

## Exploration of the relationship between isotopic signatures of inorganic nitrogen and the spiraling metrics in the river

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Spiraling metrics are important for the better understanding of the biogeochemical processes in rivers, although it is quite demanding to measure these parameters. We explore the possibility to use the natural abundance of  $^{15}\text{N}$  and  $\text{d}^{18}\text{O}$  of inorganic nitrogen (ammonium, nitrate and occasionally nitrite) as a proxy of the spiraling metrics. We measured concentrations and isotopes ratios of ammonium, nitrate and nitrite in a reach of Fuji River to figure out how concentrations and isotope ratios of these inorganic nitrogen can change according to their spiraling. We continuously collected water samples in the reach of ca. 6.5 km in the Fuji River by directly tracking a specific parcel of water following the longitudinal Lagrangian approach in June, October, November and December of 2015. We found significant inverse correlations between ammonium concentrations and  $\text{d}^{15}\text{N}$  of ammonium in all sampling periods, implying that ammonium was removed by nitrification and assimilation. The  $\text{d}^{15}\text{N}$  of nitrite measured in December were lower than both  $\text{d}^{15}\text{N}$  of ammonium and nitrate, suggesting the inverse isotopic fractionation during nitrite oxidation in the nitrification. Both concentrations and  $\text{d}^{15}\text{N}$  of nitrate significantly increased with the distance in all sampling periods, indicating the consumption of nitrate in parallel with nitrification. We will present more data collected from different rivers to explore the usefulness of isotope ratios as proxies of the spiraling metrics in the presentation.

Keywords: nutrient spiral, inorganic nitrogen, stable isotope