



Project acronym: TundraP

Project title: Phosphorus transformation across Pan-arctic tundra ecosystems

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Discipline: Earth Sciences & Environment: Other - Earth Sciences

Station(s): Toolik Field Station (USA)

The proposed research aims to begin a pan-Arctic study on drivers of phosphorus (P) availability across different tundra vegetation. Phosphorus is an essential nutrient that can co-limit or limit plant growth. Soil P occurs in a variety of different chemical forms, both organic and inorganic. The biological availability is, however, not uniform amongst the different P forms but will depend on their behavior in the soil. Both biotic and abiotic traits can affect the different P forms. For example, organic P forms such as, inositol phosphates are rapidly stabilized by cations such as iron whereas diesters are considered relatively labile. Also, biotic factors, such as vegetation type and mycorrhizal associations, may have pronounced effects on different P forms. Although phosphorus has been studied in the past in most tundra vegetation types, the tools to characterize P have been restricted to wet-chemical extractions with limited possibilities for a more in-depth understanding of how vegetation and climate affect P species in tundra ecosystems. The most recent advancements in soil P research does however, allow us the characterize different P forms in detail using ^{31}P NMR and 2-dimensional ^1H , ^{31}P -NMR. We will combine ^{31}P NMR with analyses of related biotic and abiotic soil traits to a range of tundra soils to address fundamental questions on factors influencing the distribution of P species. Until today, there is only one study from arctic tundra using the NMR technique which makes the Arctic the least investigated biome in the world with regards to different P forms.