Multi-ecosystem sampling in the North Pacific Ocean using the Continuous Plankton Recorder

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In June 2002

CPR towed behind ship and collected near surface (7m) plankton samples and temperature

Bird observer on-board ship recording bird densities
Questions

• Can the taxonomic data from lower and upper trophic levels define regions (or perhaps ecosystems) along the transect?
• How consistent are these regions between years? (Plankton data from June 2000 and June 2001 also available)
• What are the patterns of biomass for each region, for both trophic groups?
Methods

• Day time data only (no bird obs. at night and different plankton in surface CPR samples)
• Used cluster analysis and Multi-dimensional Scaling (MDS) on plankton (presence/absence, 88 taxa) and bird (density, 48 taxa) data
Results: Plankton data, June 2002

Cluster analysis

MDS analysis

June 2002
Patterns of mesozooplankton biomass

Coastal N. Japan  W. Pacific  W. Bering Sea  Central Bering Sea  W. Aleutians  E. Aleutians  W. GoA  Central GoA  E. GoA  Coastal BC

* Not sig.  P <= 0.05  Insufficient data
Results: Bird data, June 2002

Cluster analysis

MDS analysis
Regional patterns of biomass for lower and upper trophic groups

Mesozooplankton biomass

Seabird density

Coastal SE Japan  Coastal N. Japan  W. Pacific  W. Bering Sea  Central Bering Sea  W. Aleutians  E. Aleutians  W. GoA  Central GoA  E. GoA  Coastal BC

mg dry weight/sample

# km²
How consistent are these regionalisations between years?

As well as June 2002, plankton were also collected on the same transect in June 2000 and June 2001. The analyses were repeated...
Results for the western Pacific could be more variable because the transect varies most here – by up to 2° latitude.
Interannual patterns of mesozooplankton biomass

- Coastal Japan
- W. Pacific
- W. Bering
- Central Bering
- W. Aleutians
- E. Aleutians
- W. GoA
- Central GoA
- E. GoA
- Coastal BC

mg dry weight per sample

Jun-00
Jun-01
Jun-02

p<0.001

p<0.001
Summary

- Both lower and upper trophic level data identified the same regions across the north Pacific, suggesting separate ecosystems. Regional patterns of biomass are evident.
- So far (at least for plankton), these regions are consistent from year to year. Seasonal data (October 2002, April and June 2003) shortly available to look at seasonal consistency.
- A method for describing, monitoring, and understanding ecosystems.