Geophysical Research Abstracts
Vol. 18, EGU2016-8242, 2016
EGU General Assembly 2016


# Denitrification constitutes an import N sink in subtropical N-saturated forests – a nitrate dual isotope study

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Forests in China receive variable but increasing amounts of nitrogen from the atmosphere causing N saturation and nitrate runoff. Surprisingly high N-retention has been reported from subtropical forests, suggesting active mechanisms of N removal. Here we report a multi-site study of 15N and 18O abundances in soil nitrate ($NO_3$-) across seven forested catchments spanning from temperate to subtropical China. In each catchment, samples were taken on one date during one or two summer along the hydrological continuum comprising hillslope positions and riparian zones. We had found previously in an intensive multi-year study at one of the sites, that the spatial pattern of summertime 15N and 18O in soil nitrate was remarkably stable across climatically distinct years, suggesting persistent N removal by denitrification at the foot of hill slopes and in groundwater discharge zones (Yu et al., submitted). In the present study, we extended the scope to five subtropical Chinese catchments and compared them with two temperate forests. Our data confirm the general pattern of efficient nitrification on hillslopes and strong denitrification in riparian zones in the subtropical catchments but not in the temperate ones. This is likely because high summer rainfalls at the monsoonal sites connect N mineralization and oxidation in upland positions with $NO_3$- reduction in ground water discharge zones via $NO_3$- runoff, rendering subtropical forests an efficient sink for reactive N with implications for regional N budgets. The impact of N deposition level, hydrology and edaphic factors on the predictive power of nitrate isotope signatures for N removal processes will be discussed.

Yu L, Zhu J, Mulder J, Dörsch P: Spatiotemporal patterns in dual nitrate isotopes reveal efficient N transformation and denitrification along a hydrological continuum in N-saturated, subtropical forest. Submitted