# New MODIS-based Mosaics of Greenland and Antarctica: MOG and MOA

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Two digital image composites have been assembled from MODIS images of the two major ice sheets on Earth: Greenland and Antarctica. These composite images are manually cloud-cleared, and use image 'stacking' techniques (also called 'image super-resolution' or 'data cumulation') to improve spatial and radiometric detail beyond the 250-meter and 12-bit characteristics of single Band 1 and Band 2 MODIS images. The images are processed ('destriped') to remove artifacts incurred by the 40-detector whiskbroom scanner and two mirror sides of the MODIS sensor. Images are compiled over a relatively narrow range of time (~8hours UT MOA; ~5 hours UT MOG) so that the illumination direction is relatively constant across the two mosaics. The images are high-pass filtered, at a spatial scale equivalent of 60 km. This step enhances smaller-scale features and balances the histograms, thereby minimizing grey-scale variations from scene to scene. Image edges (from the cloud clearing masks or edge of the swaths) are further filtered to 'feather' them. This leads to seamless, high-contrast, high-detail products in the image stacking step.

The result is a very uniform, seamless, nearly perfectly cloud-free image of the surface of the ice sheets, ice shelves, mountains and mountain glaciers, with a contrast content (radiometric detail) capable of portraying both the gross geographic features near the coast and very subtle undulation and flow line structures in the ice sheet interiors. Spatial resolution is roughly 150 meters. The image is complementary to SAR-based mosaics because the MODIS mosaics are images of the true surface rather than composites of surface reflec-tion and volume scattering of the upper few meters. MOA is comprised of 260 250m images acquired between November 20 2003 and February 29, 2004; MOG is accumulated from ~135 scenes acquired between March 12 and April 30, 2005. The MOG grid includes islands of the eastern Canadian Archipelago, and the several small ice caps they contain. Grid spacing of MOA is 125m; for MOG it is 100m. Up to 40 images may contribute to the MOA mosaic at any one point; the mean is ~15 images.

Additionally, two simple grain-size composite images were generated by applying a normalized difference algorithm to Band 1 (red light) and Band 2 (near-infrared) of the composite scenes. To maintain a quantitative ratio, these images were not processed beyond geolocation and calibration, and so we expect to be able to provide a look-up table for mean grain size for the two ice sheets.

The mosaics are being distributed via a web-based map-server that permits on-the-fly zoom, a series of contrast stretches, and geolocated image delivery. The data are available from both UNH and NSIDC websites.