



Mesopelagic and epipelagic radiolarian accumulation rates can help interpretations of past changes in the efficiency of the high latitude ocean's biological pump

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Increased sedimentary accumulation rates of mesopelagic (200-1000m) radiolarians in glacial time may signal increased organic carbon flux to mesopelagic depths of high latitude (above 45 degrees) oceans. High latitude North Pacific (four cores) and Antarctic (one core) glacial age sediments are characterized by high accumulation rates of mesopelagic relative to epipelagic radiolarians while the reverse is true for the Holocene. Today only beneath the highly stratified waters of the Sea of Okhotsk do accumulation rates similar to the high latitude glacial oceans occur. Here low radiolarian concentrations occur in a cold upper layer, between 10 and 150m, while higher concentrations of deep-living species are found in warmer waters below. This water and biological stratification is probably similar to that of the high latitude glacial North Pacific and Antarctic Ocean.

A core from south of the Antarctic Polar Front displays multiple shallow-living species accumulation rate maxima through the last glacial cycle. Deep and shallow-living radiolarian accumulation rate maxima are generally but not exactly anti-correlated, suggesting that deep and shallow radiolarian production is not tightly connected. Shallow species accumulation rate maxima, have a pronounced saw toothed shape, can be correlated with temperature maxima in the Vostok ice core and in cores raised from north of the Polar Front. It is unlikely that these radiolarian accumulation rate changes are related to changing near surface water temperature but rather to changes of water stability.