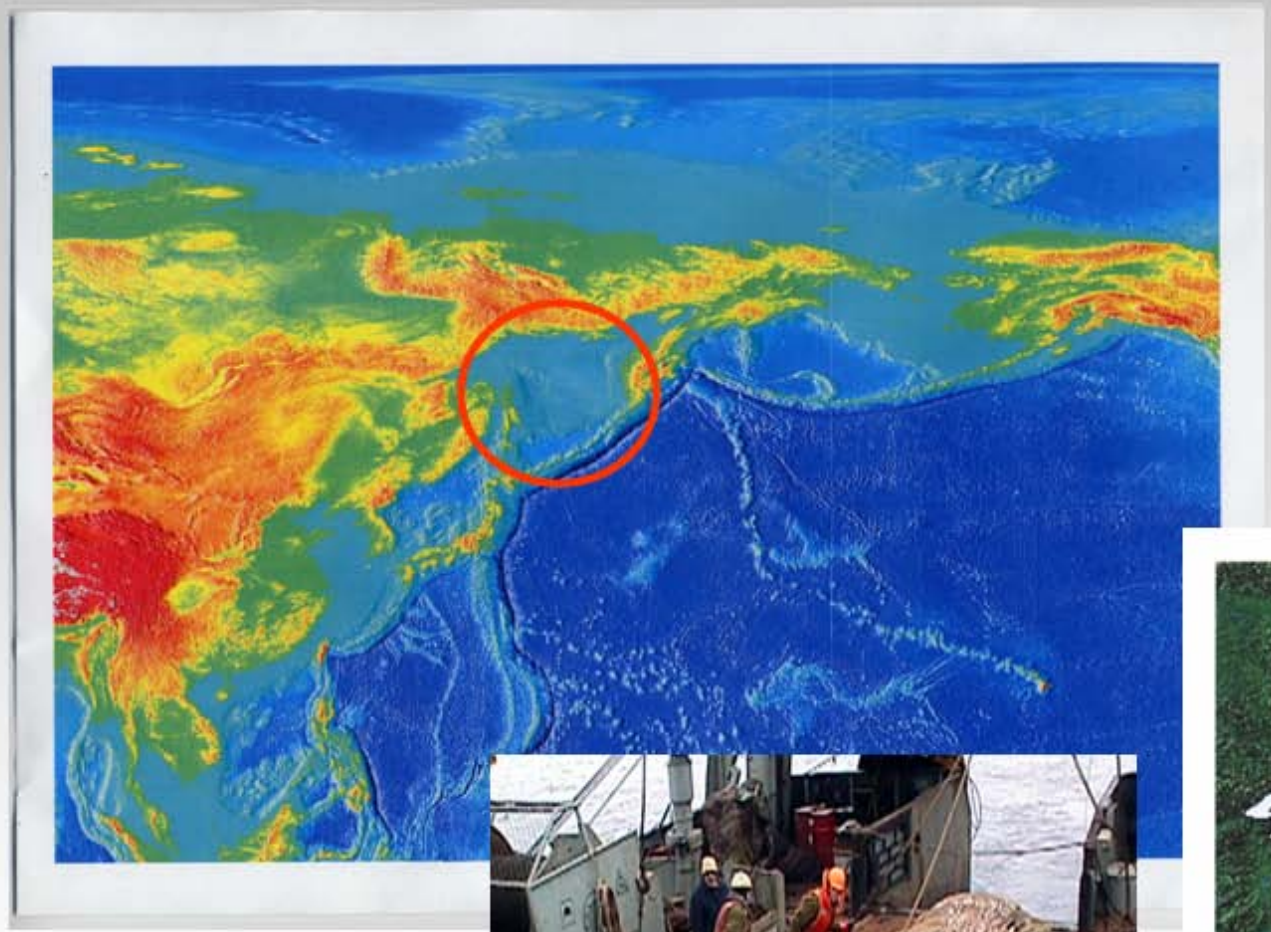
North-south comparisons of plankton communities in the Okhotsk Sea

Elena Dulepova.

Pacific Scientific Research Fisheries Centre Vladivostok, Russia.

Map of locations of plankton measurement.



Okhotsk Sea

Purposes

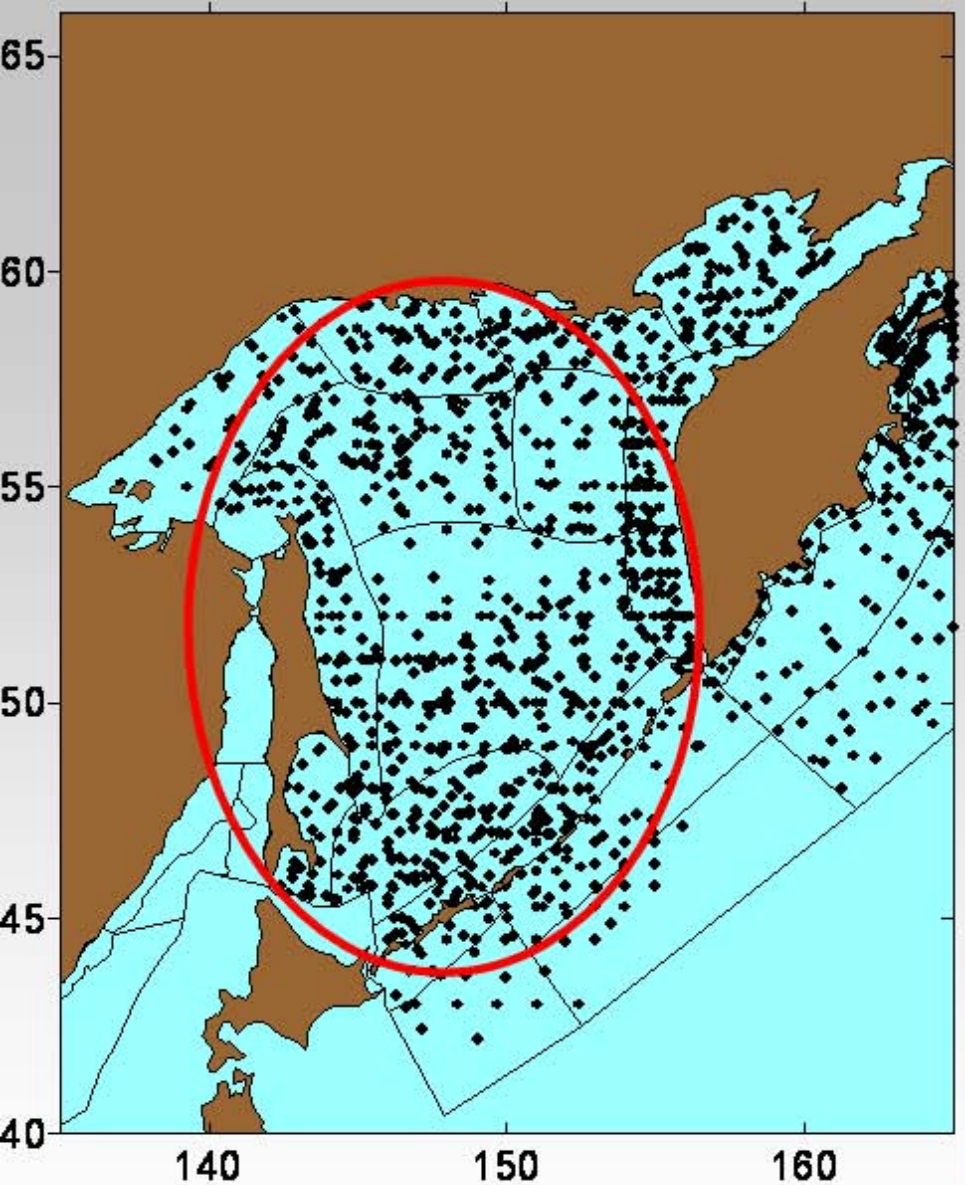
To compare biological data of zooplankton and peculiarity of environmental condition (atmospheric circulation and physical oceanography) in the northern Okhotsk Sea and

Determine productivity of zooplankton communities in the northern and southern Okhotsk Sea.

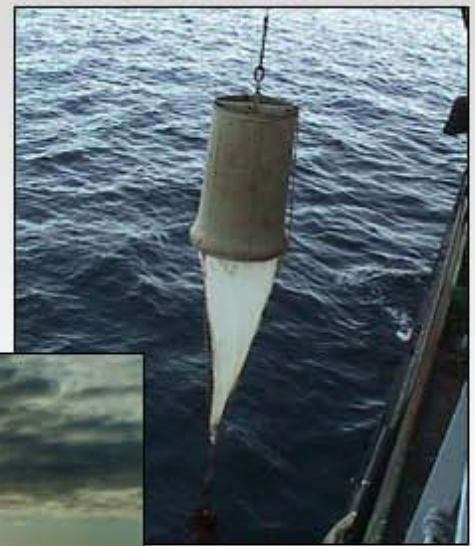
Sampling area

autumn 1998 – 2006

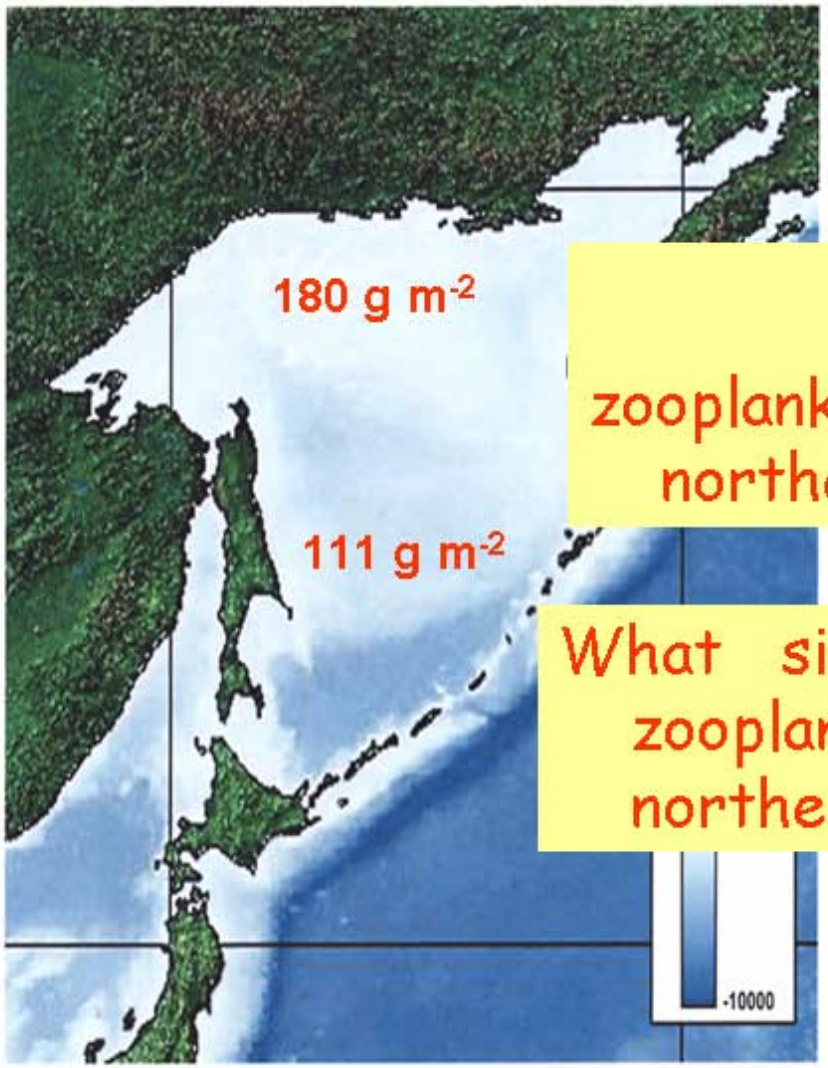
300 plankton station



Okhotsk Sea



Zooplankton biomass in the Okhotsk Sea in epipelagic layers (0-200) autumn



Why

zooplankton biomass higher in the northern Okhotsk Sea.

What similarity and difference in zooplankton community in the northern and southern Okhotsk Sea?

Environmental condition
(Atmospheric and physical oceanography conditions)

Structure of zooplankton

Size ,

Taxonomic stuff

Species composition

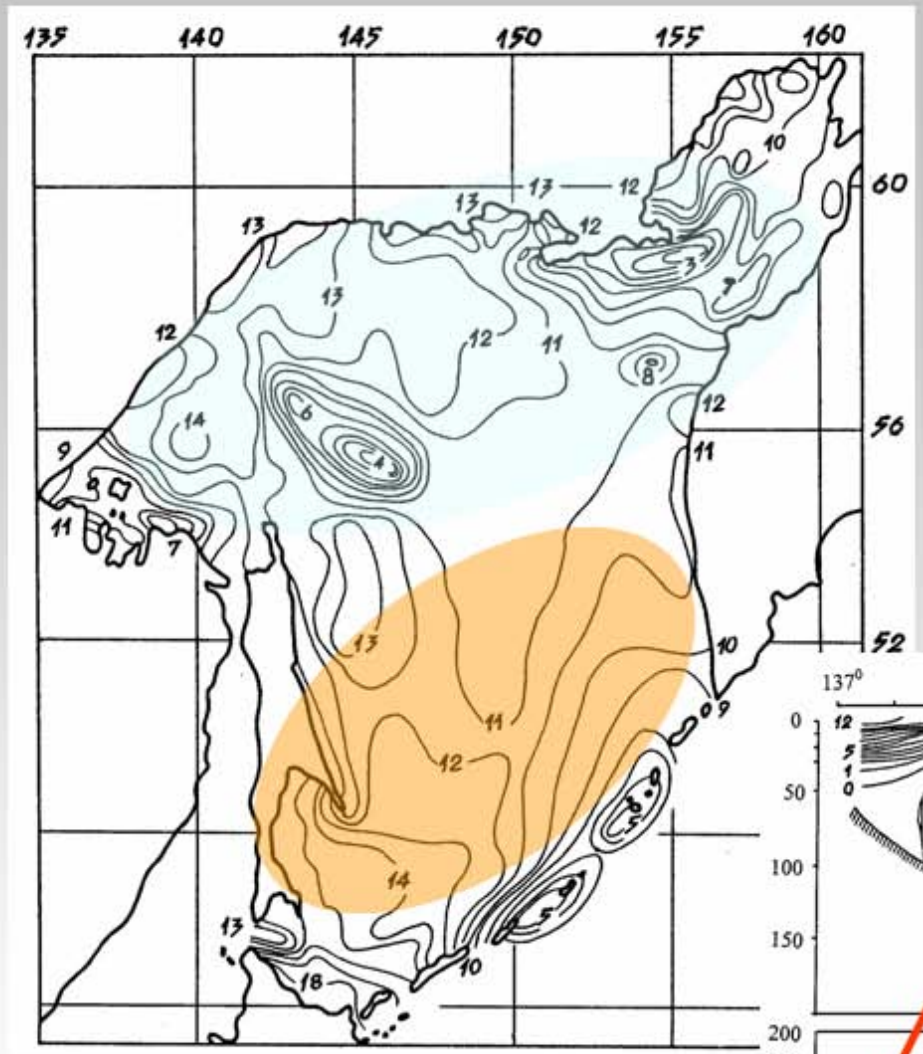
Trophic ratio

composition

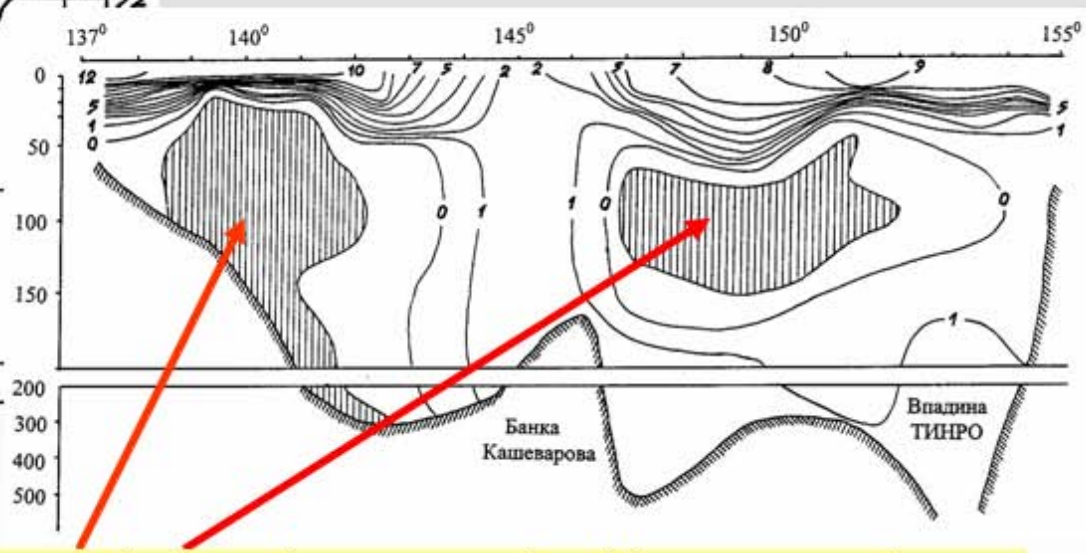
All feature have some influence on productivity of zooplankton in the northern and southern Okhotsk Sea.

Physical oceanography conditions.

The southern part of the Okhotsk Sea is much warmer than the northern area, and the eastern part is warmer than the western area.

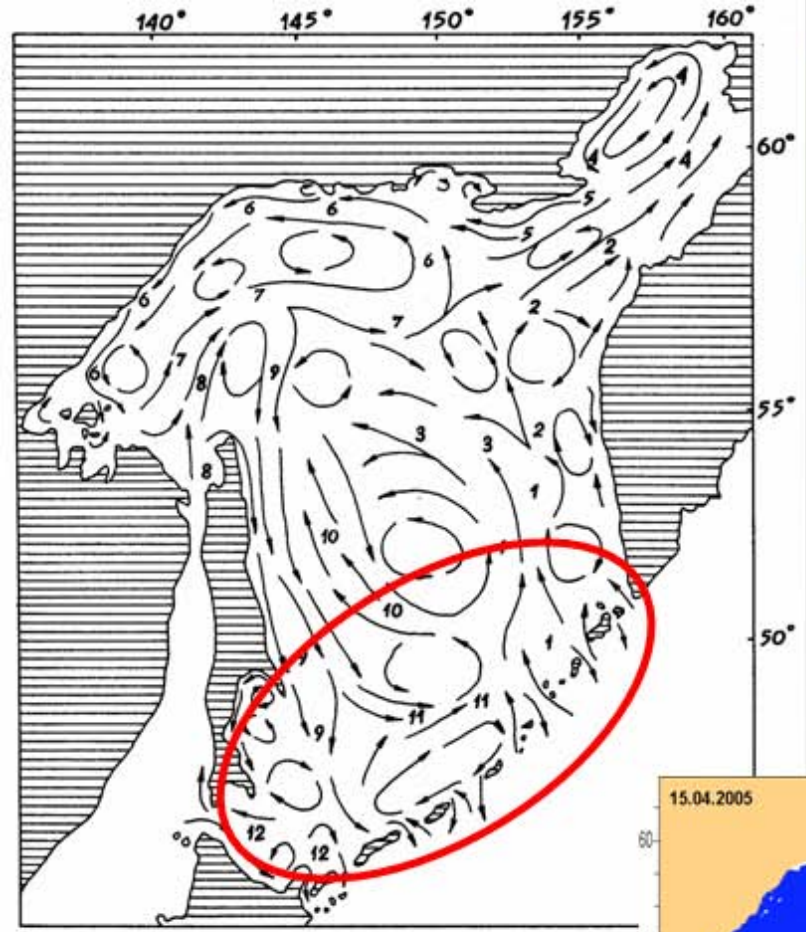


(Chernyavskyi, 1992)



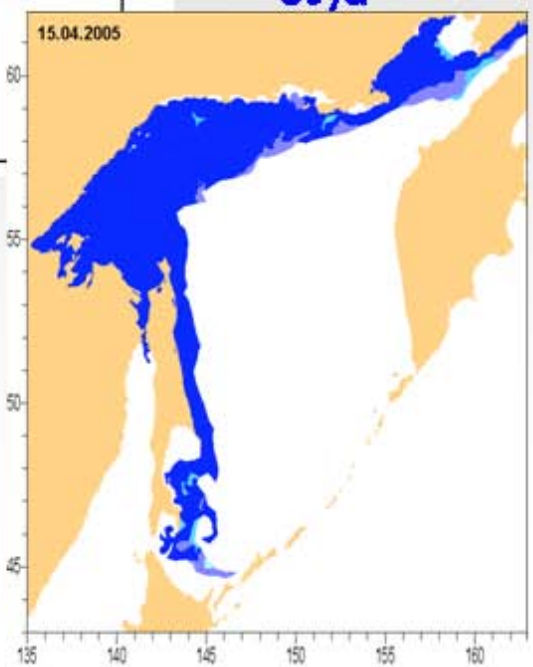
The cold intermediate layer located close to bottom and cold waters with temperature below 00C are widely distributed over the northern, western and northeastern shelves.

Peculiarity of water circulation pattern in the southern Okhotsk Sea.

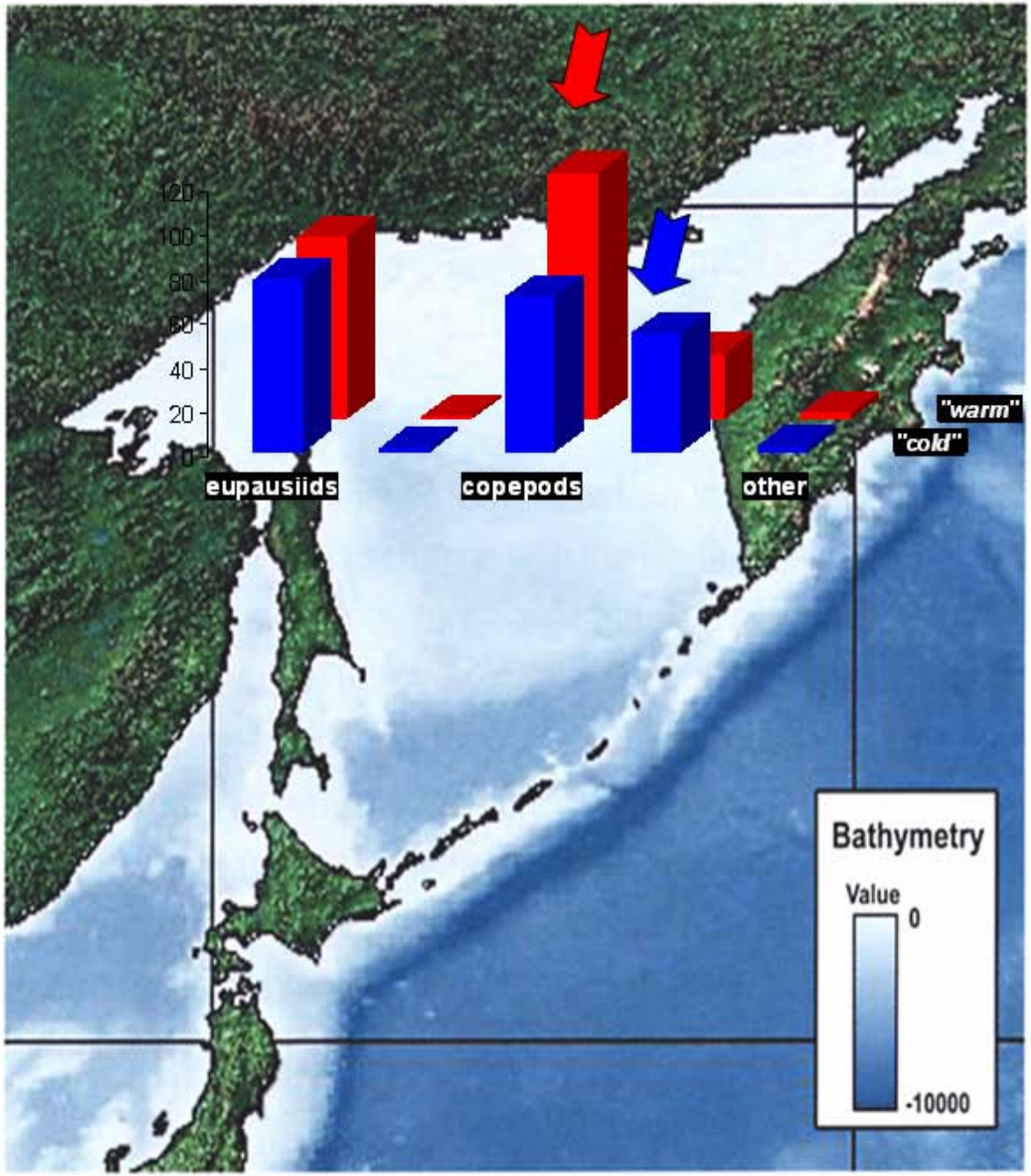


General scheme of water circulation in the Okhotsk Sea in the warm season, July-September (Chernyavskyi et al., 1993)

Currents: 1 – West Kamchatka, 2 – northern branch, 3 – Transverse, 4 – Penzhinsk, 5 – Yamskoy, 6 – North Okhotsk, 7 – North Okhotsk countercurrent, 8 – Amur, **9 – East Sakhalin, 10 – East Sakhalin countercurrent, 11 – Northeast, 12 – Soya**



Ice distribution much higher in the northern part Okhotsk Sea comparing southern area and it have strong impact on living resources.



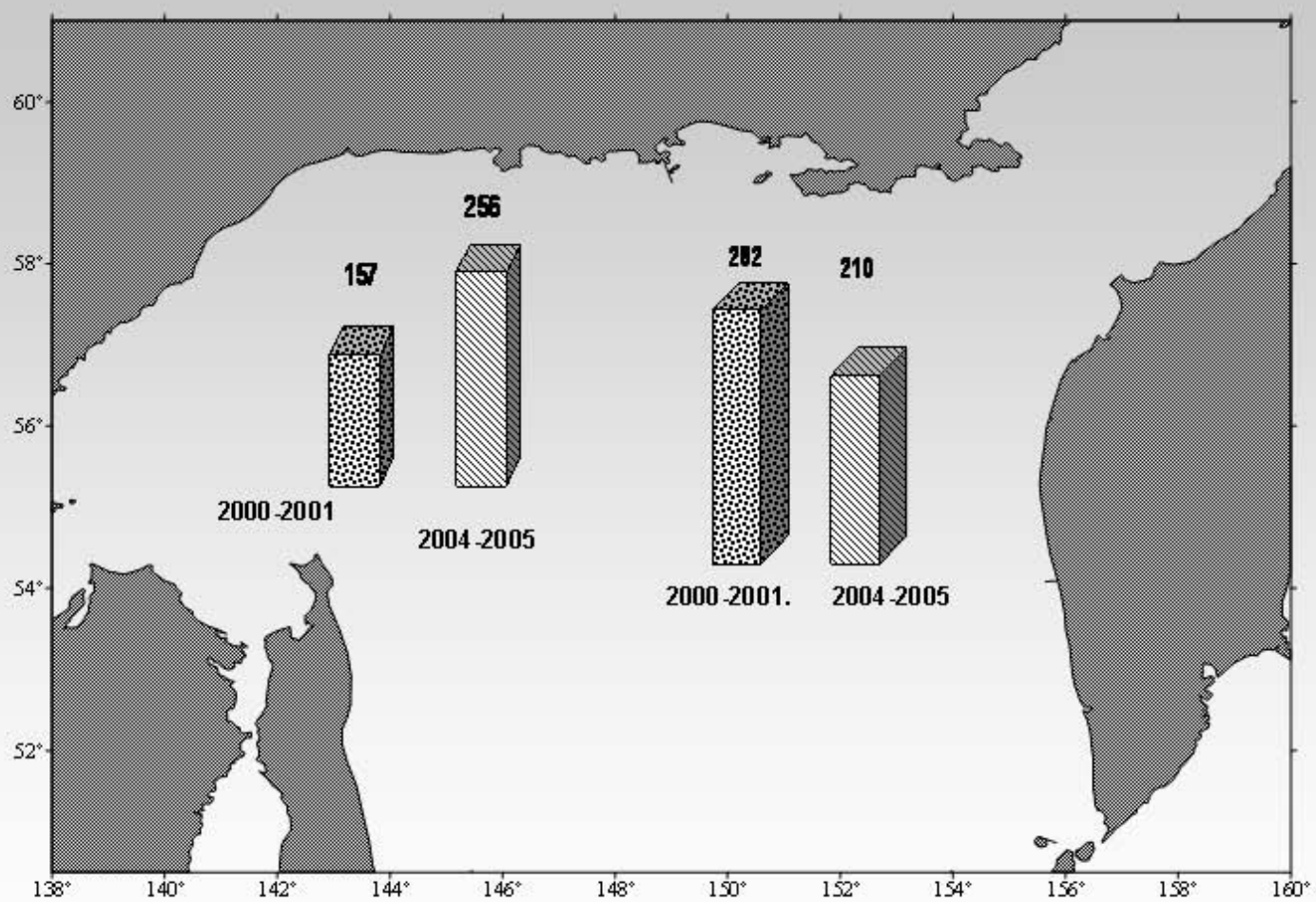
Changes in taxonomic composition of macroplankton in the nothern Okhotsk Sea

Warm years

Increase the biomass copepods

Cold years

Increase the biomass of sagitta


60°
58°
56°
54°
52°
138°
140°
142°
144°
146°
148°
150°
152°
154°
156°
158°
160°
157
256
202
210
2000 -2001
2004 -2005
2000 -2001.
2004 -2005

"2004-2005" years

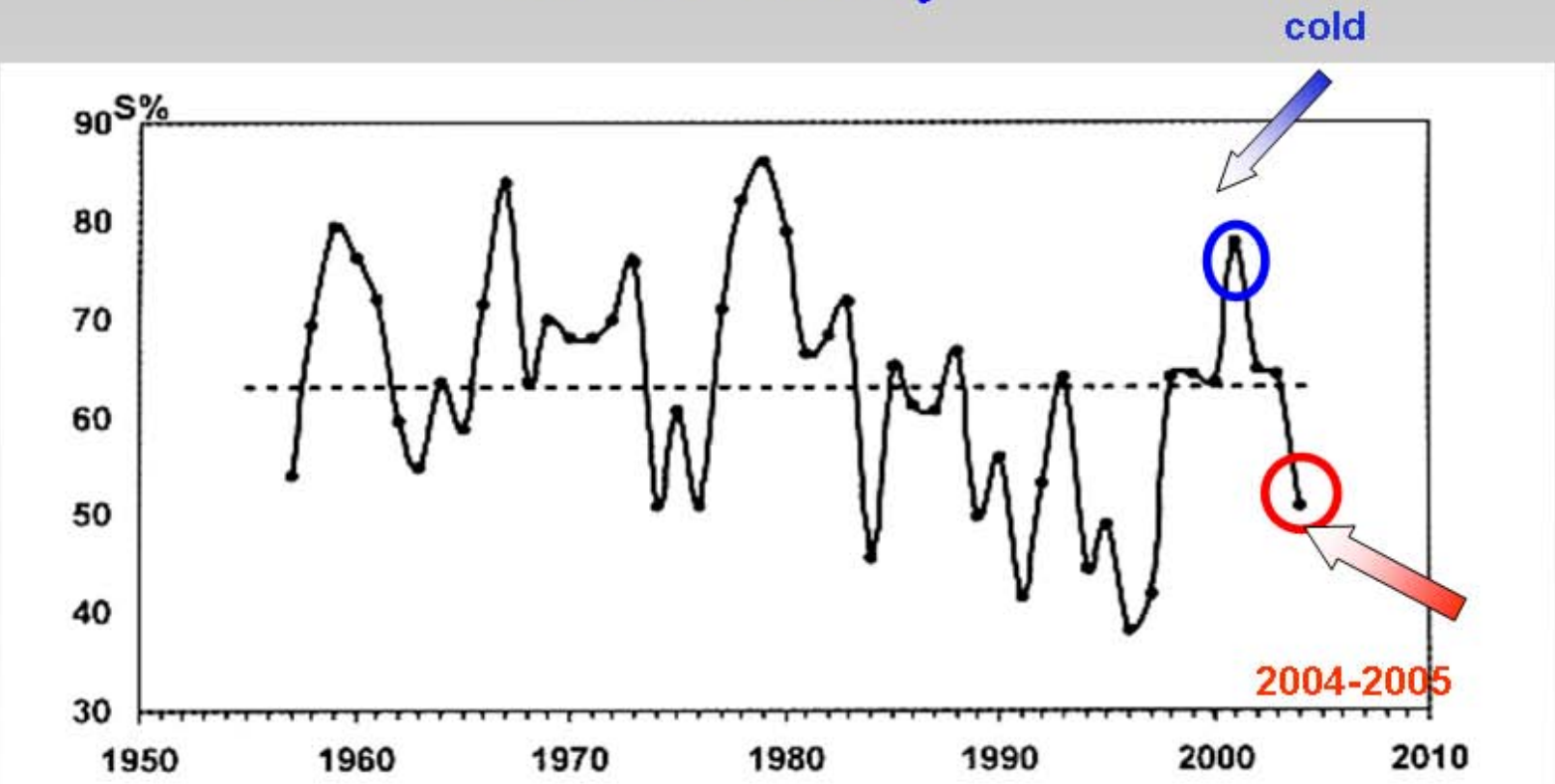
Good for northwestern plankton

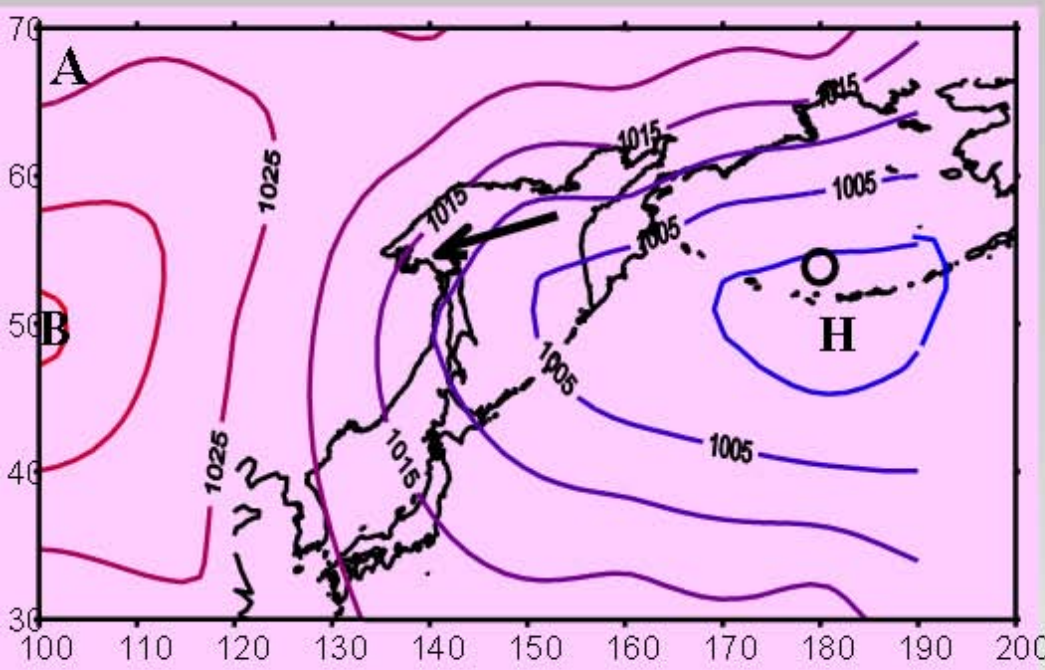
Why?

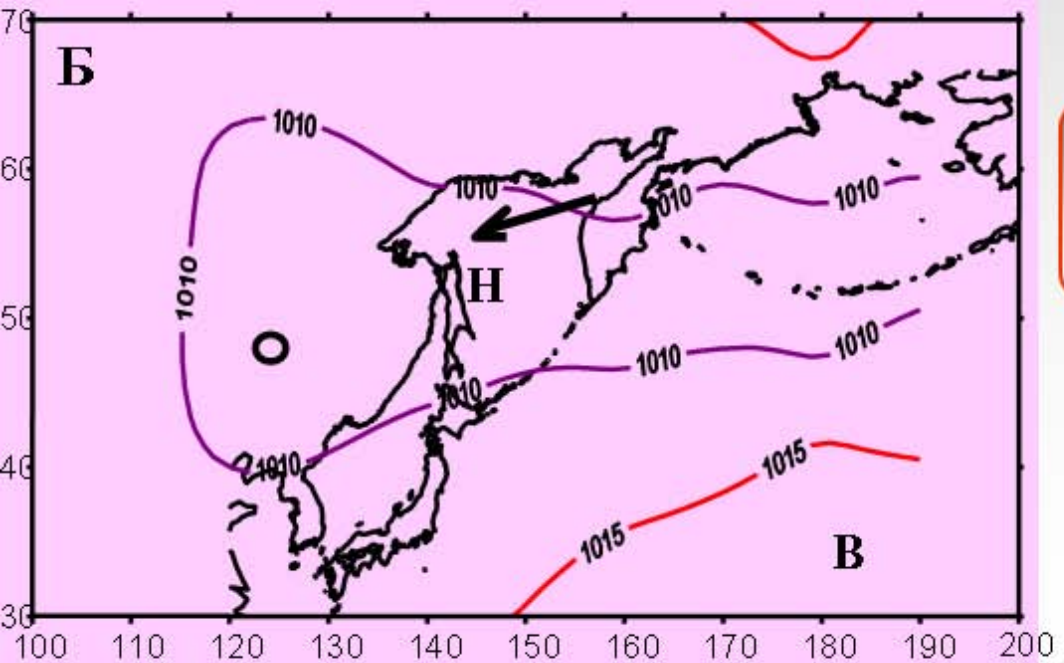
Good for northeastern plankton

"2000-2001"

Changes in winter ice cover area (% from the total sea area) in the Okhotsk Sea (Ustinova et al. 2002)



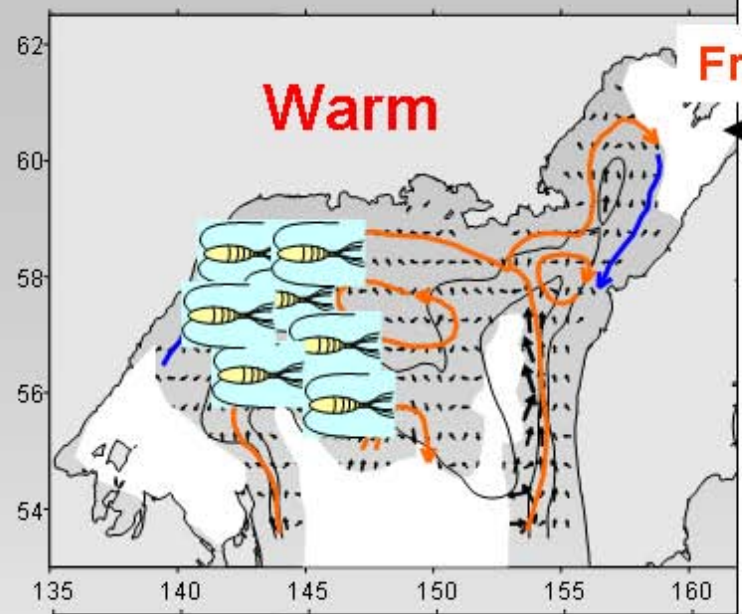




Season average baric field of surface pressure in the "warm" years (2004-2005):

Aleutian Low had a southern position in the Gulf of Alaska, and easterly winds over the Sea of Okhotsk

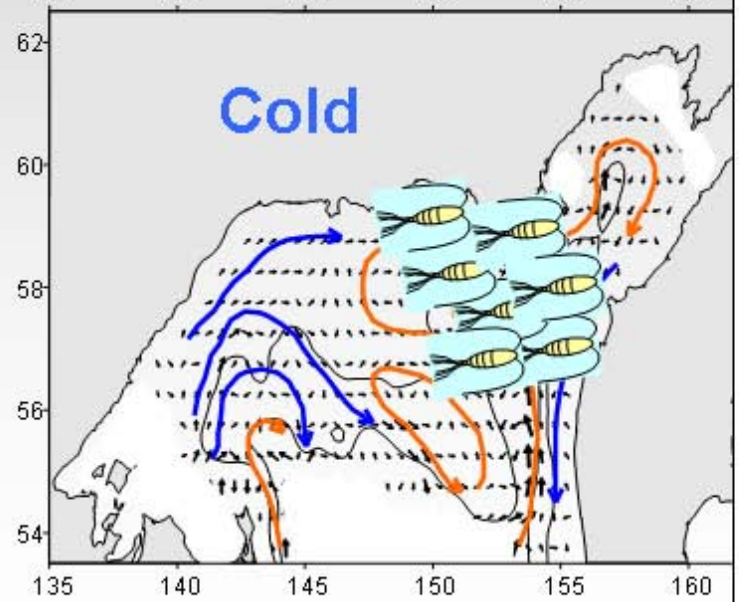
General circulation of currents is focused from east to west



From east to west

Zooplankton carrying out and accumulation in northwest areas of Okhotsk Sea.

Cold years



General circulation of currents is focused from west to east

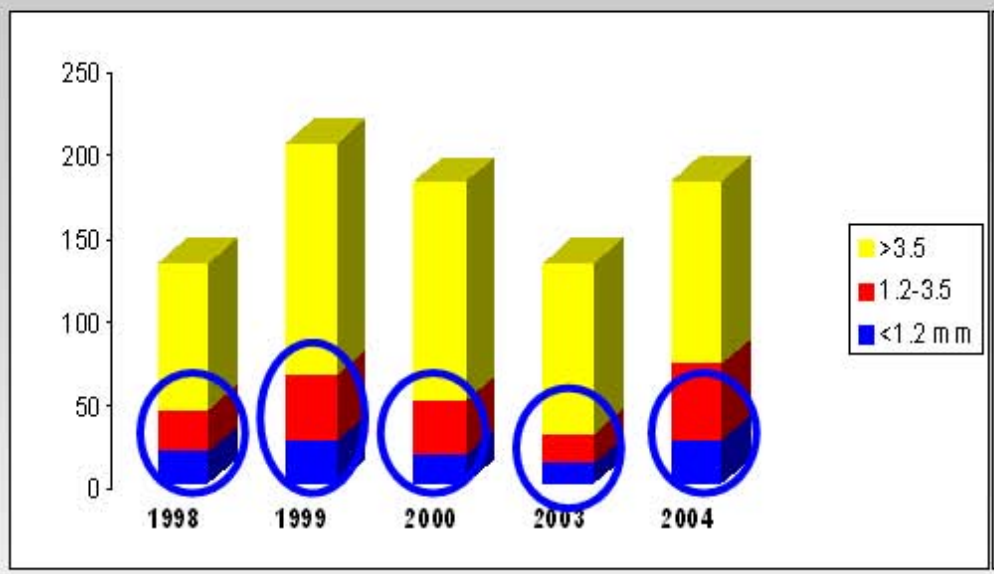
From west to east

Zooplankton carrying out and accumulation in northeast areas of Okhotsk Sea.

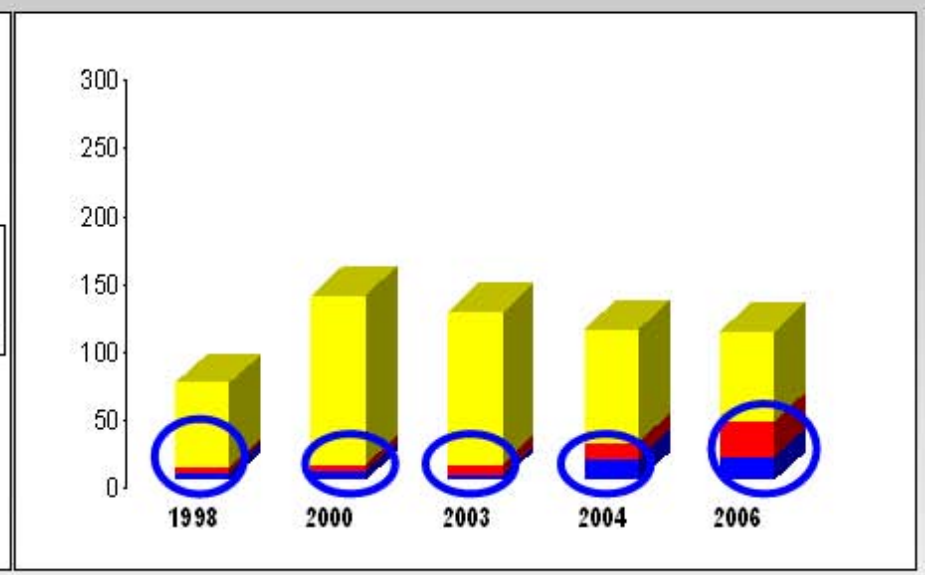
*Authors thank G.KHen for the given scheme of currents

Size structure

North



South

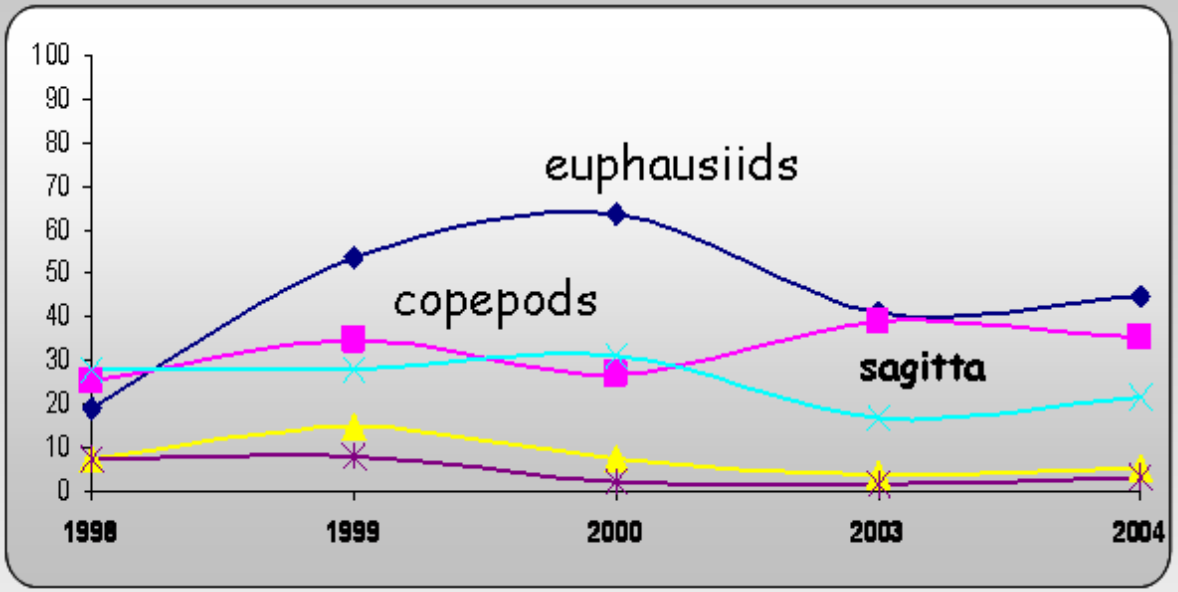


Proportion of small copepods (body size less 3.2 mm) higher in the northern Okhotsk Sea comparing southern part during all season.

Small copepods – 36.8%

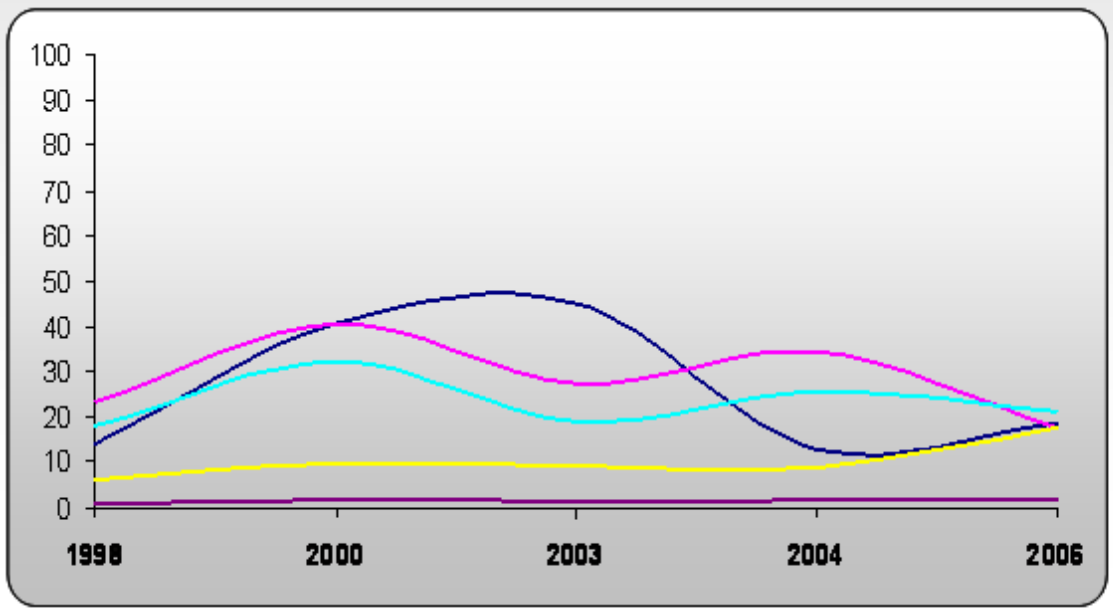
Small copepods – 18.7%

Taxonomic stuff



Northern Okhotsk Sea

Southern Okhotsk Sea



Species composition

North

Copepods:
Metridia okhotensis
Calanus glacialis
Pseudocalanus newmani
Neocalanus flemigeri
Oithona similis
Euphausiids
Thysanoessa raschii
Th.longipes
Hyperiids
Themisto libellula
Th. japonica
Chaetognats
Sagitta elegans
Other

dominant species
(60-80% of total zooplankton biomass)



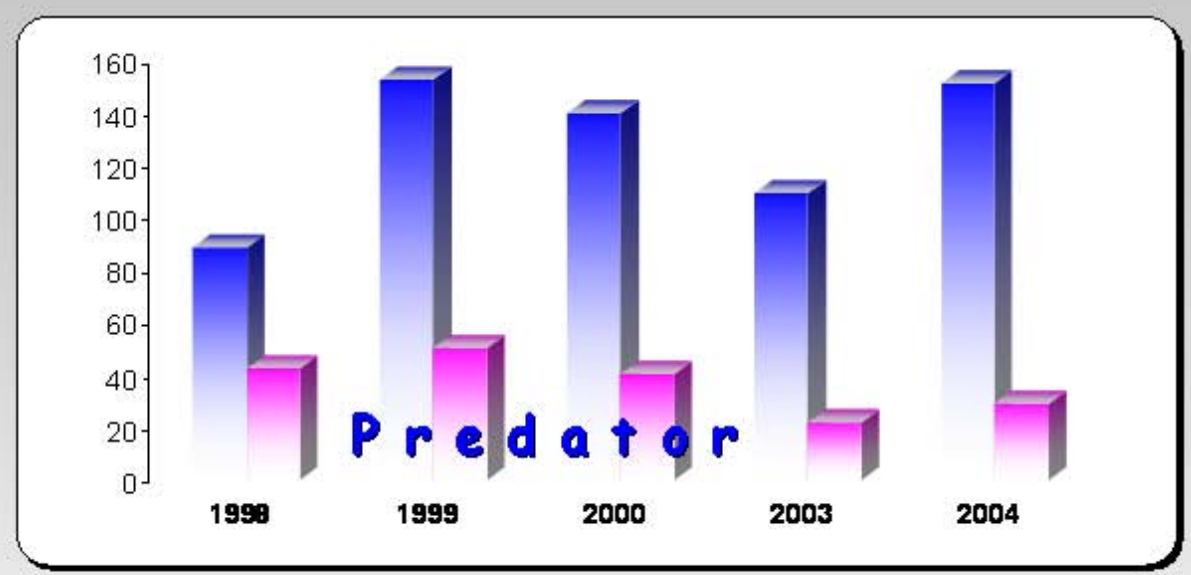



South

Copepods:
Metridia okhotensis (1)
Neocalanus flemigeri(2)
Oithona similis (3)
Pseudocalanus newmani (4)
Neocalanus cristatus (5)
Metridia pacifica (6)
Euphausiids
Th.longipes
Th.raschii
Th.inermis
Euphausia pacifica
Hyperiids
Themisto pacifica
Primno macropa
Chaetognats
Sagitta elegans
Other

Trophic structure

Northern Okhotsk Sea



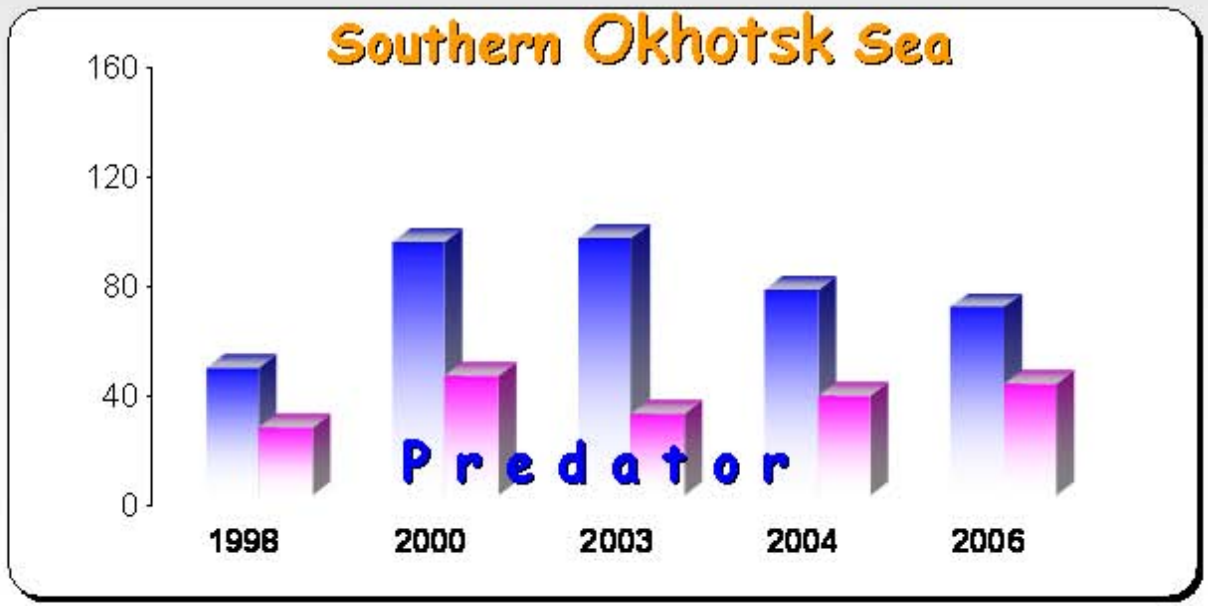
Predatory

sagitta+hyperiids+other

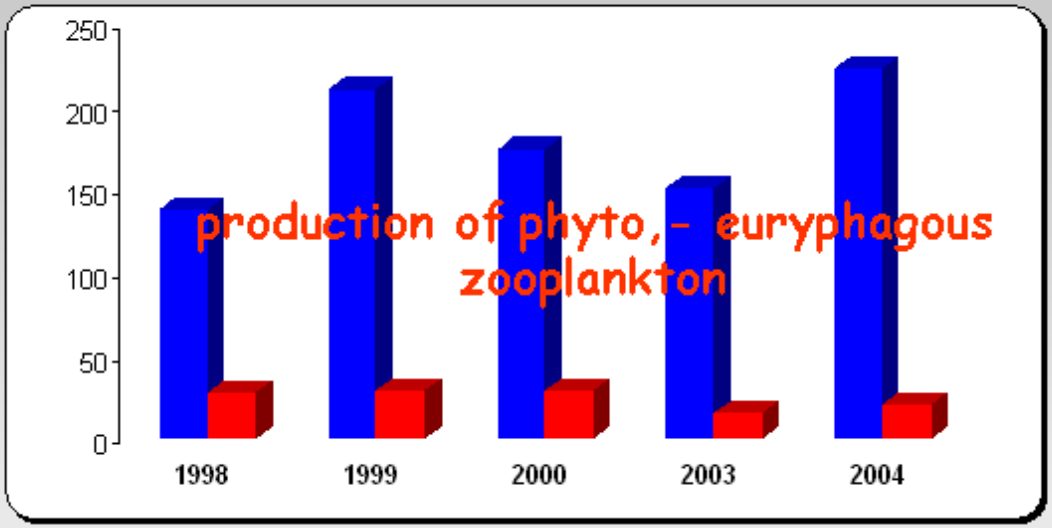
16-32% (23%)

24-40% (37%)

Southern Okhotsk Sea

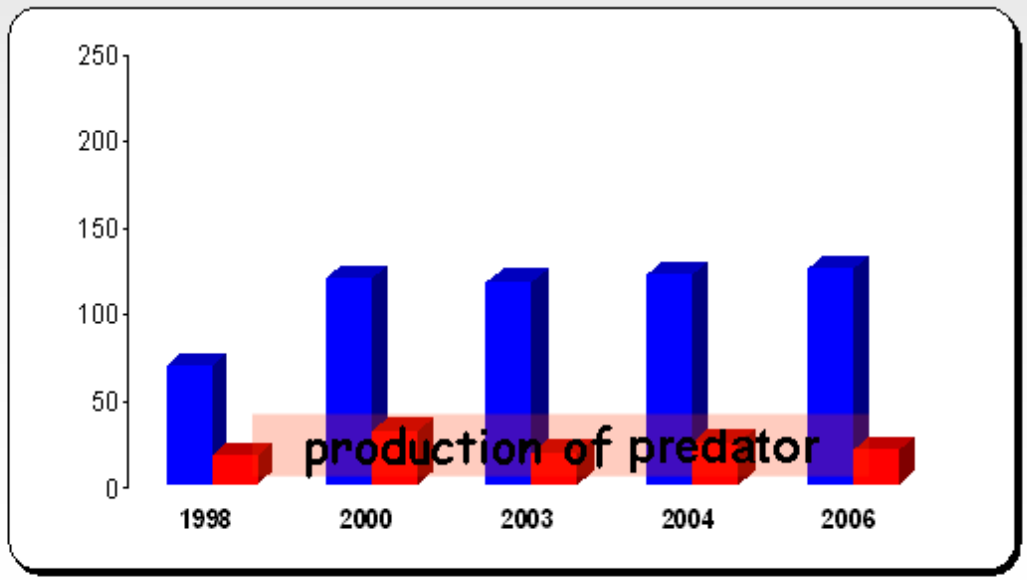


Annual change of zooplankton production

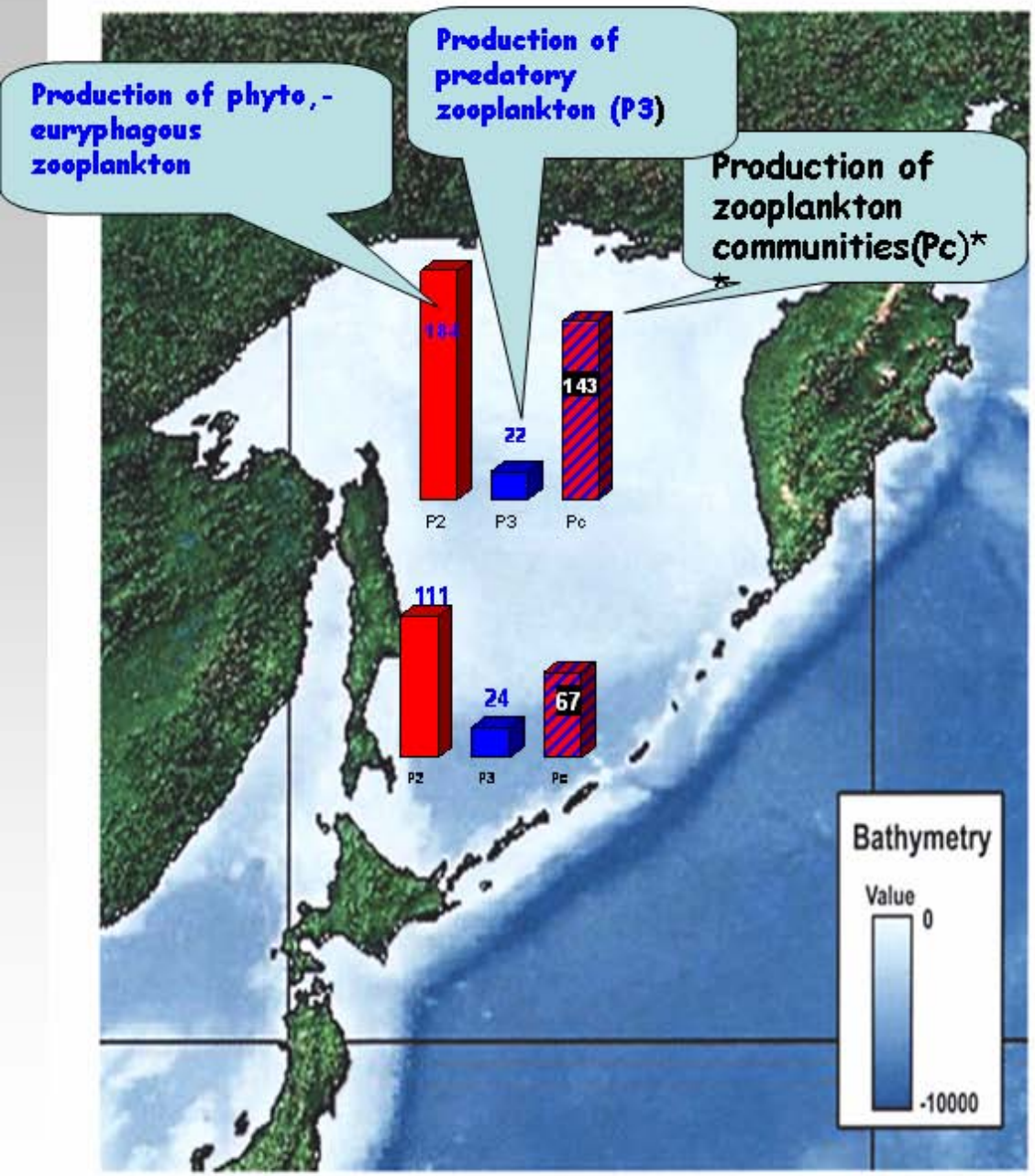


North

South



Zooplankton production in the northern and southern Okhotsk Sea



Bathymetry of the Sea of Okhotsk (Figure developed from large Marine Ecosystem website:http//www.edc.uri.edu/ime

*$Pc = P_2 + P_3 - A$,

A-assimilated part of predatory plankton diet

Conclusions

Zooplankton distribution and it community stuff depends on physical oceanography condition both in the northern and southern Okhotsk Sea.

Production of zooplankton in the northern Okhotsk Sea higher comparing southern area. It is determined by higher production of phyto-, euryphagous plankton and less quantity of predator consumer.


Thank you.