

## Nitrogen dynamics of taiga forest soils during winter

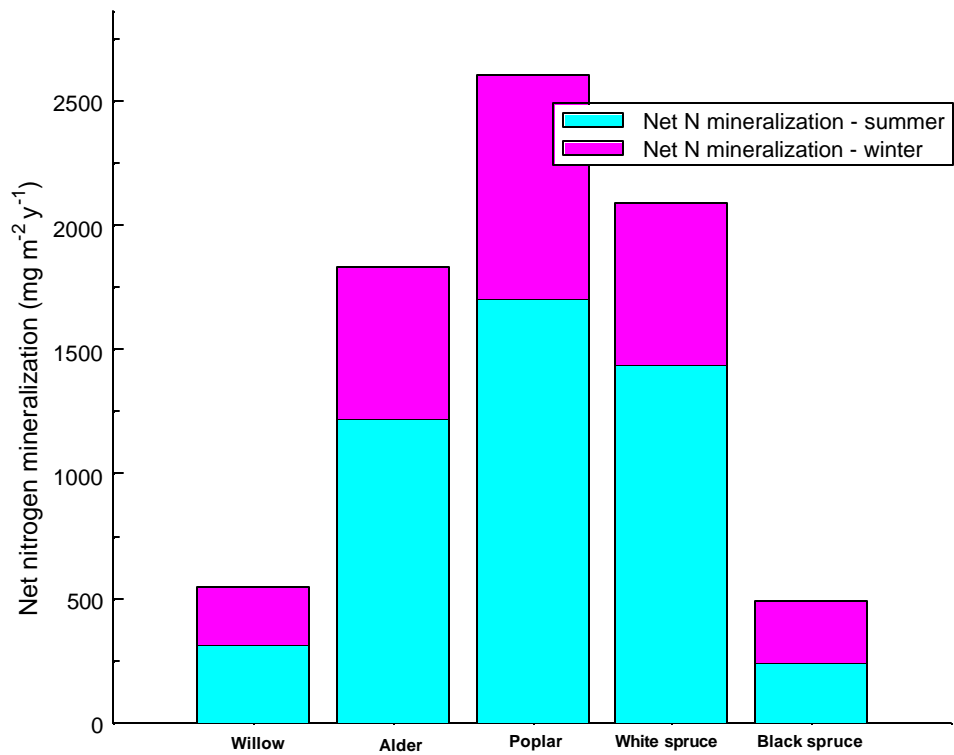
*Knut Kielland, Roger Ruess, Karl Olson, and Rich Boone*

We measured annual net nitrogen mineralization, nitrification, and amino acid production *in situ* across the LTER primary successional sequence on the Tanana River.



Net N mineralization rates during the growing season 2001 from green-up (late May) through freeze-up (late September) accounted for approximately 60% of the annual inorganic N flux, whereas the remaining N was released during the apparent

dormant season 2001-2002. In stands of willow, alder, balsam poplar and white spruce nitrogen release during winter occurred primarily during October-January, with only negligible N mineralization during early spring. By contrast, black spruce stands exhibited substantial mineralization after snow melt during in spring as well as during the first part of winter. The high rates of N mineralization in late autumn through early winter coincides with high turnover of fine root biomass in these stands, suggesting that labile substrate production, rather than temperature, is a major controlling factor over N release in these ecosystems.



The findings are consistent with the low temperature sensitivity of N mineralization previously documented for taiga soils. These results show that sub-arctic soils stay biologically active long after the aboveground world has come to a frozen standstill, and suggest that conventional measurements (restricted to the growing season) of soil processes in high-latitude ecosystems potentially may greatly underestimate annual flux rates of inorganic nitrogen.