Poster #9

Constraining Arctic Models with Disparate Datasets to Enhance Physical Process Understanding

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The NGEE-Arctic project is collecting a wide array of data in order to characterize and understand Arctic physical processes, including hydrological, thermal, geophysical, geochemical, and biological datasets. The NGEE-Arctic project is improving Arctic physical process knowledge and understanding by constraining models with these disparate datasets. The assimilation of disparate datasets to constrain and test our physical process models provide a synergistic effect improving our Arctic understanding beyond what is possible with a single type of data. For example, we are using hydrological, thermal and geophysical datasets (i.e., temperature, water content, and electrical resistivity tomography (ERT) datasets) to constrain coupled hydrothermal (ATS; https://github.com/amanzi/ats) and geophysical (BERT) simulations in a joint inversion to improve our characterization of Arctic soil, water content, salinity, and permafrost structure. This integration of hydrothermal and geophysical data is powerful as the direct observations of temperature and water content provide hard constraints on the inversion, while the ERT surveys provide comprehensive, spatially distributed soft constraints on the inversion. We are also integrating geochemical and hydrothermal data from recent tracer tests in order to improve our understanding of lateral flow in polygonal tundra. Measurements of tracer breakthrough, temperatures, and water content constrain hydrothermal tracer transport simulations using ATS. Ensuring that the ATS simulations are consistent with the hydrological, thermal, and geochemical datasets improves our ability to test hypothesis regarding the relative importance of vertical and horizontal flow in polygonal tundra.