Geophysical Research Abstracts
Vol. 15, EGU2013-1663-5, 2013
EGU General Assembly 2013

Dissolved inorganic carbon and nutrients in estuarine mixing zones of the Ob and Yenisei Rivers

Alexander Polukhin and Petr Makkaveev

Shirshov Institute of Oceanology RAS, Laboratory of biohydrochemistry, Moscow, Russian Federation (aleanapol@gmail.com)

Contact zones of river and sea water are diverse by different oceanographic processes occurring in them. And for such great rivers as the Ob and Yenisei, the area of their interaction with waters of the Kara Sea is the most interesting objects of investigation.

Shirshov Institute of Oceanology performed works in the estuaries of the Ob and Yenisei during large marine expedition in 1993. Recent work dated 2011 year. These studies were focused on the frontal zones that exist on the river-sea edge. In these areas occur important biochemical processes, such as accumulation of organic matter and nutrients, consumption and release of dissolved oxygen by phytoplankton, as well as the absorption and excretion of various forms of carbon. All of these processes are of great importance in the estuarine mixing zones, and their influence can extend to distances of several hundred kilometers into the open sea.

To study the transformation of inorganic carbon in estuarine zones of the rivers it was used the following approach. According to the equation of water mixing we calculated theoretical content of total carbon as a fairly conservative setting. Upon mixing of waters of the conservative value of the parameter Co is described by the following equation:

$Co \cdot Vo = C1 \cdot V1 + C2 \cdot V2 + C3 \cdot V3 + \ldots;$

where Vi – volume of water and Ci – the value of the corresponding parameter, given that $V = \sum Vi$ can express the relative contribution of each water mass as $Ki = Vi / \Sigma Vi$. Then the equation becomes:

$Co = \sum(Ci \cdot Vi / \sum Vi) = \sum(Ki \cdot Ci)$.

The sum of the relative contributions of each water mass $\Sigma Ki = 1$, we obtain a system of linear equations, which, knowing the values of the parameters Ci, can be solved with respect to Ki. Moreover, the use of N parameters can be carried out calculations for N+1 of the water masses.

Then obtained values were compared with the real ones. The difference between these values can be represented as a change of the content of total carbon affected by some factors. The calculation was performed for the estuarine areas of the Ob and Yenisei. Analysis of data from various expeditions have shown the existence of quasiconstant sections, where occurs the absorption or release of inorganic carbon. Absorption is confined generally to the upper boundary of the frontal zone, where observed the greatest biochemical activity. Active carbon emission into water proceeds in the bottom layer below the mixing zone, where processes of destruction take place.