Ecosystem monitoring in the western North Pacific off Japan

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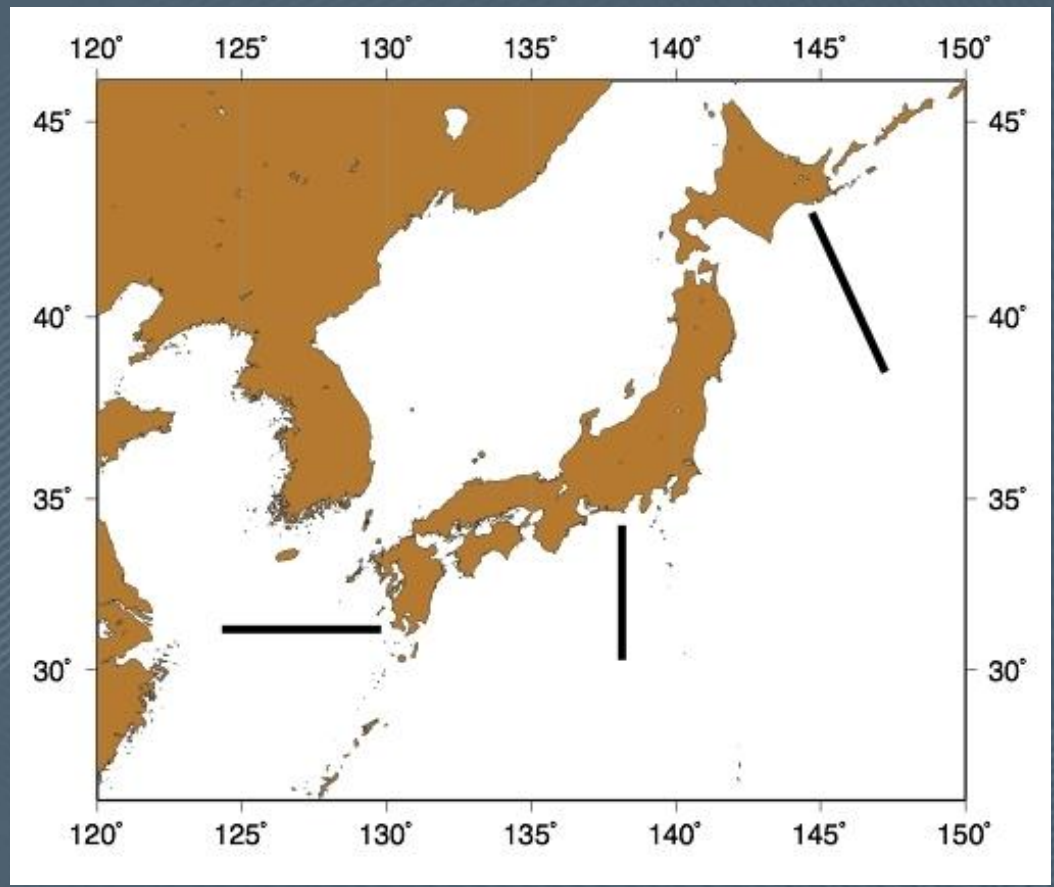
JMA monitoring
Egg Sensus
a new ecosystem monitoring
(“New Monitoring”)

Odate data/sample
Fisheries Oceanography Database

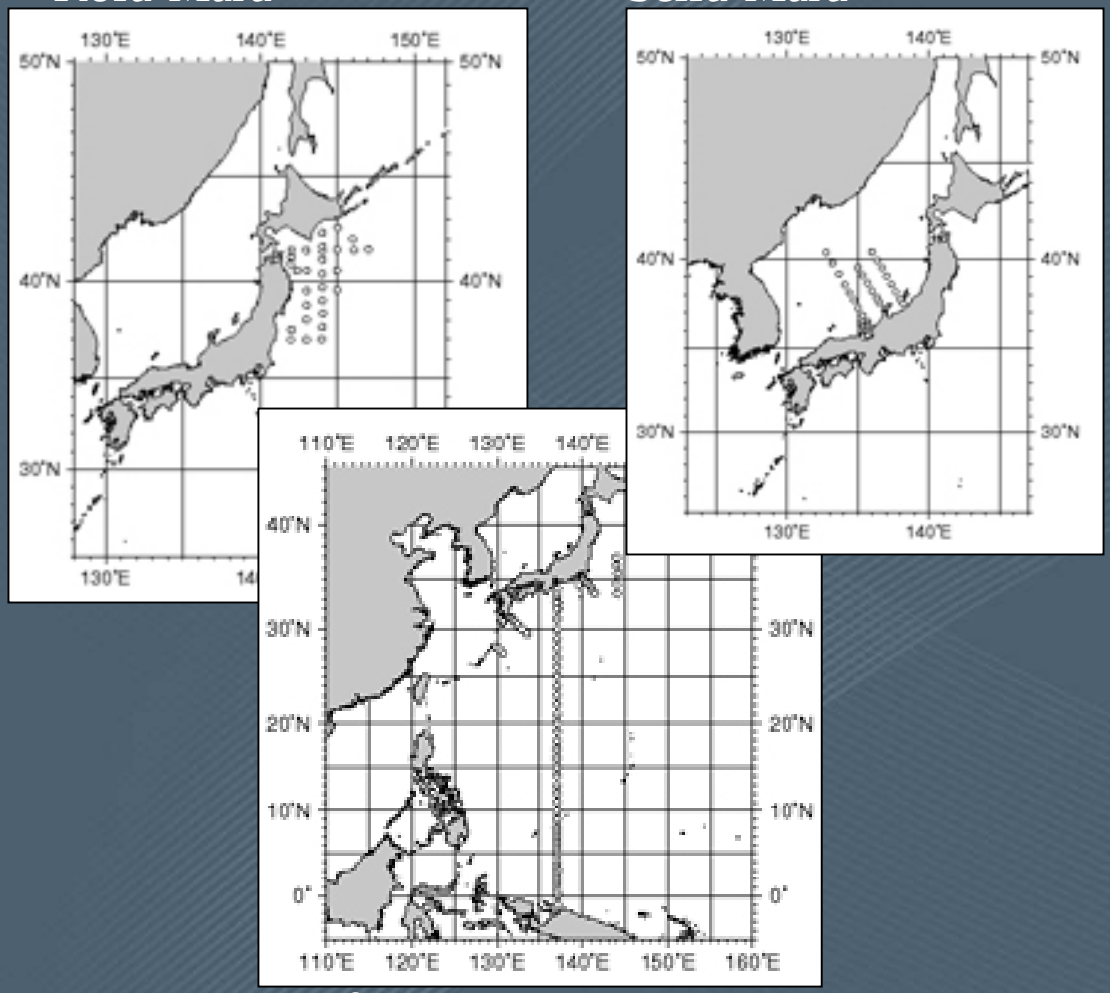


JMA (Japan Meteorological Agency) monitoring

(1965-)
(7 vessels, ca. 5 cruises / y)

Kofu-Maru

Seifu-Maru



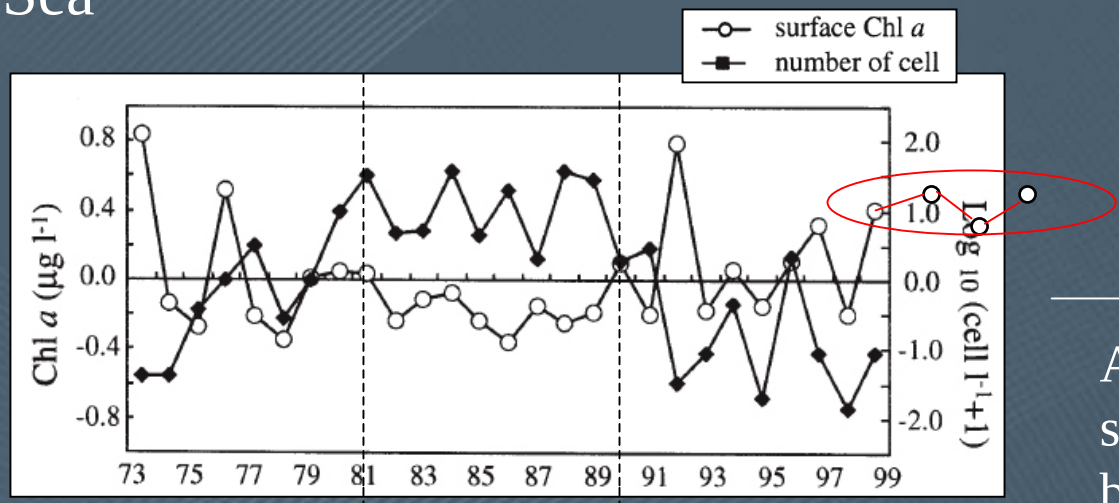
Ryofu-Maru

Temperature
Salinity
DO
Nutrients
NO3
NO2
PO4
Chl. a
zooplankton

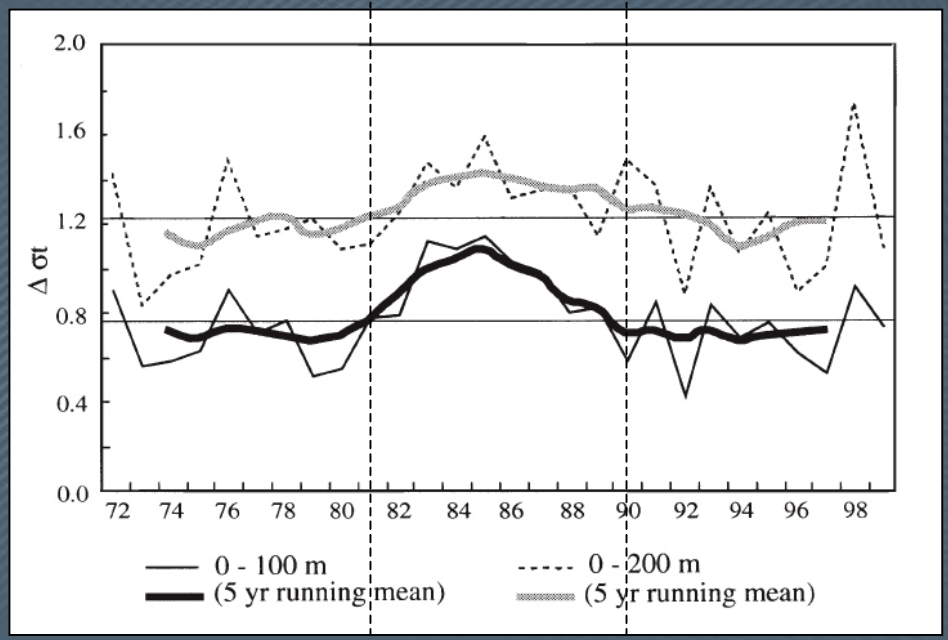
Current Topic 1

Interdecadal change in the upper water column ecosystem in the Japan Sea

Phytoplankton



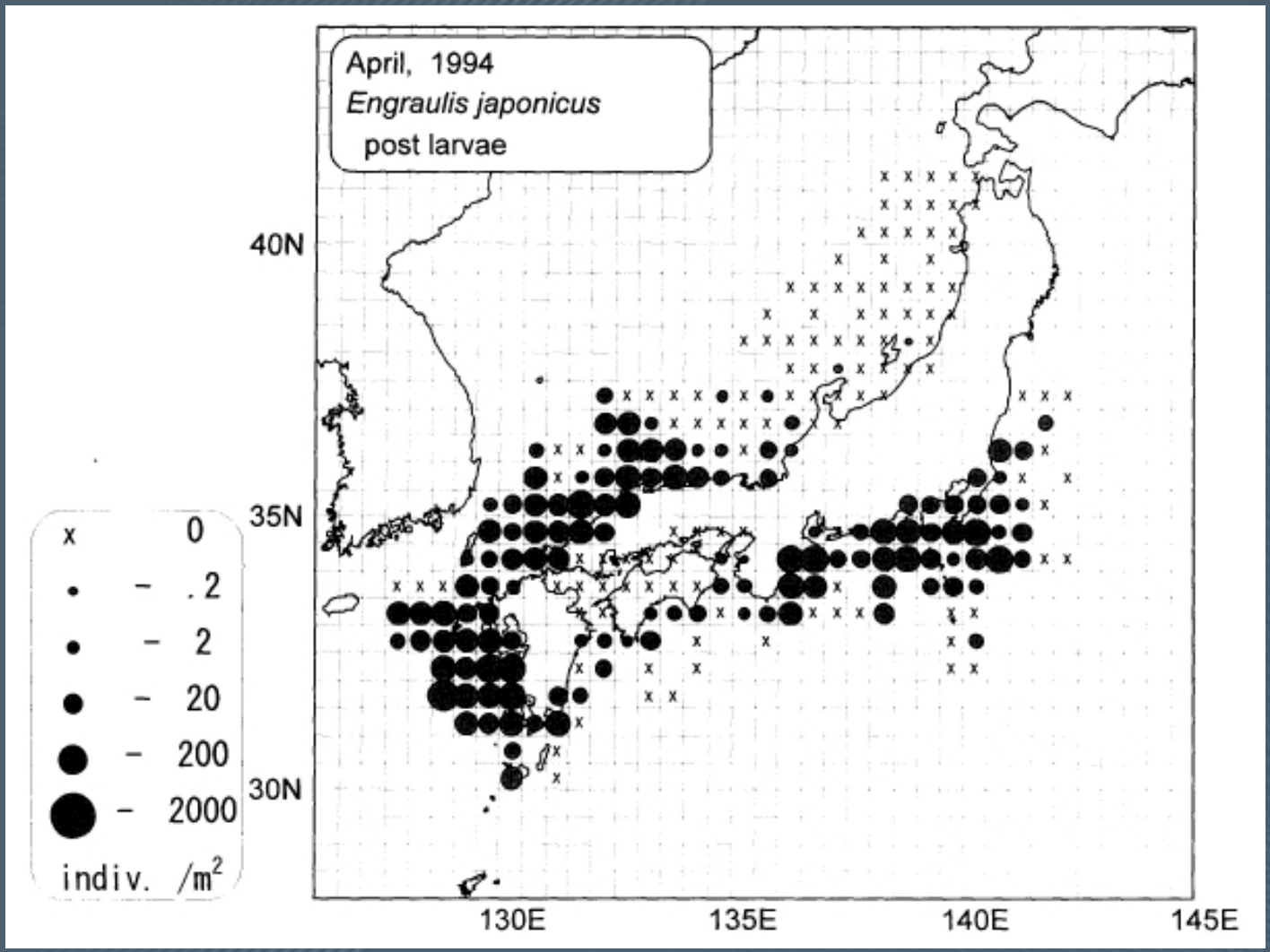
Water density gradient



After 1998, spring blooms have occured later.

Chiba and Saino, 2002
MEPS 231

Egg Sensus (Fisheries Research Agency)



(1947-)
(winter-spring)

Temperature
Salinity
fish egg
fish larvae
(zooplankton)

FISHERIES OCEANOGRAPHY Fish. Oceanogr. 10:4, 329–341, 2001

Interannual variation in spring biomass and gut content composition of copepods in the Kuroshio current, 1971–89

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ABSTRACT

We examined the effects of climate factors on annual variations of copepod biomass and gut c composition in early spring in the Kuroshio a slope water off the Pacific coast of central Japa 1971 to 1989. The biomass trends were differ large (prosomal length ≥ 1 mm) and small (pr length < 1 mm) copepods in both waters. Pe biomass of large copepods decreased in magnitu the biomass of small copepods was low around For the large copepods in the Kuroshio, 3-year r mean biomass was related to the Kuroshio m index. The yearly mean biomass was related to abundance in the gut which, in turn, was rela wind speed and temperature. The 3-year running biomass of large copepods in the slope wat positively related to solar radiation in March biomass of small copepods in both waters was ively related to solar radiation in February, and with high biomass of small copepods corresp

INTRODUCTION

Time series data on meso- and macrozooplankton biomass have revealed relationships between biomass fluctuations and climatic events. In the northern Baltic Sea, the biomass of taxa preferred as food by herring decreased when salinity declined from 1980 to 1993 (Matthaus and Schinke, 1994) and herring

Kuroshio	Small	18, 101	1.057	ns
Slope water	Large	18, 266	2.592	< 0.001
Slope water	Small	18, 266	3.972	< 0.001

Null hypothesis (H_0) was that the biomass did not differ between the years. H_0 was rejected for large copepods in the Kuroshio and large and small copepods in the slope water at 5% level.
ns, not significant.

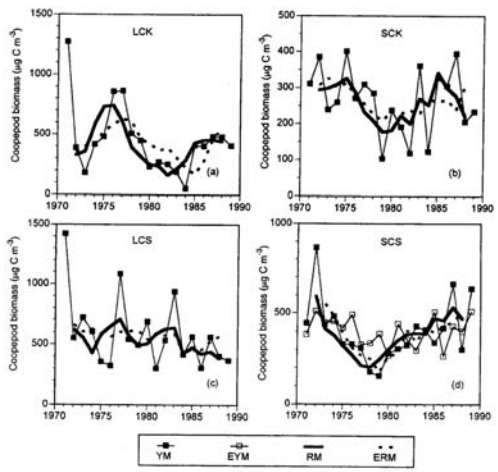


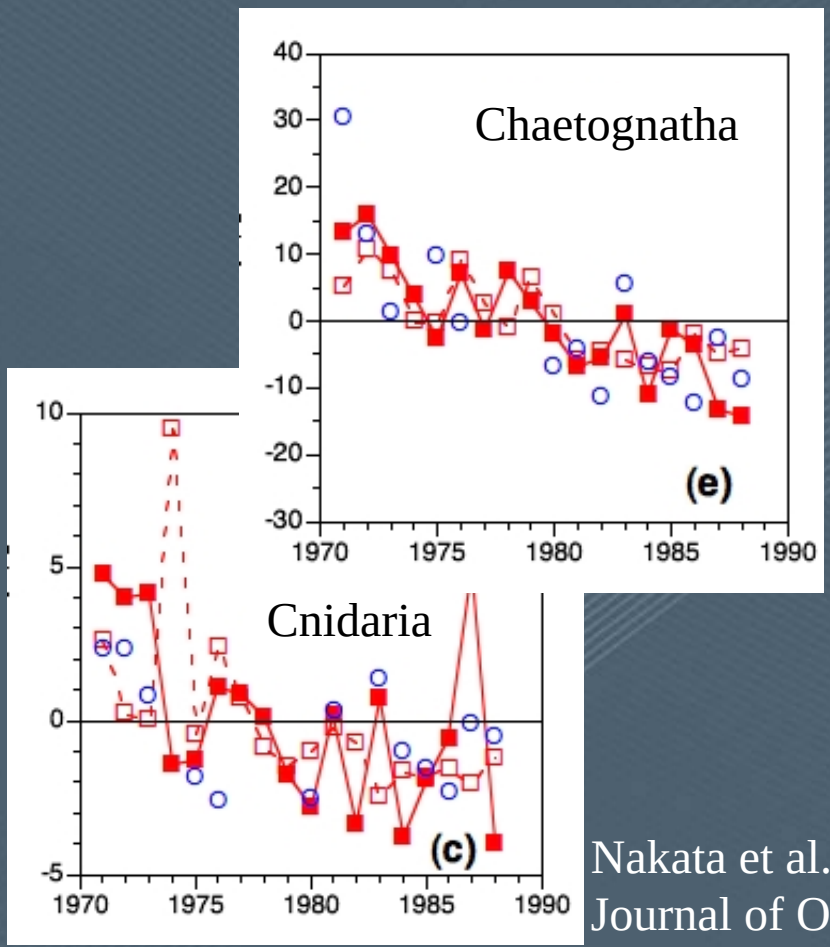
Figure 4. Interannual observed and estimated (a,c) and small (b,d) Kuroshio (a,b) and the Solid and open squares (YM) and estimated means of biomass, res and broken lines indi observed (RM) and e three-year running me respectively. Estimate calculated using regre between the biomass an (Table 3).

Nakata et al., 2001
Fisheries Oceanography

Current Topic 2

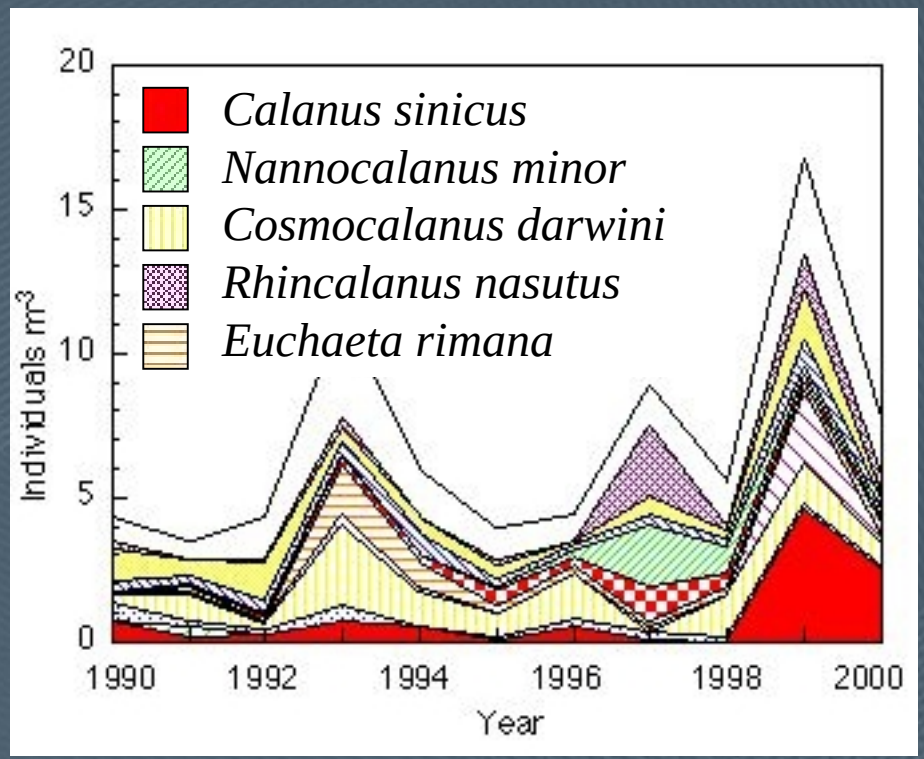
Decadal changes of zooplankton biomass and copepod composition Around Kuroshio area

Inter-decadal changes of zooplankton biomass



Nakata et al. 2003
Journal of Oceanography

Decadal change of copepod composition in Kuroshio

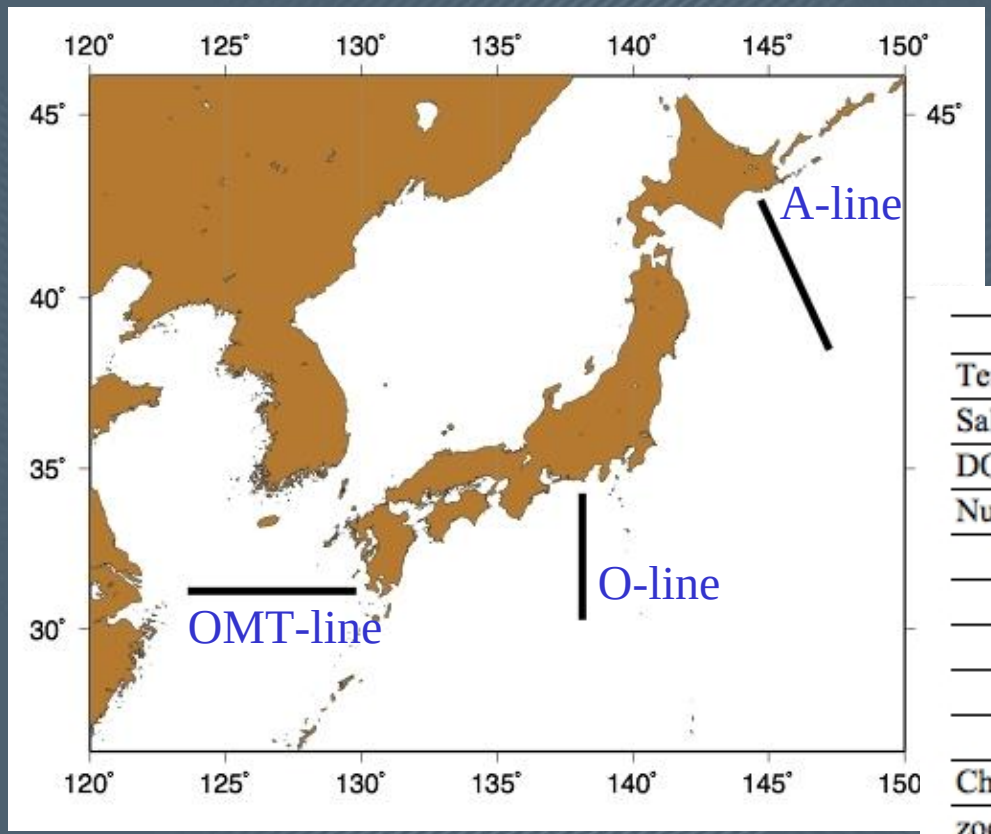


Nakata and Hidaka 2003
Fisheries Oceanography

New Ecosystem Monitoring (FRA / AFFRC*)

(to watch changes associated to global warming)

*Agriculture, Forestory and Fisheries Research Council



	A-line	O-line	OMT-line
Temperature	○	○	○
Salinity	○	○	○
DO	○	○	○
Nutrients	○	○	○
NO3	○	○	○
NO2	○	○	○
NH4	○	○	○
PO4	○	○	○
SiO2	○	○	○
Chl. a	○	○	○
zooplankton*	○	○	○
Secchi-disc dep.	○	○	
PP (13C)	○	○	○
HPLC		○	
DIC	○		
micronekton*	○		

*obtained from vertical/oblique net tows

Characteristics of the new monitoring

	JMA monitoring	Egg Sensus	new monitoring
Fund	JMA	Fisheries Agency	Agriculture, Forestory and Fisheries Research Council
Area coverage	broad	broad	3 lines
Continuity	safe	safe	rather uncertain
Menu of observation	rigid	rigid	flexible

able to serve as research platform

little possibility to modify the plan based on rather rigid contract

Current Topics 3

DOC dynamics in the western subarctic Pacific (A-line)

Local productivity is higher than predicted from inorganic nutrient supply.

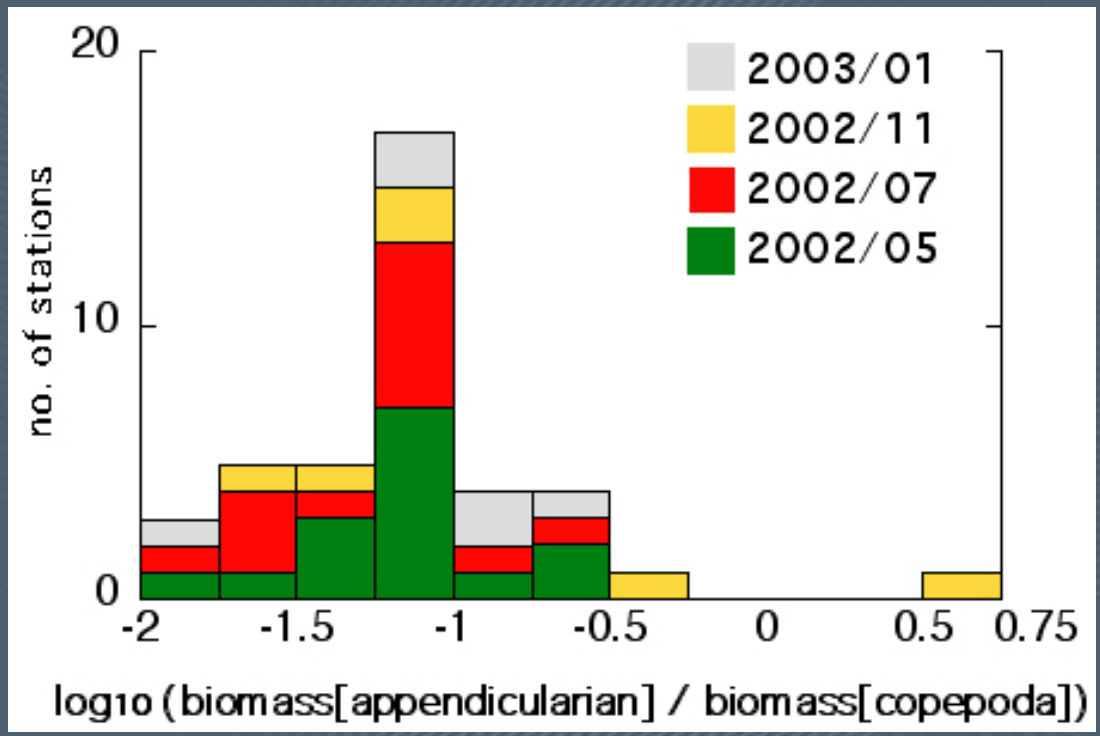
-contribution of DOM?

DOC production was confirmed,
but their amount was considerably smaller than the primary production (ca. 6%) .

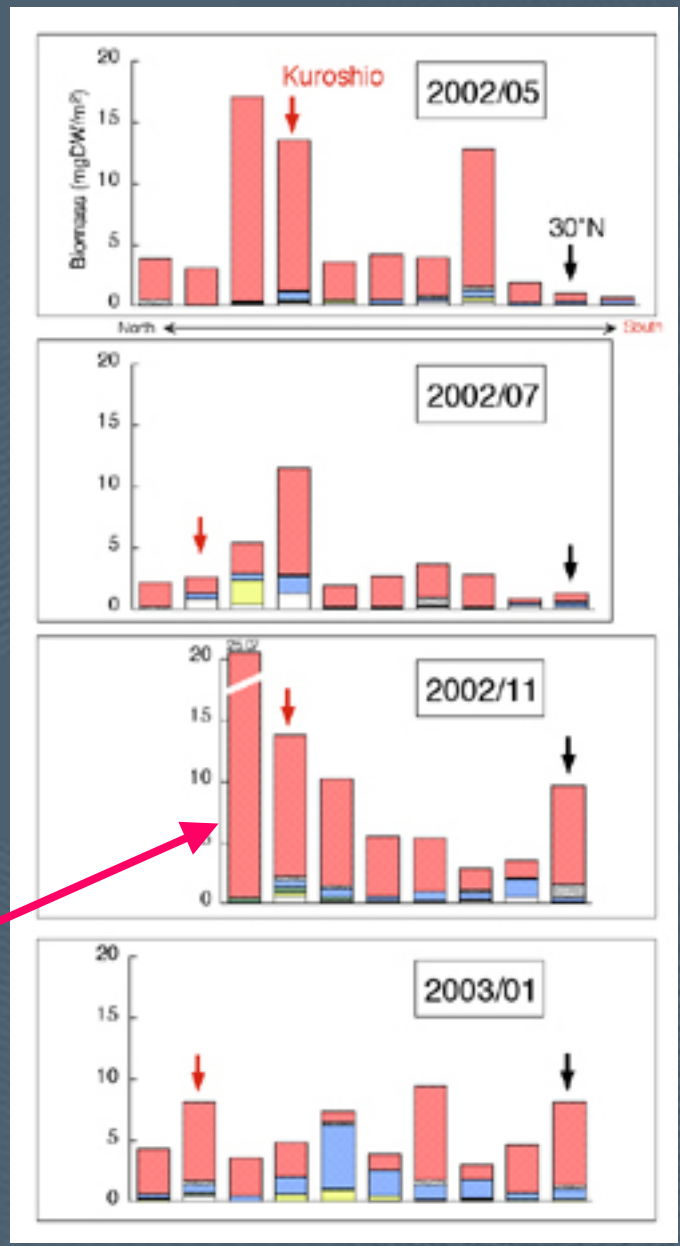
(Hasegawa et al., unpublished)

Current Topic 4

Appendicularian in the Kuroshio Region



Oikopleura longicauda



(Hidaka et al., unpublished)

Summary of current status

JMA Monitoring

Temperature
Salinity
DO
Nutrients
NO3
NO2
PO4
Chl. a
zooplankton

Egg Sensus

Temperature
Salinity
fish egg
fish larvae
(zooplankton)

Long period, Large stock of sample/data

Important publications

Succeeding observations and analysis

Still insufficient to understand the real local process in detail

New Monitoring

Observations of planktonic community in detail
(taxonomic composition, size-fractioned analysis etc.)

Flexibility to serve as platform to various process studies

→Contributes to validate the hypothesis in question

Summary of current status

New Monitoring

Observations of planktonic community in detail
(taxonomic composition, size-fractioned analysis etc.)

Flexibility to serve as platform to various process studies

→ Contributes to test the hypothesis in question

Subarctic Region (A-line)

Relatively well-understood ecosystem

Focus on particular processes

Kuroshio Region / East China Sea

Basal informations (important species etc.) are still required

Current status (Kuroshio)

Sardine stock is still small, anchovy dominates

Mesozooplanktons in winter seem recovering

(Phytoplanktons, Nutrients, ...)

Insufficient observations to draw regional picture

Remote sensing and numerical modeling are in progress