Mapping of snow cover with NPP VIIRS: First results

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The Binary Snow Cover is the primary cryosphere product derived from observations of the Visible/Infrared Imager/Radiometer Suite (VIIRS) onboard the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) and the Joint Polar Satellite System (JPSS) platforms. Global maps of snow cover distribution will be generated from VIIRS data daily at the maximum spatial resolution of 375m. The VIIRS snow identification algorithm is similar to the one developed for the MODIS instrument onboard Terra and Aqua satellites. The technique uses the Normalized Difference Snow Index (NDSI) and employs a threshold-based decision-tree algorithm to separate snow free and snow covered pixels. Snow identification and mapping is limited to daytime conditions and to clear-sky portions of the imagery. Cloud masking is not part of the snow mapping algorithm and is performed independently at the previous step of VIIRS data processing.

In the paper we present the first results of the analysis of snow cover retrievals from the data of NPP VIIRS launched in October 2011. Visual inspection of daily snow cover maps has revealed their overall realistic characterization of the global snow cover distribution. A more detailed examination has shown substantial areas of spurious snow cover in low-latitude areas of Africa, South America, and East Asia. The most probable source for these errors is clouds missed by the cloud algorithm. Elimination of some of these “false snow” identifications is possible through application of additional filters based on the snow cover climatology. To quantitatively assess the accuracy of the VIIRS snow product and monitor the product performance we compared the remote sensing data with collocated surface observation data and with NOAA interactive snow cover charts generated within Interactive Multisensor Snow and Ice Mapping System (IMS). The first tests have shown that the probability of correct snow identification with the current VIIRS algorithm is close the 90% level required by product accuracy specifications.