

Production and destruction of biogenic carbonates through the year in the Arctic Ocean

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The Arctic Ocean is one of the most sensitive realms to global climate changes in the world oceans. It is concerned that oceanic acidification accompanied by global warming allows dissolution of carbonate shells of phyto- and zooplankton and it could be affected oceanic food chain in near future. In this study, we show the result of carbonate production and destruction changes through the year in the Arctic Ocean using faunal and micro focus X-ray CT analysis. Time-series samples of sinking particles were obtained at Stn. NAP10t (75N, 162W, water depth 1,975 m) in the Northwind Abyssal Plain, the Arctic Ocean. Deployed time was from Oct. 2010 to Sep. 2011. The sediment trap cups were deployed at 300 m (shallow) and 1,300 m (deep) water depth and 26 samples were recovered from each water depths. Sampling interval for each bottle was 13-15 days.

Total mass flux (TMF, mg/cm²/day) between both water depths showed clear relationship with the seasonality. Relative higher TMF were observed in late Autumn(November - December), and Summer (August). In fact, contributors of TMF were not only carbonate shells but also some kind of phyto- and zooplankton (diatoms, Copepods, Shrimps, and other gelatinous plankton). From the perspective of biogenic carbonates, primary producers were planktic foraminifers, pteropods, and bivalves and their shells were observed in each bottles commonly. However favorable seasons for their growth were different each other: Primary producers of biogenic carbonates during the late Autumn were the pteropods and small bivalves. On the other hand, planktic foraminifers were most dominant fauna in the Summer. It suggests that faunal alternations between carbonate-shelled plankton has been occurred through the year in the Arctic Ocean. In this presentation, we will show the micro-focus X-ray CT images of planktic foraminifers, pteropods, and bivalves shells and will discuss about the carbonate dissolution in the water column.

Keywords: Arctic Ocean, time-series records, production, dissolution, calcium carbonate, micro-focus X-ray CT