



Dissolved organic phosphorus in the Baltic Sea - temporal variability and utilization

Günther Nausch (1), Monika Nausch (2), Pia Steinrücken (3), Jana Balke (4), and Jana Woelk (5)

(1) Leibniz-Institute for Baltic Sea Research Warnemünde, Seestraße 15, D-18119 Rostock-Warnemünde, (2) Leibniz-Institute for Baltic Sea Research Warnemünde, Seestraße 15, D-18119 Rostock-Warnemünde, (3) Leibniz-Institute for Baltic Sea Research Warnemünde, Seestraße 15, D-18119 Rostock-Warnemünde, (4) Leibniz-Institute for Baltic Sea Research Warnemünde, Seestraße 15, D-18119 Rostock-Warnemünde, (5) Leibniz-Institute for Baltic Sea Research Warnemünde, Seestraße 15, D-18119 Rostock-Warnemünde

The temporal variability of dissolved organic phosphorus (DOP) concentrations in the Baltic Sea was investigated during three cruises in summer 2008, late winter/early spring 2009 and summer 2012 with focus on the central Baltic Sea. In summer 2008, characteristic cyanobacteria blooms occurred in the Baltic Proper and DOP concentrations in the surface layer of $0.32 \pm 0.05 \mu\text{M}$ have been estimated. In summer 2012, meteorological conditions did not favour intense cyanobacteria development and DOP concentrations were with $0.24 \pm 0.04 \mu\text{M}$ lower on average. DOP degradation in autumn and winter resulted in lower concentrations of $0.21 \pm 0.06 \mu\text{M}$ as can be seen in the winter cruise 2009.

During the first two cruises also the spatial distribution of DOP in the surface layer between the Skagerrak and the northern Gulf of Bothnia could be measured. Highest summer concentrations of $0.32 \pm 0.05 \mu\text{M}$ were found in the Baltic Proper, followed by the Gulf of Finland having on mean $0.25 \pm 0.01 \mu\text{M}$. DOP decreased down to $0.12 \mu\text{M}$ in the phosphorus limited Bay of Bothnia. Similar low concentrations were measured in the Skagerrak. The same spatial DOP pattern as in summer 2008 was observed in late winter/early spring 2009, but on lower concentration levels, except the Skagerrak and Kattegat where the spring bloom already has started.

In addition, the bioavailable and refractory DOP fractions (B-DOP and R-DOP) were measured in time course experiments in 2008 and 2012, excluding C- and N- limitation. In summer 2008, the R-DOP constituted a higher proportion of DOP compared to B-DOP. A gradient has been observed from the northernmost station in the Bothnian Bay to the southern Baltic Proper. In the Bothnian Bay, only $0.01 \mu\text{M}$ B-DOP could be detected, comprising 8% of DOP whereas B-DOP constituted a proportion of 25-29% in the Gotland Basin and up to 46% in the Gulf of Finland. In summer 2012, B-DOP concentrations of $0.09 \pm 0.02 \mu\text{M}$ were measured in the eastern Gotland Basin corresponding to 27 - 40% of DOP. An additional supplied cocktail of DNA, RNA, ATP and phospholipides was used together with the natural B-DOP and stimulated bacteria growth by 15-26%.