Archiving historical meso-zooplankton samples collected around Japan

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Outline

1 Importance of meso-zooplankton samples

2 Archived historical samples in our institute

3 Systematic archiving of samples around Japan

4 Analysis of the samples

Advantage of meso-zooplankton sample

1 The samples are quantitatively collected by same gear in long-term.

2 It is possible to take high resolution (time and space) sample, because easy handling of gear.

3 It is possible to preserve in long-term by formaldehyde at low cost.

4 Not need large storage because of small bottle size.

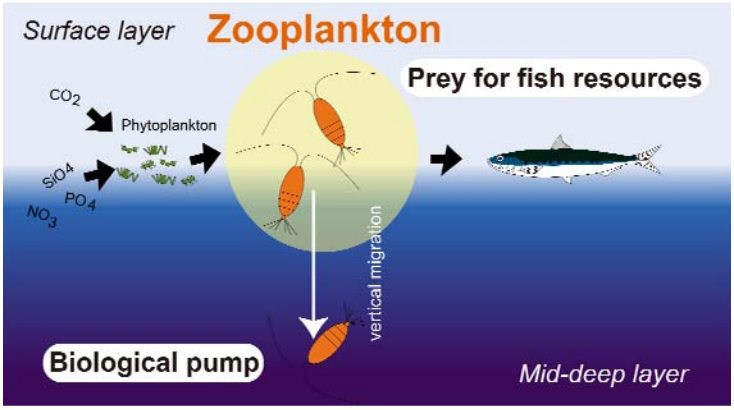
etc.

Importance of meso-zooplankton sample

It is necessary to understand….

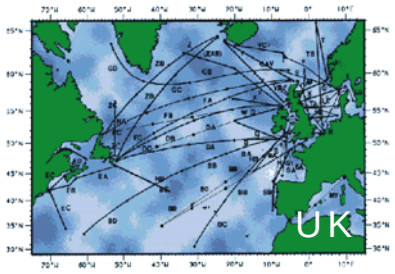
1 Population dynamics of fish resources

2 Biogeochemical cycling in the Ocean

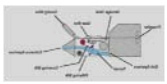


Historical collections in other countries

SAHFOS CPR survey

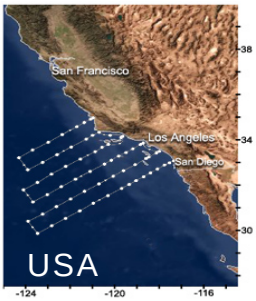


80 years history
CPR (continuous plankton recorder)
Ship of opportunity



CPR

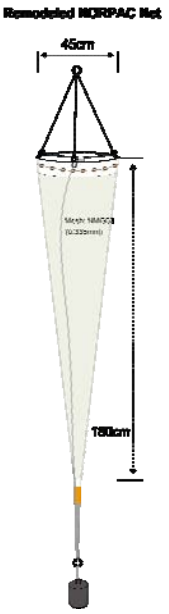
CalCOFI survey



60 years history
SCOR and Bongo net etc.
In fixed transect

Our Research

We use remodeled NORPAC net. The net is vertically towed from 150m or bottom to surface.



Advantage

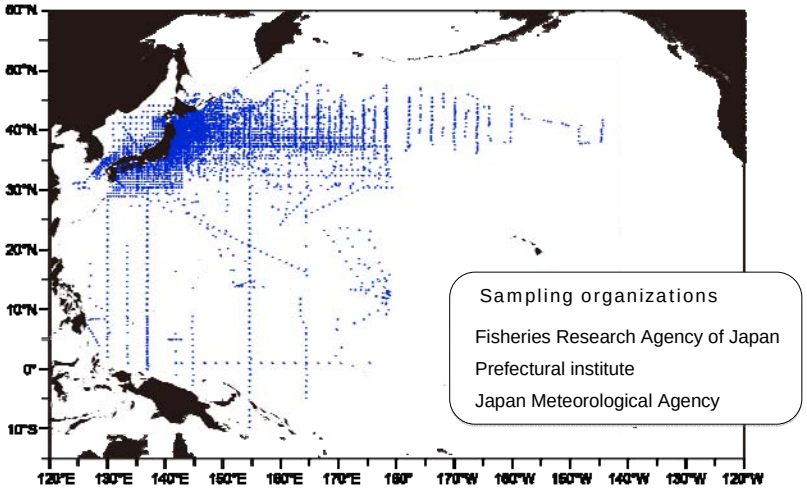
Easy handling

Long history (more than half century) in Japan

Disadvantage

Impossible to collect quantitatively on small sized (<1mm) and large sized (e.g. krill).
Not used out of Japan.

Archived samples



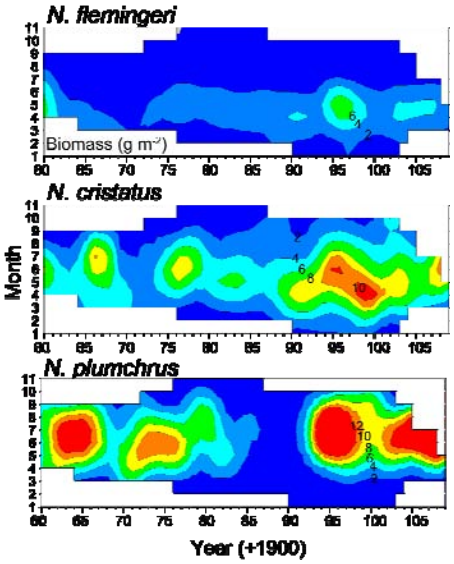
Sample number : 31687 (including ODATE collection)

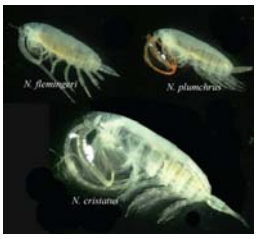
Period: 1951-present

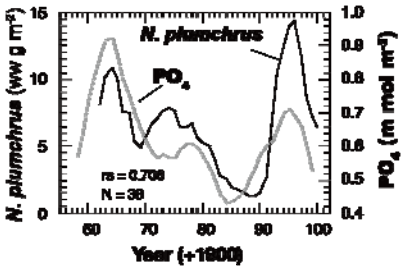
Number of species level analysis: 4669

Studies: long-term variations

Variations in *Neocalanus* copepods biomass in the Oyashio



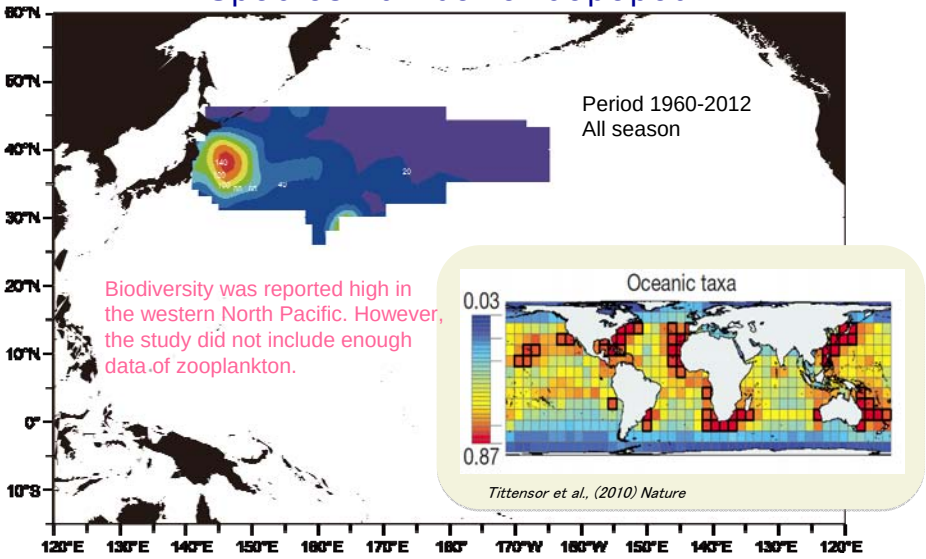




Tadokoro et al., (2009) *Geophys Res. Lett.*

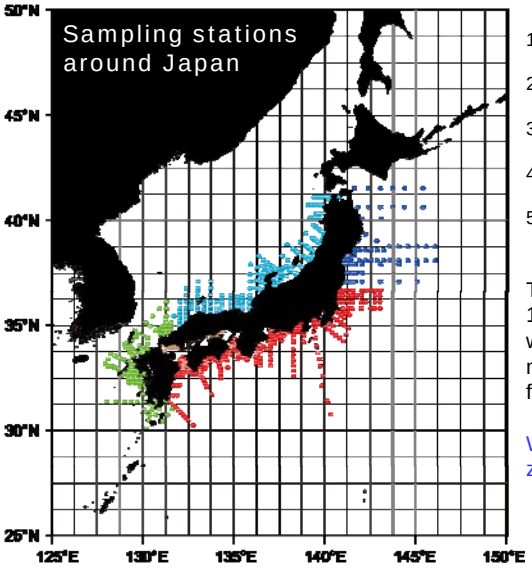
Studies: biodiversity

Species number of copepod



Tittensor et al., (2010) Nature

Systematic archive of samples around Japan



About survey

1 Number of stations: 760

2 Frequency: monthly except with some stations

3 Total number of sampling: about 7000 per year

4 Survey organization: mainly prefectural institute

5 Primary purpose of the survey:
study of egg, larvae, and juvenile of fishes.

The systematic survey was started from 1978, and egg larvae, and juvenile of fishes were identified by species level. However, meso-zooplankton was not effectively used for study.

We started to archive the samples for the zooplankton study from this year.

Change the sample flow

Previous

Institute of prefectures ⇨ Research company ⇨ Institute of prefectures

Problems

- No inventory
- Lack of storage
- Degradation of plastic bottles
- Dissipation of samples

Now

Institute of prefectures ⇨ Research company ⇨ Our institute

Resolve the problems

- Construction of inventory
- Dedicated storage
- Change to glass bottles
- Uniform management in our institute

Sample Arrangements

To uniform glass bottles

labeling

To the uniform boxes

Those tasks are performed by the research companies.

Storage building in Tohoku National Fisheries Research Institute

Capacity: about half million bottles

Analysis of the samples

Analysis of samples

1 Analysis of biomass (wet weight)
All sample are measured by research companies.

Selected samples

2 Analysis by B-VPR （Bench top video plankton recorder）

Selected samples

3 Analysis in species level by microscopic technic

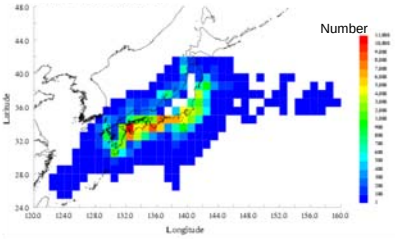
Data for the studies

Studies

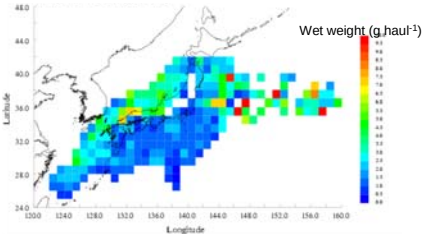
- Population dynamics of fish resources
- Time and special variability
- Biodiversity
- Biogeochemical cycling

Analysis of the samples
biomass

Data number by 1X1° grid



Mean wet weight by 1X1° grid

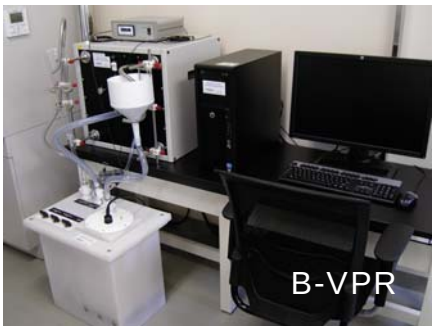


Oceanographic data was simultaneously observed with plankton sampling.

Period 1978-2007

For our studies, we are making the gridded data of monthly zooplankton biomass from 1978-present.

Analysis of the samples
B-VPR (bench top video plankton recorder)



Pictures

Data

Sample will be analyzed in Tohoku and Yokohama institutes. We will analysis about 2000 samples per year in the two institutes.

Abundance by order levels

Body size ditribution

Summary

1 We archived 31687 samples of 1951-2012. We also have large amount of non arranged samples (roughly 30000). We are arranging the samples now.

2 We established the archiving system of samples around Japan. The 7000 sample will be archived in our institute per year from this year.

And more:
Other significance of samples preservation

1 Reanalysis is need when new species is found.

2 New technology (e.g. metagenomics technic) can be adapted for species-level identification in the future.

3 For the rare elements analysis such as stable isotope of the zooplankton.

4 For the stomach contents analysis of zooplankton.

etc.

Acknowledgements

We would like to express deepest thanks for scientist of prefectural institute, Fisheries Research Agency and Japan meteorological Agency. It is impossible to collect the sample without their great efforts.