

Arctic Observing Networks: Collaborative Research: Sustaining and amplifying the ITEX AON through automation and increased interdisciplinarity of observations.

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Abstract: The International Tundra Experiment (ITEX) Arctic Observing Network (AON) collects data on phenology, plant growth, community composition and ecosystem properties as part of a greater effort to study environmental change in the Arctic. The network, started in early 1990's, now provides tremendous value for detecting changes within long-term experimentally warmed and control plots across a range of sites and ecosystems that span the major vegetation types of the Arctic. While of great value, these manually collected measurements are labor intensive and time consuming, greatly restricting frequency and spatial extent of sampling. Recent advances in sensor technology hold the promise to allow sampling of surrogates of these manual measurements rapidly and over large areas. Here we will continue the ITEX AON observations and initiate a suite of related, non-intrusive structure, reflectance and thermal measurements using robotic sensor platforms (networked infomechanical systems, NIMS). These new measurements will allow us to scale our measurements to the regional level by linking to existing 1 km<sup>2</sup> sample vegetation grids and satellite imagery, providing urgently needed data critical to our understanding of the impacts of changing tundra vegetation on the interactions between the land and the atmosphere for the Arctic and the global system, including carbon and water fluxes and energy balance.