

Stable isotopic composition of inorganic nitrogen substrates represent an efficient tool to investigate long term evolution of the Scheldt health condition

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The biogeochemical cycle of nitrogen in marine and freshwater environments is complex since subject to different within-system processes (uptake, mineralization, ammonification, nitrification), as well as varying input – output functions (discharge, N₂ fixation, denitrification). The past decade the concentrations of the different inorganic nitrogen species in the river Scheldt have changed significantly, as a result mainly of extended waste water treatment efforts. Main features are a drastic decrease of the ammonium load, as a result mainly of increased oxygen saturation levels and with a more efficient nitrification as a result.

The use of stable isotope tools, next to information about substrate concentrations and reservoir strengths, greatly helps to achieve a detailed understanding of the processes acting on the aquatic N-cycle. We have implemented a series of methodologies for the isotopic analysis ($\delta^{15}\text{N}$) of the different oxidised and reduced forms of N (nitrite, nitrate, ammonium total dissolved nitrogen, dinitrogen) as well as O ($\delta^{18}\text{O}$) in nitrate, nitrite. These methodologies rely on both bacterial and chemical methods transforming the substrates to be analysed in nitrous oxide, the gaseous compound analysed per isotope ratio mass spectrometer.

These methods will be briefly introduced and results obtained for the February, March, April 2016 OMES Schelde cruises (Ghent-Antwerp) and for the Westerschelde (March 2016) will be presented. A strong seasonal change in the relative contribution of NO_2^- and NH_4^+ and the $\delta^{15}\text{N}$ composition is observed, with a strong impact of an increased nitrification activity during the onset of spring (April). We see the long term follow-up of the isotopic composition of these inorganic N-species as a powerful tool to monitor the evolving health status of the Scheldt.