

NITRIFICATION IN A HIGHLY POLLUTED EUROPEAN ESTUARY (THE SCHELDT ESTUARY) AND CONSEQUENCES ON CHANGING THE NATURAL ISOTOPIC RATIO OF ^{15}N IN PARTICULATE ORGANIC MATTER

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The Scheldt Estuary is a highly polluted macrotidal estuary draining one of the most densely populated areas in the world (425 inhab/km²). The present nitrogen load to the estuary is approximately of 50 kT N / year from which about 20% is under the form of ammonium. This ammonium is almost completely nitrified in the estuary, even in winter conditions, when low temperatures are known to limit the activity of nitrifying bacteria. This is probably linked to the fact that water residence times are very long (75 days on the average) so that even with reduced nitrification rate depletion of ammonium is still possible. The oxidation of ammonium to nitrate by nitrifying bacteria results in an enrichment of N-NH_4^+ in its heavy isotope ^{15}N . Indeed, the heavy isotope ^{15}N is discriminated against the light ^{14}N isotope during the oxidation process. Measurements of the $\delta^{15}\text{N}$ in particulate organic matter and copepods show that the heavy ^{15}N isotope of ammonium is most probably incorporated in the entire microbial food web. This indicates that, at least for some periods of the year, the microbial food web of the estuary is based on micro-organisms (phyto- and bacterioplankton) finding their N requirements by assimilating NH_4^+ rather than any other inorganic or organic N source.