Validation of LSA-SAF Snowcover product

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MSG SEVIRI satellite data is used to produce daily LSA SAF Snow cover pre-operationally at Instituto de Meteorologia, Portugal. The LSA SAF Snowcover product is a simple classification of each SEVIRI pixel to snow free, partially snow covered or totally snow covered category. Algorithm is using all SEVIRI channels. The snow cover is produced each repeat cycle (15 min) throughout the day. These single scene snow cover fields are combined to produce daily snow cover field.

Validating satellite based snow cover with in situ measurements is extremely demanding. Best possible choise is to use standardised surface observations from large geographical areas. Synoptic weather stations observe snow depth at least daily all over Europe. These observations are used to validate the daily LSA SAF snow cover product.

The SC product is available from 1st February 2005. For this analysis SYNOP observations and ECMWF snow analysis are retrieved from the ECMWF MARS database for the period from February 1st 2005 until December 31st 2005. This data covers almost all of Europe reasonably well. There are some areas where snow depth observations are rare or missing.

Two different points of view are used to validate the SC product. Snow analysis from surface observations and SC product should give similar coverage areas. Also the duration of snow cover should be observed correctly from satellite when compared to actual snow covered period at surface stations.

In general the SC product and observations are in good agreement, especially if partial snow cover is considered as snow covered. During the spring 2005 58870 individual observations could be used to validate the snow cover product. The correlation between surface observations and LSA SAF Snowcover was 0.72. LSA SAF Snowcover product and SYNOP observations were in agreement at 88% of compared observations. False positive rate was 8.6% and false negative rate 3.4%. Further work is needed to detect problematic conditions for snow detection. These could include forests, mountains and areas where snow cover is varying rapidly.

Some improvements to the LSA SAF Snowcover algorithm are planned. The snow cover can be detected from satellite using visual channels only in cloud free areas. The NWC SAF cloudmask is developed to detect cloudy pixels instead of cloud free pixels. When compared to SYNOP cloud observations it was found that cloudy pixels were observed correctly but there were serious limitations in the detection of cloud free pixels. For this reason a more direct algorithm to detect snow cover will be developed.