Measuring the Surface Temperature of the Cryosphere using Remote Sensing

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ABSTRACT

A general description of the remote sensing of cryosphere surface temperatures from satellites will be provided. This will give historical information on surface-temperature measurements from space. There will also be a detailed description of measuring the surface temperature of the Greenland Ice Sheet using Moderate-Resolution Imaging Spectroradiometer (MODIS) data which will be the focus of the presentation.

Enhanced melting of the Greenland Ice Sheet has been documented in recent literature along with surface-temperature increases measured using infrared satellite data since 1981. Using a recently-developed climate data record, trends in the clear-sky ice-surface temperature (IST) of the Greenland Ice Sheet have been studied using the MODIS IST product. Daily and monthly MODIS ISTs of the Greenland Ice Sheet beginning on 1 March 2000 and continuing through 31 December 2010 are now freely available to download at 6.25-km spatial resolution on a polar stereographic grid.

Maps showing the maximum extent of melt for the entire ice sheet and for the six major drainage basins have been developed from the MODIS IST dataset. Twelve-year trends of the duration of the melt season on the ice sheet vary in different drainage basins with some basins melting progressively earlier over the course of the study period. Some (but not all) of the basins also show a progressively-longer duration of melt. The consistency of this IST record, with temperature and melt records from other sources will be discussed.