Sinking particles offer clues to changing ocean

The composition, abundance, and distribution of phytoplankton and zooplankton reflect changes in the pelagic food web. Sinking plankton (a component of “sinking particles”) collected by sediment traps mainly reflects the extent of grazing on primary production by zooplankton, and productivity variations over time. The material collected by the sediment traps indicates which materials are being supplied to the deep ocean and seafloor.

Why Is PCCRC Interested?

Changes in oceanography in recent years have been linked to climate warming influences on sea, air, and sea-ice ecosystems. Such changes may be altering the ocean’s ability to support some fish and marine mammal species, and may have impacts on fish stock composition, abundance, and distribution.

What Scientists Did

Since 1995, NOAA researchers have used instruments on an oceanographic mooring over the Bering Sea middle shelf near 56°N to measure temperature, salinity, chlorophyll content, current speed, and meteorological conditions.

Researchers added a time-series sediment trap, which collected particles sinking out of the surface waters from 1997 to 2003, with the last two years being supported by the Pollock Conservation Cooperative Research Center.

A parallel time series of zooplankton samples was also collected. The carbon and nitrogen stable isotope composition and selected lipids,
including fatty acids, fatty alcohols, and sterols, have been measured in the sediment trap and zooplankton samples. The composition of sinking organic material collected by the trap has reflected changes in oceanographic conditions and the Bering Sea ecosystem from 1997 to 2003.

The particles collected by Bering Sea sediment traps consist of intact phytoplankton, diatom frustules, coccoliths, zooplankton fecal pellets, and other detritus resulting from food web processes. Using microscopic examination and chemical and stable isotopic analysis of the material, information was obtained on nutrient availability, phytoplankton and zooplankton communities, the timing of phytoplankton blooms, relative extent of phytoplankton grazing by zooplankton, and other ecological data.

**What Scientists Learned**

From 1997 to 1999, the amount of organic matter accumulated by traps in the fall were comparable to levels observed in spring, when the annual plankton bloom occurs.