Woods Hole Oceanographic Institution

# Biology Department Seminar

Thursday, December 5, 2013
Redfield Auditorium – 12:00 Noon

## Structuring of the pelagic community in response to physical processes across an Arctic front


# Dr. Cecilie Broms

## Scientist, Institute of Marine Research, Norway



This study is part of the International Polar Year program, and is focusing on the physical and biological processes at the Arctic front separating subarctic Atlantic water and cold Arctic water in the North Atlantic. During June 2007 an intensive field study of the Arctic front south of Jan Mayen in the Norwegian Sea was carried out. A transect across the front was repeatedly sampled with high spatial and temporal resolution by a towed multi-sensor platform (MESSOR) and traditional sampling gear. Several trophic levels (phytoplankton, zooplankton, mesopelagic- and pelagic fish) were related to physical processes at the front. The Arctic front and an observed mesoscale eddy strongly structured the pelagic communities on all trophic levels. The front acted by separating two distinct water masses and their pelagic communities. In Atlantic water, concentrations of phytoplankton, zooplankton and fish, and *Calanus finmarchicus* individual egg production rate were higher compared to Arctic water. In addition, the zooplankton succession had reached a more developed phase. In Arctic water, the population egg production of *C. finmarchicus* was higher due to higher abundance of females. Mesopelagic fish showed a similar vertical distribution on both sides of the front, while herring was almost exclusively found in the surface in Arctic water. However, the front itself was not different from the surrounding waters in terms of being dominated by a particular size range or succession phase of zooplankton. No increased production was observed within the front itself, probably due to the lack of nutrient supply. Nor did the front acted as a permanent barrier to cross-front exchange of organisms. Physical processes caused by the observed eddy accumulated and/or increased the plankton production, resulting in big patches of phytoplankton and zooplankton. The vertical distribution of mesopelagic fish matched the depth of isolumes, resulting from day and night variations in surface irradiance and light-absorption by the phytoplankton patches. The vertical distribution of pelagic fish seemed to be governed by several environmental factors, and down-welling light, temperature and prey abundance all explained parts of the distribution pattern.