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A blending snow cover data base on MODIS and AMSR-E snow cover in Qinghai-Tibet Plateau

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The algorithms of MODIS Terra and MODIS Aqua versions of the snow products have been developed by the NASA National Snow and Ice Data Center (NSIDC). The MODIS global snow-cover products have been available through the NSIDC Distributed Active Archive Center (DAAC) since February 24, 2000 to Terra and July 4, 2002 to Aqua. The MODIS snow-cover maps represent a potential improvement relative to hemispheric-scale snow maps that are available today mainly because of the improved spatial resolution and snow/cloud discrimination capabilities of MODIS, and the frequent global coverage. In China, the snow distribution is different to other regions. Their accuracy on Qinghai-Tibet Plateau (QTP), however, has not yet been established. There are some drawbacks about NSIDC global snow cover products on QTP:
1. The characteristics of snow depth distribution on QTP: Thin, discontinuous. Our research indicated the MODIS snow-cover products underestimated the snow cover area in QTP.
2. The daily snow cover product from MODIS-Terra and Aqua can include the data gaps.
3. The snow products can separate snow from most obscuring clouds. However, there are still many cloud pixels in daily snow cover products.
The study developed a new blending daily snow cover algorithm through improving the NSIDC snow algorithms and combining MODIS and AMSR-E data in QTP. The new snow cover products will provide daily snow cover at 500-m resolution in QTP. The new snow cover algorithm employs a grouped-criteria technique using the Normalized Difference Snow Index (NDSI) and other spectral threshold tests and image fusion technology to identify and classify snow on a pixel-by-pixel basis. The usefulness of the NDSI is based on the fact that snow and ice are considerably more reflective in the visible than in the shortwave IR part of the spectrum, and the reflectance of most clouds remains high in the short-wave IR, while the reflectance of snow is low. We propose a set of three steps, based on a combination of AMSR-E snow water depth data and different spatial and temporal information, to reduce cloud obscuration from MODIS snow-cover images. Each step was performed in sequence and the output from each step was the input for the next step. The analysis was done in Arc GIS.