Geophysical Research Abstracts
Vol. 20, EGU2018-17318, 2018
EGU General Assembly 2018

An interdisciplinary integrated approach for quantifying and understanding Arctic ecosystem response at Disko, Greenland

Jordi Cristóbal (1,2), Jakob Abermann (1), Martin Olsen (1), Sille M. Myreng (1), Kerstin Rasmussen (1), Dorthe Petersen (1), Bo Elberling (3), Thomas Friborg (3), and Charlotte Sigsgaard (3)

(1) Asiaq - Greenland Survey, Nuuk, Greenland (jcr@asiaq.gl), (2) University of Alaska Fairbanks, Geophysical Institute, Fairbanks, United States, (3) Department of Geoscience and Resource Management, Copenhagen, University of Copenhagen

Surface air temperatures in the Arctic have shown a significant increase especially in the past few decades. Arctic amplification, referring to more rapid increases in air temperatures in the Arctic compared to other parts of the globe, is causing widespread melting of snow and ice, sea-ice retreat and a rise in the global sea level, increases in precipitation and local evaporation, transforming the Arctic into a warmer place. These regions, largely dominated by tundra, are witnessing unprecedented changes in response to climate warming, including increases in river discharge and significant changes in vegetation such as Arctic greening, among others. Disko Bay, a region close to the transition between Arctic bioclimatic sub-zones and marking the southern margin of seasonal sea-ice cover in West Greenland, is a highly relevant region for the Greenlandic society that has been identified as a hotspot of recent climate change in Greenland. More than 40% of the Greenlandic population lives there and due to the subsistence economy people are primarily relying on fishery and hunt. Beyond its societal significance it is also particular due to its physical characteristics, being the region in Greenland that is richest in species and varied in geomorphological features. Due to the intensification of the hydrological cycle in Arctic regions and the already quantified increase in air temperature at Disko Bay, since 2016, interdisciplinary integrated approaches from field monitoring to modelling are being carried out at Disko Island as a part of a long-term research programme on ecosystems and climate change effects and feedbacks in the Arctic, the Greenland Ecosystem Monitoring (GEM) program. In this work, an interdisciplinary integrated approach that synergistically combines, integrates and processes multiple-source data (profiler, sky camera, river discharge, surface energy fluxes, thermal gradients and satellite imagery) is presented. This framework will provide an integrated research scenario with a unique potential to set derived ecosystem gradients into context such as vertical gradients of atmospheric parameters, runoff, surface energy balance and cloud properties, amongst others, to understand the interconnections between the cryosphere and the hydrosphere, especially in Arctic coastal regions.