Molecular and geochemical constraints on anaerobic ammonium oxidation (anammox) in a riparian zone of the Seine Estuary (France)

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We studied the abundance, community structure and activity of anammox bacteria in wetland sediments and irregularly flooded soils of a riparian zone in the Seine Estuary, France [1]. The combination of i) molecular analyses of anammox bacterial 16S rRNA and hydrazine oxidoreductase (hzo) genes, ii) quantification of specific ladderane lipids and, iii) ^{15}N-isotope label incubation experiments revealed that anammox bacteria were ubiquitous in the studied ecosystem. While anammox bacteria were more abundant in the wetland sediment than in the ogygenated soil, their diversity was low and dominated by *Candidatus* 'Brocadia' at both sites.

The C_{20}-ladderane fatty acid with five cyclobutane moieties was found in sediments and soils, while others were only detected in the wetland sediments. This is the first detection of ladderanes in soils without prior enrichment. The differential ladderane distribution is probably due to intra-genus differences rather than abiotic factors (e.g. temperature).

The low, but consistent, contribution of anammox to the total N_2 production (< 8%) highlights its dependence on NO_2^- supply from denitrification. As a consequence, the dependence of denitrification on the quality and stoichiometry of organic matter seems to be passed on to the anammox bacterial community.

Our study suggests that anammox in riparian zones barely contributes to mitigating N eutrophication in riverine systems, leaving denitrification as the most important N eliminating process in these environments.

[1] Naeher *et al*. (2015) *Biogeochemistry*, doi:10.1007/s10533-014-0066-z.