



Carbon fluxes in Arctic plankton communities under elevated CO₂ levels: a stable isotope labelling study

Anna de Kluijver (1), Karline Soetaert (1), Ulf Riebesell (2), Jack J. Middelburg (1,3)

(1) Netherlands Institute of Ecology (NIOO-KNAW), Centre for Estuarine and Marine Ecology, P.O. Box 140, 4400 AC Yerseke, the Netherlands, (2) Leibniz Institute of Marine Sciences (IFM-GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany, (3) Faculty of Geosciences, Utrecht University, P.O. Box 80021, 3508 TA Utrecht, the Netherlands

The potential impact of rising CO₂ on carbon fluxes in natural plankton communities in the Arctic Ocean was investigated during the 2010 EPOCA mesocosm study in Ny Ålesund, Svalbard. Nine mesocosms were set up with a range in initial pCO₂ levels from ~180 μatm to ~1400 μatm for 5 weeks. ¹³C labelled bicarbonate was added to follow the transfer of carbon from dissolved inorganic carbon (DIC) into phytoplankton and subsequently into dissolved organic carbon (DOC), heterotrophic bacteria, zooplankton, and settling particles. Isotope ratios of group-specific polar lipid fatty acids (PLFA) were used to infer the biomass and production of different groups of phytoplankton and heterotrophic bacteria. Phytoplankton PLFA showed enrichment within one day after label addition, but label incorporation in green algae and cryptophyte PLFA was much faster than that in diatom and dinophyte PLFA. Bacteria PLFA showed enrichment within 2 days, indicating a tight phytoplankton-bacteria coupling. Both PLFA label incorporation and concentrations did not reveal a clear CO₂ effect on algal and bacterial dynamics. Modelling will be applied to analyze possible CO₂ effects on carbon transfer within the plankton community.