodologies
95	Wendy L. Ryan Metabolic Response of Individual Mysids to Changes in Pressure and Temperature
97	Caroline Durif Cascading effects of UV radiation on a simple marine food chain
127	Jiayi Xu Feeding behavior and prey selection of *Temora longicornis* fed on toxic dinoflagellates, *Alexandrium* spp.
195	May Gómez Starvation's role in plankton metabolism

236	Sara Zamora-Terol Evaluation of the fecundity of the small copepod *Oithona* under different food and temperature conditions
258	Heather Cannaby A numerical assessment of the potential ecological impacts of zooplankton extraction considering additional environmental pressures due to eutrophication and climate change in the Black Sea
263	Angélique Ollier The influence of temperature on the oxygen consumption of the Northern krill (*Meganyctiphanes norvegica*) and Arctic krill (*Thysanoessa raschii*) in the St. Lawrence Estuary, Canada
268	Daniel J. Mayor The metabolic response of marine copepods to environmental warming and ocean acidification in the absence of food
302	Fang Zhang Inter-annual variation on growth of giant jellyfish *Nemopilema nomurai* (Scyphozoa: Rhizostomeae) and influencing factor in China coastal waters
313	Neil S Banas Traits controlling body size in copepods: Separating general constraints from species-specific strategies
320	Lei Chen Different tolerance of jellyfish ephyrae (*Aurelia* sp.1) and fish larvae (*Paralichthys olivaceus*) for nutrient limitations
326	Rodrigo Almeda Trade-offs in zooplankton feeding behaviour
360	Pamela Hidalgo Non-predatory mortality in dominant copepods in the northern Chile (23°S) Humboldt Current Ecosystem
375	Jaeyong Bae Population structure and life history of *Neomysis nigra* Nakazawa, 1910 (Crustacea, Mysida) in Jeju Island, Korea
387	Epaminondas Christou Why *Clausocalanus furcatus* occurs over a wide latitudinal range throughout the world?
456	Roberto Carlos Quesquen Liza Holoplanktonic mollusks (Mollusca: Heteropoda, Thecosomata and Nudibranchia) as indicators of oceanographic variability in front Callao and Pisco: Perú
473	David Fields Infection of the planktonic copepod *Calanus finmarchicus* by the parasitic dinoflagellate, *Blastodinium* spp: effects on grazing, respiration, fecundity and fecal pellet production
475	Samuel Hylander Oxygenation of anoxic sediments triggers hatching of zooplankton eggs
476	Melanie L. Ross Swimming under the influence: signal detection in a changing world
509	Kang Wang Reassessment of the life cycle *Limacina helicina* from a high resolution interannual time series in the temperate north Pacific.
522	Alexander Bergan Increased CO2 affects the shell condition, swimming, and sinking of the thecosomatous pteropod *Limacina retroversa*

SESSION 7

ZOOPLANKTON IN HIGH-LATITUDE ECOSYSTEMS

Monday 9 May 2016 | 11:20–17:50
Tuesday 10 May 2016 | 10:50–15:40

Conveners: Kim Bernard (USA) Rolf Gradinger (Norway)
Invited speakers: Ksenia Kosobokova (Russia) Bettina Meyer (Germany)

Zooplankton play a key role in high-latitude ecosystems, both as part of the microbial loop and as a link from primary producers to higher trophic levels like fish, whales, and birds. The unique physiological adaptations and life cycle strategies of Arctic and Antarctic zooplankton allow for high productivity and biomass, and for an elevated contribution to the carbon cycle.

S7 PRESENTATIONS

MONDAY 9 MAY 2016

11:20		Introduction by conveners
11:25	ID 338	Invited speaker: Ksenia N. Kosobokova Zooplankton of the Arctic Ocean: patterns of diversity and productivity
11:50	541	Invited speaker: Bettina Meyer The unique life cycle strategy of Antarctic krill to the high latitude environment
12:15	22	Elena Eriksen Predator diet as an indicator of comb jellyfish (Ctenophora) abundance dynamics in the Barents Sea
12:35		Lunch
14:00	70	Andrey V. Dolgov Zooplankton communities and pelagic fish diet in the Barents Sea during recent warming period
14:20	89	Alison Clare Cleary *In situ* feeding by *Euphausia superba* in the West Antarctic Peninsula: new insights from DNA analysis of gut contents
14:40	218	Tara L. Connelly Annual cycle of lipid dynamics in zooplankton from the Beaufort Sea shelf, Canadian Arctic
15:00	271	Evgeny Pakhomov *Salpa thompsoni* life cycle: new insights and implications for the Southern Ocean biological pump
15:20	123	Marja Koski Particle-colonising copepods in the subarctic food webs: Feeding and reproduction of *Microsetella norvegica* and *Triconia* spp. in the North Atlantic
15:40		Tea/coffee break
16:10	347	Deborah K Steinberg Long-term and regional effects of sea ice on zooplankton along the Western Antarctic Peninsula

16:30	357	Charlotte Havermans Is the hyperiid amphipod *Themisto gaudichaudii* poised to displace krill in the warming region of the Southern Ocean?
16:50	254	Patricia Thibodeau Environmental controls on temporal and spatial patterns in pteropod (*Limacina helicina*) abundance along the Western Antarctic Peninsula
17:10	191	Rafal Boehnke Not too small to be overlooked: annual changes in *Oithona similis* abundance and copepodid structure in Adventfjorden (Isfjorden, Svalbard)
17:30	499	Janne Elin Søreide Is the key Arctic copepod *Calanus glacialis* resilient to climate change?

TUESDAY 10 MAY 2016

10:50	ID 241	Carin Ashjian Springtime renewal of *Calanus glacialis* populations in the Chukchi Sea
11:10	43	Nils Sören Häfke First records of clock gene activity in *Calanus finmarchicus* – expression patters during overwintering in a high Arctic fjord
11:30	288	Kristina Øie Kvile Climate responses of *Calanus finmarchicus* in a high latitude system
11:50	488	Alexey Ryabov Population cycles of Antarctic krill
12:10	37	Geraint A. Tarling Growth and shrinkage is sex-dependent in Antarctic krill
12:30		Lunch
14:00	324	Marta Gluchowska Atlantic zooplankton journey to the Arctic Ocean: how to get there?
14:20	235	Helena Kling Michelsen The spatial distribution of meroplankton in an arctic fjord
14:40	355	Morten Iversen Sinkers or floaters? Contribution from salp pellets to the export flux during a large bloom event in the Southern Ocean
15:00	401	Cecilia Mary Liszka Zooplankton in flux: the role of Southern Ocean migrators in the active flux of carbon and its response to climate change
15:20	367	Frederic Maps "Hit and run" in numerical ecology

S7 POSTERS

ID 11	Jaime Farber Lorda Total carotenoids in Antarctic Krill from the Indian Ocean Sector of the Antarctic Ocean. Sexual and Spatial differences.
56	Humberto E. González Carbon flows through the pelagic food web in the southern Chilean Patagonia
57	Adam Spear Spatial and temporal variability of zooplankton community structure in the Chukchi Sea

81	Marina Marrari Interannual variability in distribution and age structure of larval euphausiids in relation to the environmental conditions (Marguerite Bay, Western Antarctic Peninsula)
111	Kunio T. Takahashi The variability of zooplankton community structure along the 110°E meridian in the Southern Ocean, 1972–2014
112	Leif Christian Stige The role of zooplankton in multispecies dynamics in the Barents Sea
120	Harald Gjøsæter Does an acoustic deep scattering layer show dial vertical migration in the Arctic?
147	Kohei Matsuno Regional patterns and controlling factors on population structure of *Calanus glacialis* in the western Arctic Ocean during summers of 1991–2014
148	Naoya Yokoi Seasonal changes in zooplankton swimmer community collected by sediment trap moored in the western North Pacific Ocean
164	Irina Prokopchuk Comparative analysis of Juday and WP2 net catchability
176	Claudia Castellani *Oithona* species diversity and ecological niche in high latitude North Atlantic
207	Camilla Svensen Small zooplankton in the Arctic: overlooked but abundant?
265	Sanna Majaneva The graveyard diary: changes in the population structure and seasonal dynamics of Arctic zooplankton from a 10+ year time series of sediment traps
272	Evgeny Pakhomov Feeding habits of mesopelagic fish in the Scotia/Weddell Sea during the austral winter
299	Shinji Shimode Egg sizes and life histories of the copepod family Eucalanidae
328	Agata Weydmann Postglacial expansion of the Arctic keystone copepod *Calanus glacialis*
331	Wilhelm Hagen Life strategies and energetic adaptations of polar euphausiids
346	Elizaveta Ershova Distribution, production and inter-annual variability of *Pseudocalanus* spp. in the Chukchi Sea
348	María Delia Viñas The autumn copepod community at South Georgia Islands (Southern Ocean): composition, abundance, biomass, and link with physical forcing and phytoplankton
350	Franz Schroeter Variability in Arctic pelagic amphipods derived from a 15 years time series obtained with sediment traps in eastern Fram Strait
351	Caitlin Anne Smoot Vertical community structure and mesopelagic zooplankton diversity in the Beaufort Sea
386	Elisabeth Halvorsen Seasonal variation in mesozooplankton trait composition: structural role of advected mesozooplankton on the plankton community north of Svalbard.

394	Malin Daase New insights into life history traits of *Calanus* spp. males in the Arctic
419	Ulrike Grote Modeling the fate of *Calanus glacialis* and *C. finmarchicus* in the Barents Sea in a rising temperature scenario
426	Carlotti François Mesozooplankton structure and functioning on shelf and oceanic waters of during the Kerguelen Bloom during the Keops2 survey (15 October–20 November 2011)
448	Nicole Hildebrandt Interannual zooplankton distribution in the HAUSGARTEN area (eastern Fram Strait) in relation to environmental conditions
450	Marina Chelak Variations in *Calanus* spp. populations in the Nordic Seas in relation to local and large-scale environmental factors
459	Boris Espinasse Origins of the *Calanus* population on the Lofoten-Vesterålen shelf as the main food source for cod larvae in early spring, combining particle tracking and stable isotopes analysis approaches
462	Svein Sundby Specific gravity in boreal and arctic copepods – impacts on vertical migration and overwintering at high latitudes
471	Galina Abyzova Genetic population structure and the potential of hybridization between *Calanus finmarchicus* and *C. glacialis* in Svalbard fjords
480	Gerald Darnis Zooplankton fecal pellet export during the transition from polar night to spring in a high-Arctic Svalbard fjord, Kongsfjorden
483	Zhixuan Feng The response of the biogeographic distribution of the copepod *Calanus glacialis* to a changing Arctic marine environment
485	Ole Jacob Broch Modelling spatial hetereogeneity in the *Calanus finmarchicus* distribution on the Norwegian coastal shelf
489	Maria Fredrika Norrbin Plankton phenology and community structure in ice covered and open high-latitude fjords; a comparison between Isfjorden, Svalbard, and Porsangerfjord, northern Norway
503	Elda Luz Pinedo Arteaga Vertical distribution of antarctic zooplankton around Elephant Island Austral summer 2007. Peru Antar XVII
511	Mónica S. Hoffmeyer Diel vertical migration of meso-and macrozooplankton in a small Antarctic cove during summer: role of abiotic conditions and trophic interactions
528	Kjell Gundersen Dissolved inorganic nutrients determine phytoplankton primary production, cellular elemental composition and zooplankton growth in the Barents Sea
536	Hongsheng Bi Size-specific growth and mortality shapes the size structure of euphausiids in the eastern Bering Sea
540	Roxana Di Mauro The functioning of the planktonic food web in a sub-polar marine ecosystem during spring–summer

SESSION 8

NEW TECHNOLOGIES AND APPROACHES IN ZOOPLANKTON TROPHIC STUDIES

Friday 13 May 2016 | 09:00-12:45

Conveners: Monika Winder (Sweden) Antonio Bode (Spain)
Invited speaker: Edward G. Durbin (USA)

Zooplankton are a key link for carbon and nutritional flux from primary producers to fish in marine foodwebs. For this reason there is a long history of diet reconstructions for many zooplankton species, mainly for copepods and the larger predator species. Traditional approaches rely on examining prey selectivity based on examination of gut contents and *in situ* zooplankton samples in the laboratory or at sea. Such techniques alone, however, are not able to fully cover the plasticity of zooplankton diets from diverse prey availability, thus limiting our understanding of foodweb functioning. Resolving adequately the trophic role of omnivorous zooplankton, or detecting organic matter subsidies from continental origins and anthropogenic sources are among the main research challenges. In this session contributions will address these and future challenges by using new approaches such as the following:

- Determination of stable isotopes in specific compounds (as amino acids and lipids) as a complement to the traditional determinations in bulk organic matter.
- Identification of diet sources from fatty acid markers.
- Application of genetic and molecular techniques for identification of zooplankton prey (e.g. DNA barcoding).
- Novel models for estimation of trophic transfers from zooplankton to top consumers.

S8 PRESENTATIONS

FRIDAY 13 MAY 2016

09:00		Introduction by conveners
09:05	ID 17	Invited speaker: Edward G. Durbin Molecular techniques for identifying zooplankton gut contents and quantifying feeding
09:30	184	Monika Winder Zooplankton diet preferences across species, life stages and seasons using DNA barcoding
09:55	379	Alvaro Roura Small copepods channel missing carbon through metazoan predation

10:15	237	Theodore T. Packard Ocean respiration: new concepts, new significance, and new applications
10:35		Tea/coffee break
11:05	219	Hildur Petursdottir Comparison of trophic relationships of the pelagic ecosystems south and north of Iceland
11:25	63	Lidia Yebra Molecular characterization of the diet of the planktonic community in Málaga Bay (NW Alboran Sea)
11:45	166	Rita Melo Franco Santos Dietary lipid assimilation and metabolism in *Temora longicornis*
12:05	19	Antonio Bode Amino acid stable N isotope estimations reveal uniform diazotrophic contributions across zooplankton size fractions in the subtropical N Atlantic
12:25	468	Maria Belyaeva Molecular quantification of chytrid fungi from gut content of freshwater zooplankton

S8 POSTERS

ID	
100	Martin Graeve Carbon transfer and food web relationships of Arctic zooplankton organisms revealed by fatty acid and stable isotope analyses
163	Natalie Loick-Wilde "End-to-end" amino acid transfer and net growth efficiency by compound-specific isotope analysis
179	Elisa Camatti Zooplankton dynamics in the Western Mediterranean Sea using Carbon and Nitrogen stable isotopes
211	Kris Hostens Effects of prey type and quality on *Mnemiopsis leidyi* feeding and carbon assimilation: a trophic biomarker approach
243	Tomas Willems Trophic ecology of Atlantic seabob shrimp *Xiphopenaeus kroyeri*: intertidal benthic microalgae support the subtidal food web off Suriname
275	Deborah A. Lichti The dynamics of community composition and fatty acid profiles of seston and zooplankton in contrasting estuarine systems
340	Carie Hoover Evaluating the impacts of fisheries and climate change on polar marine ecosystems: comparing the Beaufort Sea Shelf with the Antarctic Peninsula marine ecosystem using Ecopath with Ecosim models
341	Angus Atkinson Reconciling differing perspectives of copepod feeding selectivity: the utility of flowCAM to analyse feeding experiments
380	Patricia Mercedes Ayon Dejo Fatty acids contents of *Acartia tonsa* (Copepoda) in Peruvian upwelling system
464	Alison Clare Cleary Feeding by *Calanus glacialis* over the annual cycle in an arctic fjord

WORKSHOP 1

USE OF ZOOPLANKTON INDICATORS TO CHARACTERIZE STATE OF PELAGIC ECOSYSTEMS

Wednesday 11 May 2016 | 09:00–12:30

Conveners: Alessandra Conversi (Italy) Hongsheng Bi (USA) Sun Song (China)
Invited speaker: Julie Keister (USA)

Zooplankton are, by definition, drifters in the ocean, a characteristic that often makes them associated with different water masses and makes them ideal candidates for examining potential physical and biological interactions. Zooplankton often function as the principal food source for ecologically and economically important fish and are main grazers of primary production. Consequently, they play an important role in transferring organic matter through the pelagic foodwebs, and their population dynamics and community structure can often serve as proxies for both upper and lower trophic levels. Zooplankton also respond quickly to environmental variability, and changes in their population dynamics and species composition are often indicative of changes in large scale ocean conditions. Therefore, zooplankton can provide useful information regarding ecosystems and are ideal indicators for assessing ecosystem status.

The overall goals of the workshop are to look at the function of zooplankton indicators as proxies for physical and biological processes, their use in ecosystem modelling, and their practical applications in marine policy. The workshop will address the following topics:

- Zooplankton changes - causes and indicator potential.
- Impacts of zooplankton changes on ecosystems, including future scenarios.
- The use of zooplankton indicators for marine policy applications.

W1 PRESENTATIONS

09:00		Introduction by conveners
09:05	ID 545	Invited speaker:Julie E. Keister What are the characteristics of useful zooplankton indices?
09:25	130	James Pierson Too hot to breathe: The impact of rising temperature and decreasing oxygen on zooplankton individuals and populations
09:35	286	Iain M. Suthers Estuarine and catchment disturbance indicators and the response of the zooplankton biomass size frequency distribution
09:45	125	Tim Dudeck Size diversity and Normalized Biomass Size-Spectrum as suitable ecological indicators for lower trophic levels
09:55	234	Kathryn Cook Status of pelagic habitats in Scottish coastal waters: an application of the UK plankton index
10:05	411	Saskia A. Otto Evaluating zooplankton indicators for the MSFD foodweb descriptor under environmental gradients and non-linear interactions: is there a universal indicator?
10:15	266	Goberville Eric A multi-indicators approach to better characterise littoral pelagic biodiversity
10:25		Tea/coffee break
11:00	535	Hongsheng Bi Use of zooplankton indicators for integrated ecosystem assessment
11:10 - 12:30		Discussion and poster presentations

W1 POSTERS

ID 26	Igor Fernández-Urruzola Modeling downward particulate organic nitrogen flux from zooplankton ammonium regeneration in the northern Benguela
87	Piotr Margonski Testing changes in the food web structure using zooplankton indicators in the southern Baltic Sea
186	Sophie Pitois Evaluation of a semi-automatic zooplankton sampler for use in multidisciplinary monitoring programmes
249	Maria Luz Fernandez de Puelles Zooplankton composition changes during a submarine post-eruptive process in waters of El Hierro island

280	Yuichiro Nishibe Impact of the 2011 Tohoku earthquake tsunami on zooplankton community in Otsuchi Bay, northeastern Japan
289	Guang-Tao ZHANG Annual cycle and opportunistic response of *Oikopleura dioica* (Tunicata) in a semi-closed embayment: tradeoffs between growth and reproduction
298	Xu Zhiqiang Inter-annual variation of summer zooplankton community in the Chukchi Sea: spatial heterogeneity during a decade of rapid ice retreat
463	Tuba Terbıyık Kurt Mesozooplankton distribution in epipelagic waters of Cilician Basin (Northeastern Mediterranean Sea)

WORKSHOP 2

ICES/PICES COOPERATIVE RESEARCH INITIATIVE: TOWARDS A GLOBAL MEASUREMENT OF ZOOPLANKTON PRODUCTION

Wednesday 11 May 2016 | 09:00-12:30

Conveners: Lidia Yebra (Spain) Toru Kobari (Japan)
Invited speaker: Lutz Postel (Germany)

Zooplankton communities play a central role in the flow of matter and energy passing from primary producers to higher trophic levels in marine ecosystems. Over the past two decades, quantitative evaluation of zooplankton production and its driving forces has been emphasized as a critical component to improved understanding of the responses of marine ecosystems to global climate change. While many methodologies have been proposed for estimating zooplankton production, we have limited knowledge of which methods are the most practical and relevant for measuring the production rates of natural zooplankton populations and/or communities across a wide range of phyla and trophic levels. A quantitative evaluation of existing, new, and emerging methodologies is required.

This workshop will share the applicability of existing methods (i.e. traditional approaches) as well as the development of novel methods (i.e. biochemical-based approaches and others) for measuring zooplankton production rates.

Through this workshop, we aim to foster cooperative research activities and working groups on zooplankton production among members of the PICES and ICES communities.

W2 PRESENTATIONS

09:00	Introduction by conveners	
09:05	ID 188	Invited speaker: Lutz Postel Zooplankton production and metabolic activity in the North Atlantic and adjacent seas
09:40	101	Karyn D. Suchy Interannual variability in the relationship between *in situ* primary productivity and chitobiase-based crustacean productivity in a temperate fjord
10:05	278	Koichi Ara Seasonal and year-on-year variations in primary production and mesozooplankton secondary and tertiary production for 9 years (2006-2014) in the neritic area of Sagami Bay, Japan
10:30	Tea/coffee break	
11:00	Discussion	

12:15 – 12:30	Summary

W2 POSTERS

ID	
15	Toru Kobari Taxonomic composition, biomass, and productivity of zooplankton community in Kuroshio as a key for Kuroshio Paradox
20	Alejandro Jesús Marrero Benítez Can zooplankton secondary production models predict growth in the marine mysid *Leptomysis lingvura* (G.O. Sars, 1866)?
65	Lidia Yebra Summer zooplankton production along the SE Spanish coast (SW Mediterranean)
244	Erik Muxagata Seasonal distribution and production of Acartia in Southampton Water (England, U.K.)

Photo: Nils Aukan

WORKSHOP 3

ZOOPLANKTON AS A POTENTIAL HARVESTABLE RESOURCE

Wednesday 11 May 2016 | 09:00–12:30

Conveners: Webjørn Melle (Norway) So Kawaguchi (Australia)
Invited speaker: Kurt Tande (Norway)

Some zooplankton species are currently being targeted for commercial harvesting around the world. The only current large-scale harvesting is for Antarctic krill. Other species are now only harvested in small-scale fisheries. However, recent advances in technology allowing for more efficient fishery operation, and the making of high value products (omega 3, cosmetic products, food for aquaculture industry) are starting to change the dynamics of zooplankton fisheries. Increased demand for these products may open up new zooplankton fisheries in the near future. The management of these new fisheries, taking place at the base of the marine foodweb, in many cases may lack the necessary scientific knowledge to be performed according to best practice. For example, stock size, productivity, reproductive potential, and trophic role are to some extent unknown for many of the potentially harvestable zooplankton species. This workshop brings together the latest information on current and potential zooplankton fisheries, their future prospects, and will discuss scientific contribution for improving our understanding of the ecosystem, which will in turn help to improve management of the fisheries and the ecosystems they are in. The workshop also serves as a forum to bridge industry and the scientists for potential future collaboration.

W3 PRESENTATIONS

09:00	Introduction by conveners	
09:05	ID 128	Invited speaker: Kurt Tande *Calanus copepods* – development of harvesting and utilization of Norway's largest renewable resource
09:25	197	Cecilie Hansen An individual based modeling approach to harvesting of *Calanus finmarchicus* in the Norwegian Sea
09:40	500	Lionel Eisenhauer Comparing modelling results of highly resolved analogous Eularian/Lagrangian model setups of Calanoid copepod to study aggregation patterns
09:55	530	Cecilie Broms (presented by Lise Langård) Norwegian management plan for harvesting *Calanus finmarchicus*

10:10	253	Gesche Winkler Ecosystem-based stock management of krill in the Gulf of St. Lawrence, Canada
10:25		Tea/coffee break
10:50	300	So Kawaguchi Krill fishery management in the Southern Ocean
11:10	217	Angus Atkinson Impacts of rapid regional climate change on the population dynamics of Antarctic krill
11:25	151	Patti Virtue Utilising innovative fishing technology to address key questions on the biology of Antarctic krill
11:40	114	Bjørn Arne Krafft Assessment of mortality of Antarctic krill (*Euphausia superba*) escaping from a trawl
11:55 – 12:30		General discussion

WORKSHOP 4

EFFECTS OF MICROPLASTICS ON ZOOPLANKTON

Wednesday 11 May 2016 | 09:00–12:30

Conveners: Elaine Fileman (UK) Maiju Lehtiniemi (Finland)
Invited speaker: Pennie Lindeque (UK)

Microscopic plastic debris termed 'microplastics' (plastic particles or fibres < 5 mm in size) have been accumulating in the oceans over the past few decades. Their increased widespread occurrence corresponds to growth in the manufacture of plastic materials and include sources such as cosmetic exfoliates, polyester fibres from fabrics, polyethylene fragments from plastic bags, and other larger plastic items. Since microplastics occupy the same size range as many planktonic organisms they can easily be mistaken for food and thus may affect a wide range of marine organisms, including zooplankton. The few studies carried out to date have shown microplastics to be ingested by, for example, ciliates, cladocerans, copepods, mysids, small fish, and even whales, and that ingestion of microplastics may result in reduced feeding, energetic deficiencies, injury, or death.

The purpose of this workshop is to assess the risk posed to zooplankton by microplastics in the marine environment.

This workshop will report on current research through a series of short presentations followed by group discussion to identify gaps in our knowledge and suggest areas for future research.

W4 PRESENTATIONS

09:00		Introduction by conveners
	ID 44	Invited speaker: Penelope Kate Lindeque Plastics and plankton: What do we know?
	138	Claudia Halsband Microplastic ingestion: the role of taste
	36	Alice Wilson McNeal Ingestion of microplastics by zooplankton in the western English Channel
	378	Jung Hoon Kang Occurrence of zooplankton entangled in microplastic: *in situ* and laboratory studies
		Discussion

W4 POSTERS

ID	
53	Elaine Fileman Microplastic ingestion by decapod larvae
261	Alicia Herrera Ulibarri Microplastic incorporation in marine food webs

WORKSHOP 5

ZOOPLANKTON AS THE "TO" IN END-TO-END MODELS

Wednesday 11 May 2016 | 09:00–12:30

Conveners: Geir Huse (Norway) Rubao Ji (USA)
Invited speaker: Øyvind Fiksen (Norway)

Traditional marine ecosystem models simulate the dynamics of nutrients, phytoplankton, zooplankton, and detritus. These so-called NPZD models have been developed into more sophisticated models with several functional forms coupled as a foodweb. The "Grand challenge" in marine ecosystem modelling is to achieve realistic end-to-end 3D models where the entire ecosystem is simulated from the physics all the way up through the foodweb. Models are now beginning to emerge that cover this range, with model systems such as ATLANTIS being parameterized for different ecosystems around the world. However, end-to-end ecosystem modelling poses a lot of challenges. Zooplankton play a crucial role in the ecosystems, and key challenges for end-to-end ecosystem models are representing the proper zooplankton diversity with regards to size, function, and parameterization of key processes. This is challenging for all types of marine ecosystem models and in particular for the end-to-end models that integrate different ecosystem components, including predators and prey of the zooplankton. The workshop will focus on presenting new ideas for improving the functionality of end-to-end models, emphasizing zooplankton implementation and how that affects the overall functioning and results of end-to-end ecosystem models.

W5 PRESENTATIONS

09:00	Introduction by conveners	
	ID 546	Øyvind Fiksen (Invited) Zooplankton as link or key in marine ecosystem models
	395	Wendy Claire Gentleman Uncertainty in copepod mortality rates and fates: implications for ecological linkages
	469	Frode Bendiksen Vikebø Predator-prey interactions on the Norwegian Continental shelf – starvation mortality in Northeast Arctic cod larvae
	213	Sevrine F. Sailley Stoichiometry and microzooplankton: how one predator response to food quality impacts the ecosystem around him

	185	Eneko Bachiller Bioenergetics modeling of the annual consumption of zooplankton by pelagic fish feeding in the Norwegian Sea
	Discussion	

W5 POSTER

ID 177	Maria Grigoratou Towards understanding the global ocean zooplankton diversity and its response to climate change: A trait-based observations-to-modelling approach

WORKSHOP 6

A HANDS-ON INTRODUCTION TO TIME SERIES ANALYSIS, VISUALIZATION, AND INTER-COMPARISON OF PLANKTON SURVEY DATA

Wednesday 11 May 2016 | 09:00–12:30

Instructor: Todd O'Brien (USA)

A zooplankton researcher has ten years of monthly-sampled species counts data. They want to look for seasonal and inter-annual trends within their data, as well as any changes in relative species composition over time. They also want to compare these data with weekly-sampled *in situ* chlorophyll data, irregularly-sampled nutrient data, and to somehow extract and include a subset of geographically-relevant satellite SST and chlorophyll data from the waters around their time series site. Finally, they are curious if there are any relationships between their variables and the local climate indices (e.g., the NAO or the PDO).

This may sound like it involves months of work, expensive software (or access to an "R" guru), and a lot of data reformatting and processing effort. In reality, it can be done with a spreadsheet and a web browser in a matter of minutes using a free online tool that will be demonstrated during this half day workshop. Further, the "Interactive Time-series Explorer" being used in this workshop uses the same analyses methods and visualization graphics featured in the ICES Zooplankton Status Report series and the International Group for Marine Ecological Time Series (IMGETS) studies.

This hands-on workshop will walk participants through a time series analysis, step-by-step, from raw data to temporal synchronization, visualization, correlation, and interpretation. Participants that bring their own laptop can try out the toolkit during the workshop, using the provided sample data set or their own data. Step-by-step documentation will be provided, allowing the participants to recreate the steps in class or to repeat and expand upon them later.

The goal of this workshop is to give researchers an introduction to basic time series analysis and visualization tools. The workshop will address and demonstrate the following topics:

- Basics of time series data preparation (temporal binning and synchronizing time periods, issues of numeric transformation (aka "to log or not to log"))

- Visualizing individual variables (seasonal patterns, inter-annual trends, month-based investigations, visual quality control / investigating outliers)
- Comparing multiple variables to each other (group plots, correlation plots)
- Linking to local climate indices (e.g., NAO/PDO) and larger regional trends in SST or satellite chlorophyll.
- Comparing data from/between different depths, sites or programs.

09:00 - 12:30	Introduction, demonstration, and practical by convener

W6 POSTERS

ID	
55	Jaime Gómez-Gutiérrez Seasonal succession of zooplankton taxonomic groups through a weekly time series (2014–2015) at Cabo Pulmo Natural Reserve, Mexico
72	Pierre Helaouët Reliability of spatial and temporal patterns of *C. finmarchicus* inferred from the CPR survey
104	Jose M. Landeira Decapod larvae community assemblages in the Bering and Chukchi Seas during summers of 2007 and 2008
113	Bjørn Arne Krafft An Antarctic krill (*Euphausia superba*) hotspot: population characteristics, abundance and vertical structure explored from a krill fishing vessel
173	Álvaro Fanjul Miranda Comparison of different scales of zooplankton variability in four sites of the Northeast Atlantic Shelves in relation to latitude and trophic status
221	Todd D. O'Brien COPEPODITE: A free, online, user-friendly time series data analysis and visualization tool
264	Sanna Majaneva Deficiency syndromes in Baltic Sea top predators and zooplankton community composition: What the long-term data shows?
291	Daichi Arima Seasonal and inter-annual changes in mesozooplankton community at Mombetsu Harbor, southern Okhotsk Sea during 1997 to 2012
344	María Delia Viñas Interannual variability in a copepod time-series in the spawning and nursery area of the patagonian hake. Implications for fish recruitment
465	Katia Julissa Aronés Flores Multidecadal trends in mesozooplankton biomass off Peru from 1961-2012

WORKSHOP 7

TOWARD A TAXONOMICALLY-COMPREHENSIVE GLOBAL REFERENCE DATABASE FOR DNA BARCODES OF MARINE ZOOPLANKTON

Wednesday 11 May 2016 | 09:00–12:30

Conveners: Tone Falkenhaug (Norway) Silke Laakmann (Germany)
Invited speaker: Ann Bucklin (USA)

DNA barcoding is a useful tool for identification and discrimination of species across most taxonomic groups of marine zooplankton. DNA barcodes can also reveal cryptic, rare, and invasive species, link different life cycle stages of a species, and – increasingly – characterize patterns of biodiversity based on environmental sequencing (also called metabarcoding).

A variety of genes have been used for DNA barcoding, including most frequently mitochondrial cytochrome oxidase I (COI), but also other mitochondrial (16S rRNA, COII) and nuclear genes (18S rRNA). With some exceptions, genes suited for discrimination of closely-related species typically provide very weak phylogenetic information at higher taxonomic levels. Hence, barcodes cannot be used to identify and classify species for which no barcode has been determined. In this sense, lack of a complete DNA barcode reference library is the most limiting factor for accurate and reliable discrimination and identification of zooplankton species. In particular, comprehensive databases are needed for metabarcoding efforts that seek to characterize species-level diversity of marine zooplankton assemblages and ecosystems.

The purpose of this workshop is to encourage wide-ranging discussion of the concept of a taxonomically-comprehensive, global DNA barcode reference database linking DNA sequences of zooplankton to accurately-identified specimens. The goal of the workshop is to consider costs and benefits, prospects and impediments, and work toward to a realistic plan to encourage and facilitate progress toward a DNA barcode reference database. Among practical considerations to be discussed are:

- Which gene(s) should be included in a barcode database?
- How can the accuracy of species identification be assured?
- Should taxonomic authorities be reviewed or rated in some way?
- What policies and procedures should be used to ensure open access to data and protection of data ownership rights?
- What metadata should be required for submission of DNA barcodes data to a reference database?

W7 PRESENTATIONS

09:00	Introduction by conveners	
	ID 412	Invited speaker: Ann Bucklin Name that species: The need for reference dna barcode databases for analysis of zooplankton diversity using barcoding and metabarcoding
	402	Panagiotis Kasapidis The "MetaCopepod" project: Designing an integrated DNA metabarcoding and image analysis approach to study and monitor the diversity of zooplanktonic copepods and cladocerans in the Mediterranean Sea
	Presentation of posters (10 minutes each)	
	Discussion	

W7 POSTERS

ID	
132	Sergio Hernandez Trujillo DNA barcoding of calanoid copepods from the Gulf of California
214	Lisa Devriese A DNA metabarcoding approach to profile macrobenthos and zooplankton biodiversity
305	Ryuji Machida Integration of individual- and community-based transcriptomics: case study using planktonic gastropod Hydromyles globulosus
413	Ann Bucklin Toward a DNA barcode reference database: Contributions from the ICES Working Group on Integrated Morphological and Molecular Taxonomy (WGIMT)
420	Peter H. Wiebe Integrating DNA barcodes into oceanographic data management systems: the BCO-DMO approach
542	Maiju Lehtiniemi Information system on aquatic non-indigenous and cryptogenic species AquaNIS with integrated DNA barcode information
544	Inga Mohrbeck Evaluating DNA-based Identifications of Next-Generation Sequencing and Classical Sanger Sequencing Using a Comprehensive 18S rDNA Reference Library of the North Sea Metazoan Fauna

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Technology for sustainable fisheries

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HYDROPTIC

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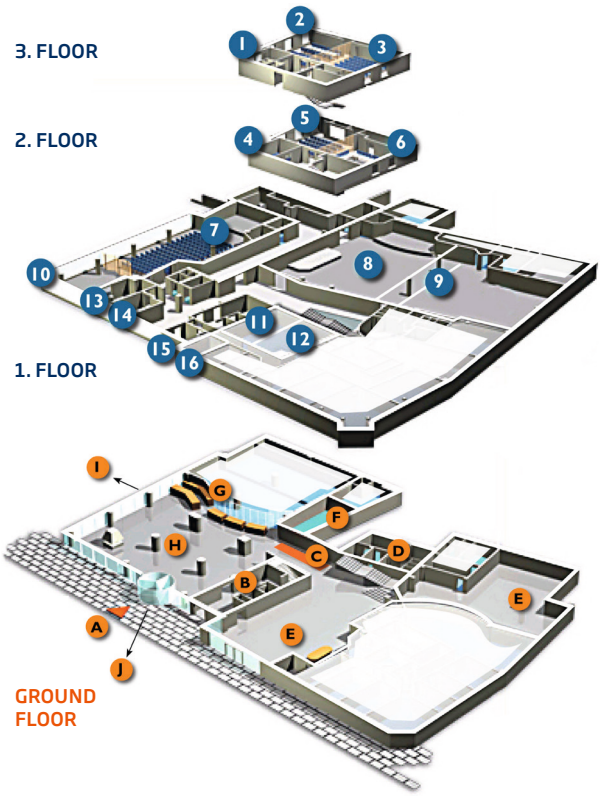

3. FLOOR
2 Tårnplass
3 Galgebakken

2. FLOOR
5 Muséplass

1. FLOOR
7 Sydneshaugen
8 Dragerfjellet
9 Teatergaten
10 Hødden
11 Office, Dokken
12 Office, Baneveien
15 Presentation Desk
16 Office, Klosteret

GROUND FLOOR
A Entrance
B Elevator
C Registration
D Toilets
E Posters
F Wardrobe
G Cash Bar
H Foyer
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J Across the street to Amalie (Dining)

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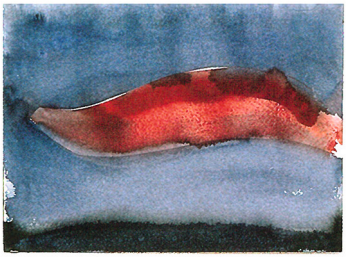

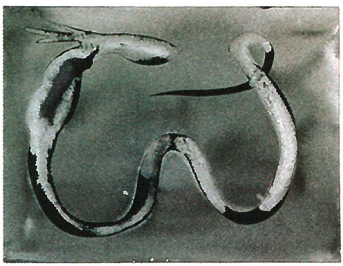

Photo: Ørnulf Opdahl