

Methodology to obtain 30 m resolution of snow cover area from FSCA MODIS and NDSI Landsat

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In the last years numerous free images and product satellites have been released, with different spatial and temporal resolution. Out of them, the most commonly used to describe the snow area are MODIS and Landsat. Fractional snow cover area (FSCA) is a daily MODIS product with a 500 m spatial resolution; Landsat images have around 16 days and 30 m respectively. In this work we use both images to obtain a new daily 30 m resolution snow distribution product based in probabilistic and geospatial information. This can be useful because a higher resolution can be used to improve the estimation of the accuracy of a physically-based distributed model to represent the snow cover distribution.

We choose three basins in central Chile, with an important snow and glacier presence, to analyze the spatial and temporal distribution of snow using (1) the mean value between MOD10A1 (terra) and MYD10A1 (aqua) and (2) the corrected images by topography and atmosphere from Landsat 5 and Landsat 8 computing the normalized difference snow index (NDSI).

When both satellites data are available in the same day, each MODIS pixel is studied considering the Landsat pixels contained in it. A new matrix is created, covering all MODIS pixels, using a 30 m spatial resolution, where each pixel value represents the probability of snow presence in time from Landsat images, and then each pixel is corrected by its neighbour's pixels, elevation, slope and aspect. Then snow is distributed, for each MODIS pixel, considering the corrected probability matrix and sorted between pixels with high probability until the area from FSCA is completed.