Geophysical Research Abstracts
Vol. 14, EGU2012-11608, 2012
EGU General Assembly 2012

Supra-glacial lake evolution and variations on the Greenland Ice Sheet

A. M. Johansson, P Jansson, and I.A. Brown
Stockholm University, Physical Geography and Quaternary Geology, Sweden (malin.johansson@natgeo.su.se)

Supra-glacial lakes form every year in the ablation zone of the Greenland ice sheet. Inherently related to basal water conditions, surface lakes on the Greenland ice sheet provide temporary storage for meltwater that influences both the surface and basal water fluxes. Thus, to understand the effects of climate on ice sheet dynamics it is necessary to understand the surface hydrology. We have investigated the initiation, evolution, disappearance and location of these lakes on the Greenland ice sheet to obtain better understanding for the spatio-temporal variations in lake distribution.

Moderate Resolution Imaging Spectroradiometer (MODIS) images from 2007, 2008 and 2009 where used to investigate the amount of energy needed to initiate the lakes and also the processes behind the disappearance of the lakes. The lakes in each image were linked together in such a way that the lake evolution could be followed. Lakes where then divided into transient lakes (available only in one image) and sustained lakes (available in multiple images). Following from this we developed a dynamic method for supra-glacial mapping in multispectral satellite imagery. Using a multiresolution segmentation followed by an object-oriented classification covering the melt seasons from 2001 until 2010 on roughly a 5-day interval basis. With improved knowledge of the size, presence and evolution of such lakes as well as the energy needed to initiate them we can further relate the lakes to the current climate and also make assumptions on the whereabouts of the lakes with a changing climate.