Geologically Derived Nitrogen & Stream Nitrate Concentrations in Interior Alaska

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Nitrate in Streams of AK
The high concentration of nitrate in interior Alaskan streams cannot be explained by anthropogenic or environmental factors. I am examining the possibility of geologically sourced nitrogen through spatial correlation of nitrogen (N mg/L) and stable isotope values (d15N) of rocks from stream catchments with nitrate concentration of those streams.

Potential Sources Are Absent
- Atmospheric deposition
- Bio-fixation
- Fertilizer
- Sewage

Geologic Sources
- Nitrogen cycles through geologic systems (Fig.2)
- Sedimentary and meta-sedimentary rocks are the most significant sources
- Effect of rock nitrogen inputs in terrestrial and aquatic ecosystems have been studied in California forests and streams
- Most notable rock type bearing nitrogen is a mica-schist
  - Mica-schist is a mudstone subjected to low-grade metamorphism

Source N in Rock

Rock Nitrogen Concentrations of Interior Alaska

Sampling Classification
- Rock samples were collected from the Alaska Geologic Materials Center representing stream catchment lithology.
- Samples were ground and weighed into 100 mg tins for isotope analysis
- Classified by rock type based on state geo-data base as well as visual identification

Analysis
- Breccia has the highest median N ppm
- Gneiss has both the highest and lowest N ppm
- Schist has lower N values than phyllite and schist
- d15N highest and lowest values represented by schist and granite with in rock samples

Findings and Further Work
- Gneiss rock samples had the highest range in N ppm within our samples as well as within the state geology map.
- Schist samples with low N ppm values were located near streams with high nitrate concentration calling for more investigation into weathering rates within these catchments and how a low concentration substrate could still impact stream concentrations
- Higher levels of d15N in samples is associated with lower N ppm samples due to the fractionation that occurs during hydrothermal and metamorphic processes.

Excess Nitrogen Concentration in Fairbanks Drinking Water is Possibly Correlated to Geological Substrate