Nitrogen biogeochemistry in stream-lake networks, English Lake District

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Cumbrian Lakes Research Forum 2023

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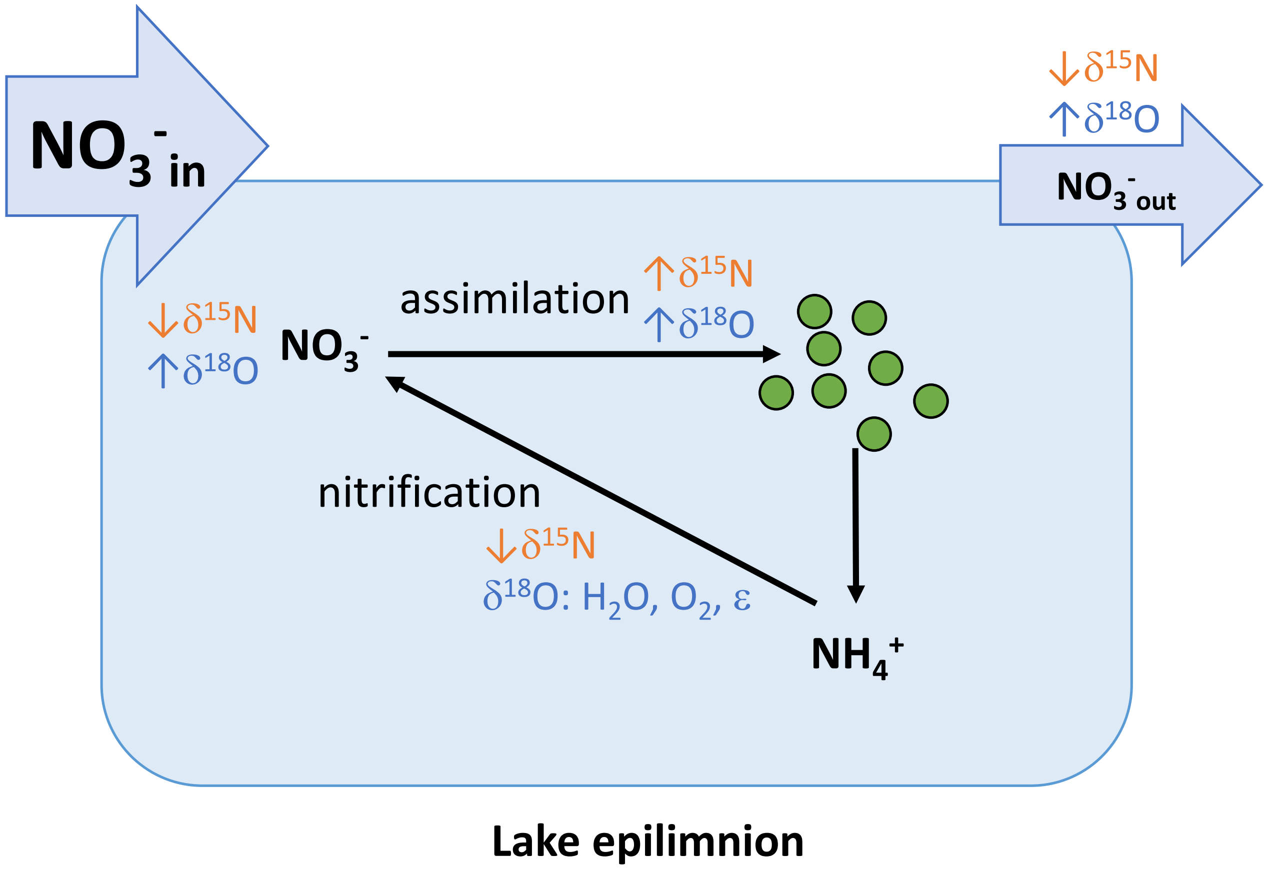
Connectivity

Hydrological connectivity

- Link between waterbodies
- Material transport
- Biogeochemical transformation

What happens to NO_3^- when water flows from a stream into a lake?

ELD lowland lakes



- NO_3^- retention in lake: phytoplankton assimilation
- Remineralisation, followed by nitrification
- Epilimnion NO_3^- mixture of consumption (assimilation) and production (nitrification) processes
- Water residence time stronger control on NO_3^- retention than trophic state or season

ELD upland tarns

$\delta^{18}O$ a better tracer of NO_3^- biogeochemistry than $\delta^{15}N$ in upland stream-lake networks.

Retention

- Assimilation: negative $NO_{3\ change}$, $\uparrow\delta^{18}O$

Subsidy

- Tarns act like rain gauges, collecting atmospheric NO_3^- deposition: positive $NO_{3\ change}$, $\uparrow\delta^{18}O$

ELD nitrogen biogeochemistry

Lowland lakes

- NO_3^- retention related to residence time
- Concurrent uptake and subsidy of NO_3^-
- Trophic status less important

Upland tarns

- Atmospheric depositions important NO_3^- source
- Retention and subsidy related to upstream nutrient concentrations
- Internal N cycling less important