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Identification of N_2O production pathways in estuarine and intertidal sediments

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Natural isotope abundance technique, combined with acetylene inhibition, was applied to identify the processes responsible for nitrous oxide (N_2O) production in intertidal sediments of the Yangtze Estuary. N_2O production rates varied from 0.70 to 2.15 μmol m^{-2} h^{-1} in the study area. $\delta^{15}N$, $\delta^{18}O$ and SP (intramolecular 15N site preference) of produced N_2O varied from -4.49 to 6.65‰ 42.39 to 53.17‰ and 6.66 to 15.43‰ respectively. Isotopic signatures (SP and $\delta^{15}N$ of N_2O) and acetylene inhibition shows that both hydroxylamine (NH_2OH) oxidation (2.42 to 21.78%) and nitrifier denitrification (6.13 to 31.28%) contributed substantially to N_2O production, although denitrification was the dominant pathway (56.38 to 82.15%) of generated N_2O. Sediment water filled pore space, grain size, pH, salinity, Fe^{2+}/ Fe^{3+} and substrate availability were the primary factors influencing N_2O production. These results improves our understanding about the N_2O dynamics in estuarine and intertidal wetlands.