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PHOSPHORUS SPECIATION IN THE SCHELDT ESTUARY AND THE BELGIAN COASTAL ZONE

C. van der Zee and L. Chou

Laboratoire d'Océanographie Chimique et Géochimie des Eaux, Université Libre de Bruxelles, Campus Plaine - CP 208, B-1050 Brussels, Belgium (cvdzee@ulb.ac.be; lei.chou@ulb.ac.be)

Phosphorus speciation was studied in the Scheldt estuary and the Belgian coastal zone from November 2002 to December 2003. Monthly surveys were performed at 10 coastal stations and seasonal campaigns (winter, spring and summer) were conducted in the Scheldt estuary. Weekly to monthly samples were also taken in the upper freshwater reaches of the Scheldt and in tributaries at stations under the tidal influence.

Phosphorus was measured as soluble reactive phosphorus (hereafter called PO₄), dissolved inorganic phosphorus (DIP), total dissolved phosphorus (TDP), particulate inorganic phosphorus (PIP), total particulate phosphorus (TPP) and total phosphorus (TP). Dissolved organic phosphorus (DOP) was determined by difference between TDP and DIP. Likewise, particulate organic phosphorus (POP) was determined by difference between TPP and PIP.

In the freshwater part of the Scheldt estuary practically all dissolved P is in the PO₄ pool and the concentration shows a seasonal trend, whereas little variation in the DOP pool is observed. The concentration of particulate P is usually higher than that of the dissolved P pool. During July and August in the upper freshwater reaches of the Scheldt where intensive diatom blooms have been developed resulting in a depletion of dissolved silicate, the PO₄ concentration remains above 3 μM. In contrast, at the mouth of the Scheldt estuary, the PO₄ concentration drops below 0.30 μM in April-May.

Phosphate versus salinity plots show conservative mixing in the Belgian coastal zone

from November 2002 until February 2003 and again from July/August onwards. In March, the PO₄ concentration decreases and the chlorophyll a content in the water reaches maximal values in March-April. The DOP concentration is usually low compared to the PO₄ concentration, except in this period. At the more off-shore stations, the dissolved P pool is larger than the particulate P pool. Closer to the coast particulate and dissolved P contribute about equally to the total P, whereas near the mouth of the Scheldt particulate P is the dominant P pool. The % POP of the TPP shows a seasonal trend for the coastal stations with maxima around April. Biogeochemical cycling of phosphorus will be discussed in terms of the relative contribution of biological versus inorganic processes.