

## Dual N and O isotopes analysis of nitrate using identification method in freshwater ecosystem

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Current research introduces utilization of stable isotope for identification of nitrogen sources with conventional approaches (bulk carbon and nitrogen isotope of POM and nitrogen isotope of DIN) as well as new approaches (nitrogen and oxygen isotopes) in freshwater ecosystem. In this study organic matter origin and nitrogen sources is possibly traced by both approaches suggesting that nitrogen sources should be identified in freshwater ecosystem using multiple stable isotope methods.

In order to determine the suitable sample concentration required for high precision and accuracy and the factors required for optimal equipment conditions, certified reference materials were repeatedly measured with various concentration range using TG-IRMS. To evaluate the precision and accuracy of our analytical results, three reference materials (IAEA-NO-3, USGS 34 and USGS 35) were analyzed repeatedly. Measured  $\delta^{15}\text{N}$  and  $\delta^{18}\text{O}$  values of IAEA-NO-3, USGS 34 and USGS 35 were  $4.7\pm 0.1\text{‰}$  and  $25.6\pm 0.5\text{‰}$ , and  $-1.8\pm 0.1\text{‰}$  and  $-27.8\pm 0.4\text{‰}$ , and  $2.7\pm 0.2\text{‰}$  and  $57.5\pm 0.7\text{‰}$ , respectively. These data are all consistent with recommended values within the error. This indicates that our established method and measurement is reliable and thus can be widely used to trace the contamination source of nitrate in freshwater ecosystem. Therefore, organic matter origin and nitrogen sources is possibly traced by denitrification method suggesting that nitrogen sources should be identified in freshwater ecosystem using multiple stable isotope methods.