

5.2 Phytoplankton biomass and production in the Ob and Yenisei estuaries and adjacent Kara Sea

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Arctic rivers representing very dynamic environments characterized by strong seasonal changes. The variable light conditions, seasonal ice cover, and the pulse of fluvial matter affect biological processes and transformation rates of organic matter at large geographical scales. The aim of this study was like in the years before (1997, 1999, 2000) to investigate the horizontal and vertical distribution of phytoplankton biomass with regard to the different physical and chemical conditions in order to estimate the significance of biological processes for the transformation of matter in arctic estuaries. Furthermore, together with the results from investigations of the other groups, a more complete picture of the pathway of primary produced carbon could be established in the future. During the expedition to the Kara Sea with 'Akademik Boris Petrov' in 2001 phytoplankton biomass (expressed as chlorophyll *a*) as well as primary production (oxygen method) were measured.

Material and Methods

Water samples to estimate phytoplankton biomass and oxygen production rates were collected with a Niskin Rosette sampling system. On 46 stations subsamples were taken from 1 to 6 different water depths according to different water masses determined by the CTD profiles. In most cases, samples were taken at the surface, just above and below the pycnocline and close to the bottom. For the chlorophyll *a* determination 500 - 1000 ml of water were filtered through Whatman GF/F glasfibre filter and stored at -18° C and analyzed at AWI. The filters were extracted in 90 % acetone and analyzed with a Turner-Design fluorometer according to the methods described in Evans and O'Reily (1987). In addition, light measurements were carried out at 10 stations with a 4 π LICOR probe, and oxygen production rates were measured at 12 stations with surface phytoplankton populations.

First Results

Chlorophyll *a* concentrations ranged from 0.01 to 7.27 $\mu\text{g/L}$ with maximum values in the surface layers in most cases. The lowest values were found at the most northern stations in the eastern part of the investigation area; highest phytoplankton biomass was found in both rivers at the southernmost stations decreasing continuously towards the estuary. Between 73°S and 75° chlorophyll *a* concentrations around 1 $\mu\text{g/L}$ prevailed decreasing to values ranging from 0.13 $\mu\text{g/L}$ to about 1 $\mu\text{g/L}$ north of 76 °N.

The light measurements showed light was available for phytoplankton in the rivers only in the upper 3-5 m, whereas in the estuary and the northern part of the investigation area light penetrated down to about 20 m. Analyses of the production measurements will give more information on the productivity of the phytoplankton populations in the investigation area. First results showed somewhat higher oxygen production in the rivers and fairly low production in the northern region.