



Project acronym: PAPIN

Project title: Pan Arctic Precipitation Isotope ($\delta^{18}\text{O}$ & $\delta^2\text{H}$) Network: Interactions between sea ice-atmospheric dynamics and precipitation isotope geochemistry

Project leader: Jeff Welker, University of Oulu, United States

Discipline: Earth Sciences & Environment: Global change & Climate observation

Station(s): Toolik Field Station (USA), Greenland Institute of Natural Resources (Greenland/Denmark), Sudurnes Science and Learning Center (Iceland)

The Arctic water cycle is undergoing remarkable change in all three individual key components: the cryosphere, atmosphere, and hydrosphere. However, we have a very rudimentary understanding of the geochemical interactions between these systems (e.g. Arctic sea ice, the atmosphere, and precipitation). The lack of this understanding curtails accurate projections of change, as well as our ability to respond, adapt and develop resilient communities in the future. We will coordinate a network of INTERACT stations across the Pan Arctic to examine how sea ice traits, atmospheric processes, and precipitation geochemistry connect through space and time. We will establish and integrate a new precipitation isotope database into models of Pan Arctic atmospheric processes and sea ice conditions to produce weekly interactive maps (i.e., isoscapes). These animated visualizations will depict the geochemical interactions between sea ice, atmospheric processes, and precipitation patterns across the Arctic, and provide the much-needed empirical-based understanding of the linkages and mechanisms driving recent change. The key scientific outcomes will be: 1) a transformational understanding of the interactive nature of the Pan Arctic System; 2) creation of an Arctic-wide visualization of precipitation geochemistry and fresh water delivery and 3) a foundation for improved palaeoclimate reconstructions and climate forecasting. The societal beneficial impacts can be applied to: 1) management of Arctic water resources; 2) local societies adapting to changing conditions, and 3) understanding Arctic terrestrial and aquatic ecology and ecosystem well being.