Update on MODIS Snow and Sea Ice Products: March 2005

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Abstract

Recent and planned enhancements in the MODIS snow and ice product suite are shown. These enhancements are specifically targeted to provide products that are more useful to and familiar to modelers. Two new snow products are developed: a climate-modeling grid (CMG) daily snow map product as a flat binary file at 0.25° resolution (1.), and a monthly snow cover CMG product at 0.05° resolution (2.). Additionally, fractional-snow cover (FSC) for the 500-m resolution product has been developed (3.), both the monthly snow map and the FSC snow map for the 500-m product will be available in Collection 5, while the new 0.25° CMG product will initially be available via ftp in the summer of 2005. An algorithm is under development to separate snow cover from bare glacier ice on Greenland (4.) and is planned as a Collection 6 enhancement to the snow-mapping product. For sea ice, comparisons are being undertaken with the Advanced Microwave Scanning Radiometer-EOS (AMSRE-E) ice-concentration product (5.).

1. New Product for GCM Modelers

In response to many requests, we are now producing an experimental product of 0.25° resolution from polar footprint snow cover (PSC). The daily MODIS snow cover product at 500-m resolution is available through the Terra satellite. The resolution of that product is finer than needed by many GCM and land-surface modelers who have found that they must first resample the data before using it (for example, see Rodell and Houser, 2005). Additionally, the HDF files are awkward for many modelers to ingest, so this experimental product will be provided as flat-binary files. The full time series of this product should be available during the summer of 2005 for testing purposes.

2. Monthly Snow Maps

A new product in Collection 5 will be the MOD10CN which is the monthly snow map (including fractional-snow cover) on the climatological grid (CMG) at 0.25°-degree resolution. This product is emailable to comparison with operational products such as those produced by the Rutgers University Cloud Lab (RCL) using NOAA/NESDIS data. It is expected that the product might become part of a Climatological Record (CER) that could include Satellite Glimpse or the NCEP-Greenbelt Enhanced Supervised Classification (NCEP-ESC). An interannual data set of the monthly snow extent is planned for Collection 6.

3. Fractional Snow Cover MOD10_L2

An algorithm was developed to map fractional snow cover (FSC) using MODIS data and Sea Ice Index (SI) data (Salomonson & Appel, submitted). The FSC algorithm utilizes MODIS band 6 as well as other bands to map fractional snow cover. Applying the FSC algorithm to the MODIS bands 7 and 8 results in a FSC product from both Terra and Aqua MODIS data (Salomonson & Appel, submitted).

4. Mapping Snow on Greenland

Anomalously-warm summers have occurred recently on the Greenland Ice Sheet, leading to further change in the extent of exposed ice on the sheet. The need for improved cloud-reduction algorithms over the Greenland Ice Sheet has motivated the past (Stamnes, 2004) and it is our work to start in the future. The search continues for an optimal algorithm.

The snow mapping algorithm that is employed to map snow globally (see Riggs et al., 2003) has been adapted to map snow on the Greenland Ice Sheet. The new algorithm was designed to diminish snow cover from bare ice at the perimeter of the Greenland Ice Sheet and improve the land-water interface. Therefore, an algorithm is being developed that will diminish snow from bare ice on the edges of the Ice Sheet. The algorithm will be evaluated together with the mapping algorithm and should be available for Collection 6.

5. Maximum Sea Ice Extent

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Eight-Day Composite Global Climate Modeling Grid (CMG) Snow Map (MODIS_CMG) -- 0.25° resolution (1-64 km) MODIS_CMG maps reveal snow cover and minimum cloud cover for the 8-day period.

References

Salomonson, V.V. and I. Appel, submitted for publication: Development of the Aqua MODIS NDSI snow and ice concentration product. Cryospheric Sciences Branch.

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Now that five full years of MODIS data are available, unprecedented opportunities for long-term analysis are possible. Each of these images is created from a sin 6-week composite (MODIS_CMG) map from early to mid February each year. These images reveal the extent of land covered with snow on the Earth's surface. (See color tray or CD-ROM.)

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