Denitrification rates in riparian wetlands of the Seine River are influenced by carbon quantity rather than quality

ANNIET LAVERMAN[1] CHRISTELLE ANQUETIL[2] AND SYLVIE DERENNE[2]

[1] UMR 7619 Sisyphe, UPMC, CNRS, Paris
[2] UMR 7618 Bioemco, UPMC, CNRS, Paris

Benthic denitrification in riparian zones or adjacent wetlands of the Seine River could significantly improve its water quality. The goal of this study was to investigate the potential for denitrification and the factors affecting *in situ* denitrification rates with special emphasis on the role of organic matter. We measured denitrification potentials in sediments collected from four sites along the Seine River during three different seasons. Sediment characteristics (C_{org}, C:N ratio, bioavailable carbon and chlorophyll content) were determined and the sedimentary organic matter was analyzed at the molecular level (^{13}C NMR and pyrolysis coupled with gas chromatography-mass spectrometry).

Denitrification rates showed large spatial and seasonal variations. They were significantly correlated with sedimentary chlorophyll concentrations, but not with biodegradable carbon, measured as the decrease in total organic carbon under oxic conditions. Algal C most likely served as a carbon source for this process. The addition of carbon, either in the form of simple organic molecules (acetate, lactate), reed or algae always increased the denitrification rates, indicating a strong carbon limitation in these sediments and a lack of discrimination against the carbon source. The latter was confirmed through examination of the molecular structure of the sedimentary organic matter from four sites. Indeed the sediments which exhibit the highest denitrification rates show the most similar organic matter chemical structures. Moreover, incubation of sediments for two months under denitrifying conditions did not induce any significant change in the chemical structure of the organic matter although the latter was contrasted from one site to another one.

Fluxes of fine particles over a semi arid pine forest: possible effects of a complex terrain

AVI LAVI[1], DELPHINE K. FARMER[2,3], ENRICO SEGRE[4], TAMAR MOISE[1], EYAL ROTENBERG[1], JOSE L. JIMENEZ[2] AND YINON RUDICH[1*]

[1] Department of Environmental Sciences, Weizmann Institute of Science, Rehovot, 76100 Israel (avi.lavi@weizmann.ac.il, tamar.moise@weizmann.ac.il, eyal.rotenberg@weizmann.ac.il, *correspondence: yinon.rudich@weizmann.ac.il)
[2] Department of Chemistry and Biochemistry, University of Colorado Boulder, CIRES, Boulder, CO 80303 USA (jose.jimenez@colorado.edu)
[3] Department of Chemistry, Colorado State University, Department of Chemistry Ft Collins, CO 80523 USA (delphine.farmer@colostate.edu)
[4] Department of Physical Services, Weizmann Institute of Science, Rehovot, 76100 Israel (enrico.segre@weizmann.ac.il)

Semi-arid forests are of growing importance due to expected ecosystem transformations following climatic changes. Size-resolved flux measurements of atmospheric aerosols (0.25-0.65 μm) were conducted for the first time in such an ecosystem in the Yatir forest in southern Israel, using an optical particle counter and eddy covariance methodology. Both downward and upward fluxes were observed. Upward fluxes were not associated with a local particle source. Moreover, the flux direction correlated strongly with wind direction suggesting topographical effects. The measured effect of topography on the deposition velocity (V_d) is greater as particle size increases, as had been shown in modeling and laboratory studies [1, 2] but had not been demonstrated yet in field studies. We therefore suggest that a complex terrain and a patchy fetch affect the expected dependence of V_d on particle size and cause the observed upward particle fluxes. This hypothesis is consistent with the observed relationship between V_d and the friction velocity, the topography around the flux tower, and the observed correlation of flux direction with wind direction. The averaged V_d for 0.25-0.28μm particles (3.8±4.5 $mm \cdot s^{-1}$) is similar to previous particle deposition velocity measurements in mid and northern latitude coniferous forests.

[1] Belcher, *et al*.. (2012), Ann. Rev. of Fluid Mech **44**,479-504.[2] Katul, *et al*.. (2010), Bound-Lay Meteorol **135**,67-88.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.12