Geophysical Research Abstracts
Vol. 16, EGU2014-8100, 2014
EGU General Assembly 2014

The seasonal abundance and size distributions of water bodies on the Yamal Peninsula

Anna Maria Trofaier (1,4), Annett Bartsch (2,3,4), and William Gareth Rees (1)

(1) Scott Polar Research Institute, University of Cambridge, UK (amat2@cam.ac.uk), (2) Department of Geodesy and Geoinformation, Vienna University of Technology, Vienna, Austria, (3) Department of Geography, LMU Munich, Germany, (4) Austrian Polar Research Institute, Vienna, Austria

The significant role Arctic freshwater ecosystems play in the carbon cycle leads to a necessity to quantify these remote inland waters on the landscape-scale.
A new approach to analysing size-frequency distributions of open surface water bodies is presented in this study. Geospatial data of water bodies over the Yamal peninsula (NW Siberia) in the form of binary (two classes: water and land) temporal composite classifications are analysed over the two summer months July and August in 2007, 2008 and 2009. The source of the temporal composite dataset is the European Space Agency's Envisat Advanced Synthetic Aperture Radar (ASAR) operating in Wide Swath Mode (WSM). These data are medium/low spatial resolution data with a pixel spacing of 75 m. However, their high temporal frequencies enable a seasonal analysis of water body abundance and size distributions. The emphasis is not only on quantifying Arctic lakes, but also on evaluating the distribution of spring floods throughout the active season.
Size-frequency distributions are fit to a power-law model, conforming to be linear on a base 10 log-log scale. However, extrapolation of the myriad of smaller water bodies has in the past proven to be more complex than the current model would suggest. The apparent scale issues are investigated by additionally analysing active microwave data from the high spatial resolution TerraSAR-X satellite, and comparing the results to co-temporal ASAR WS data.
With a total surface water area of around 606±50 km2 over the first two weeks of July in 2007, 2008 and 2009, a continuous decrease in water surface extent is determined over the course of the following six weeks. In 2009, high fragmentation of the early season classification is determined (1.6 and 1.4 times more polygons are found compared to the same period in 2007 and 2008). This is an artefact from weather affected data, resulting from high wind speeds over larger lakes and therefore showing a distinct wind bias in the threshold classification technique of active microwave data.