Organic matter dynamics and CO_2 responses of the 2010 Svalbard mesocosm experiment

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In June/July 2010 nine mesocosms were moored in the Kongsfjord off Spitsbergen each enclosing about 50 m^3 of nutrient poor fjord water. Additions of CO_2 enriched seawater between day t0 and t4 established a gradient of CO_2 partial pressures ranging from about 180 to 1400 μatm. A relatively weak phytoplankton bloom developed in all mesocosms mainly fueled by dissolved inorganic phosphorus, ammonia and dissolved organic nitrogen, peaking between day t6 and t10. After this bloom 5 μmoll^{-1} of nitrate and 0.32 μmoll^{-1} of phosphate were added to all mesocosms on day t13. The timing of the second bloom, however, was different between CO_2 treatments. While standing stocks of organic biomass peaked between day t18 and t20 at elevated CO_2 levels, the peak was delayed by almost a week at the lower CO_2 levels (between day t25 and t30). This phenomenon was probably related to differences in inorganic nutrient utilization which started earlier at elevated CO_2. Here we present water-column dynamics of particulate and dissolved organic and inorganic carbon, nitrogen and phosphorus during the experiment.