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Nitrous Oxide levels and fluxes along Minho and Lima estuaries (Portugal)

C. Gonçalves and M. J. Brogueira
INRB/IPIMAR, U-AMB, Lisbon, Portugal (cpg@ipimar.pt/+351 213015948)

Nitrous oxide (N_2O) concentrations were measured in September 2006, along the salinity gradient, in Minho and Lima estuaries which are subjected to high anthropogenic nitrogen inputs from diffuse and point sources. Nitrate (NO_3^-), nitrite (NO_2^-), ammonium (NH_4^+), dissolved oxygen (DO), pH, salinity (S), temperature (T), suspended particulate matter (SPM) and other interpretative parameters were also determined. Higher N_2O concentrations were observed in Lima estuary, ranging between 10.1 nM at higher salinities and 20.0 nM in the lower salinity region. In Minho estuary N_2O values varied only between 8.6 nM and 14.4 nM. These estuarine systems revealed, as well, to be different in terms of N_2O sources. In Minho estuary N_2O seemed to be, mostly, originated within the system while in Lima estuary river input was, apparently, the dominant N_2O source. All concentrations were well above atmospheric equilibrium in both estuaries, mean saturation values reaching 132% in Minho and 153% in Lima, which indicates that these estuaries represent sources of N_2O to the atmosphere. Accordingly, the water-air fluxes of N_2O in Lima estuary attained 8.5 μmol $m^{-2}d^{-1}$, while in Minho values did not surpass 5.1 μmol $m^{-2}d^{-1}$. Our results give an insight into factors which influence N_2O formation in the studied systems and represent a first evaluation of contribution of these estuaries to N_2O coastal emissions.