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High protein assimilation of the phytoplankton in the Chukchi Sea

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High incorporation of carbon into proteins and low incorporation into lipids were a characteristic pattern of the photosynthetic allocations through the euphotic water columns in the Chukchi Sea in 2004. According to earlier studies, this indicates that phytoplankton had no nitrogen limitation and a physiologically healthy condition, at least during the cruise period in 2004. This is an interesting result, especially for the phytoplankton in the Alaskan Coastal Water mass dominated region in the Chukchi Sea which has been thought to be nitrogen limited. The relatively high ammonium concentration is believed to have supported the nitrogen demand of the phytoplankton in the region where small cells (< 5 μm) were composed of about 50% of the community since they prefer assimilated nitrogen such as ammonium. In fact, a small cell-size community of phytoplankton incorporated much more carbon into proteins in nitrate-depleted water suggesting that small phytoplankton had less nitrogen stress than large phytoplankton. If the high protein assimilation of the phytoplankton in 2004 is a general pattern of the photosynthetic allocations in the Chukchi Sea, they could provide nitrogen-sufficient food for the highest benthic faunal biomass sustaining large populations of benthic-feeding marine mammals and seabirds at higher trophic levels in the food chain in the Arctic Ocean.