



Spatial changes of lakes on the Greenland Ice Sheet and their dependence on subglacial topography

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Recent research has shown that meltwater discharge from supraglacial lakes on the Greenland Ice Sheet increase the lubrication at the bottom and enhance the ice velocity. Supraglacial lakes are considered a positive feedback to the Greenland Ice Sheet as Arctic warming continues. In this context, we want to know how the Inter-annual and inter-regional variation to area and distribution of supraglacial lakes on the entire Greenland Ice Sheet has evolved during the last decade. Also how the distribution of lakes is linked to the subglacial topography. We used 180 satellite images covering the melt seasons for the period 2000-2008. The BRDF adjusted MCD43A4 MODIS surface reflectance product was re-projected and re-sampled with a grid resolution of 500 m, with each individual image covering Greenland up to 80 degrees latitude. Lake area estimates and distributions were extracted using an automated supervised classification method and assigned to their respective large-scale drainage areas. Elevation has been added to the classification data for analysis of mean altitude over seasons. Longer term lake distribution was established through older satellite and aerial photographs. Our results show the temporal migration of lakes from north-south over the ice sheet. Many lakes seem to hold a stable spatial position over several decades reflecting dependence of the bedrock topography.