Geophysical Research Abstracts
Vol. 16, EGU2014-8370-3, 2014
EGU General Assembly 2014

Multi-annual evapotranspiration in the Lena River Delta - Observations and upscaling using eddy covariance and remote sensing

Benjamin R. K. Runkle (1), Christian Wille (1), Moritz Langer (2), Julia Boike (2), Torsten Sachs (3), Eva-Maria Pfeiffer (1), and Lars Kutzbach (1)

(1) Institute of Soil Science, University of Hamburg, Hamburg, Germany (benjamin.runkle@zmaw.de), (2) Alfred Wegener Institute, Potsdam, Germany, (3) GFZ German Research Centre for Geosciences, Potsdam, Germany

Evapotranspiration (ET) is a key component of the energy and water balances in permafrost tundra, establishing hydrological conditions for the next year and controlling several aspects of the carbon cycle. Both the energy balance and hydrological conditions of the landscape surface are important drivers of how Arctic climate change will impact landscape processes, including the carbon feedback. The accurate measurement of evapotranspiration within an energy balance context therefore provides crucial information on ecosystem functioning and raises our predictive capacity for estimating the impact of climate change.

In this study we report field measurements from eight summers (2002-06, 2008, 2012-13) using the eddy covariance method in a lowland ice wedge polygon landscape within Russia's Lena River Delta. These time-series are gap-filled and extrapolated with both statistical and process-based models to generate estimates of growing season ET. We find that interannual differences, including two August periods with high ET and two with low ET, are locally driven more by changes in air temperature and vapor pressure deficit than in land surface characteristics or radiation. We explore predictive relationships between various land surface indicators (e.g., NDVI, LAI, LST, Growing season length) derived from remote sensing products (MODIS and ESA DUE Permafrost products) to quantify local mechanisms necessary for upscaling to the Delta region. We conclude with implications for the local carbon cycle, particularly CO_2 uptake and release.