**Impact of change from NISE version 4 to NISE version 5
ground snow cover for MOD06 (The Cloud Product)**

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The (Near-real time Ice and Snow Extent) NISE product provided by the National Snow and Ice Data Center (NSIDC) has been recently updated from version 4 to version 5. The Version 5 data record started on 12/01/2016 with overlap months of December 2016 and January 2017. In this document, we look at where the changes in ground snow cover have occurred.

1. Summary of changes from Version 4

From the NSIDC website: https://nsidc.org/data/nise

- The NISE snow and sea ice algorithm both use near-real-time brightness temperature observations from the SSMIS instrument on DMSP-F18.
- The coefficients for the NISE snow algorithm were updated to better match results from DMSP-F13 as a result of an inter-calibration between F13 and F17 during an overlap period from 3/27/2008-3/26/2009 and between F17 and F18 during an overlap period from 7/1/2014-6/30/2015.
- ESDT metadata was updated to reflect the change in data set version number.

2. The NISE product and its use in MODIS operations

The NISE product is updated daily using the best available data from the five days prior to the day of interest. The product is generated using the microwave SSMI/F imagers on board the Defense Meteorological Satellite Program (DMSP) satellites. The data is available in EASY-Grid polar projection 27km resolution in HDF-EOS format with a separate set of datasets for Age and Extent of snow and ice for Northern and Southern Hemisphere. Sea ice is given as a fraction of coverage. Ground snow cover is a yes/no answer. Figure 1 shows an example NISE image for Northern Hemisphere valid for 01.06.2015.
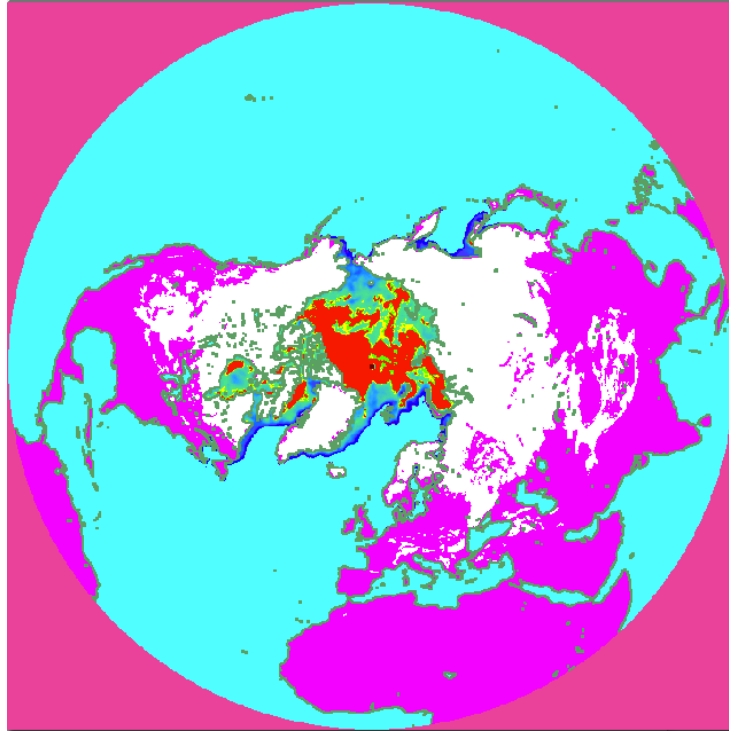
*Figure 1. NISE snow/ice extent for Northern Hemisphere on January 6, 2015. Ground snow cover extent is indicated in **white** color.*

The MODIS cloud optical and microphysical properties product (MOD06) uses the NISE ground snow cover extent to determine which channel should be used as the non-absorbing band during retrieval of cloud optical thickness and cloud effective radius. In order to perform a good quality retrieval, we would like the surface to be as dark as possible. When there is snow on the ground, the standard 0.65μm channel we use over land becomes very bright. However, the 1.2μm channel remains dark for snow-covered surfaces. For bare ground 0.65μm channel is better than 1.2μm. In order to make the choice between 0.65 and 1.2μm we need to know whether or not there is snow on the ground. The NISE product is used by the operational MOD06 product to make this determination.

3. Perceived changes from Version 4 to Version 5

We examined a month of February 2016 in order to see the changes between NISE V4 and V5 products. Figure 2 shows a difference image from a sample day from the chosen month, in this case 02.11.2016.

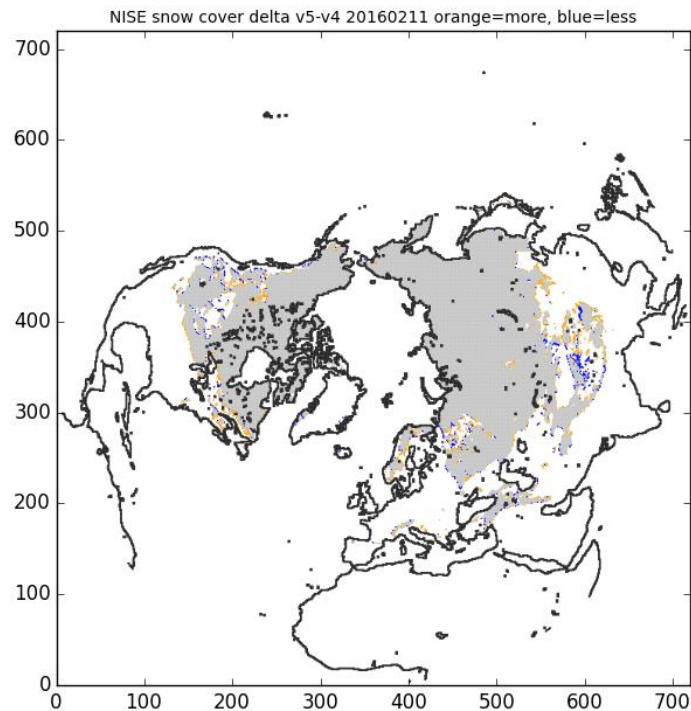NISE snow cover delta v5-v4 20160211 orange=more, blue=less

Figure 1. Changes in the NISE snow/ice extent for Northern Hemisphere on February 11, 2016. Orange hue is V5 giving more snow, blue is where V5 gives less snow. Gray is no change between V5 and V4.

Overall the impact of the change appears to be rather minimal. Some places have more snow. Some places have less. The exact map changes day to day and it does not appear that there will be any noticeable impact on mean monthly statistics of retrieved cloud optical thickness or cloud effective radius.

There is an animation available on the modis-atmos website that shows the entire month of February at this link: http://modis-atmos.gsfc.nasa.gov/validation_06.html

Note that by mid-2017, a new modis-atmos website is expected to be launched and at that time the appropriate link will change to: https://modis-atmosphere.gsfc.nasa.gov/data-issues/cloud