

**Seasonal variations of MODIS snow cover over the Andes,  
comparison with snowmelt runoff.**

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## ***Abstract***

In this article, the observed spatial evolution of the snow cover in the mountainous Cordillera de Los Andes region located at the central part of Chile is correlated to snowmelt runoff through remote sensing techniques. The snow cover variation was modeled using 290 MODIS satellite images available every 8 days and the Normalized Differentiation Snow Index (NDSI), from February 2000 until June 2006. Different threshold values of the NDSI were used to evaluate the snow cover evolution for 6 catchments in the region. The main problem for the determination of the snow cover area was the atmospheric interference therefore when this interference was high the adopted solution was to eliminate the corresponding image from the continuous series. The generated series for the percentage of area covered with snow in each basin was correlated to the average of mean daily flows using a time step of 8 days. Results show a correlation coefficient greater than 0.7 for these variables in some basins and this is considered a good support for the application of this type of images for the evaluation and forecasting of water resources for the snowmelt period. Also the best threshold value of the NDSI to represent the snow cover evolution was selected using the correlation coefficient. A fixed threshold value is used through the year but results suggest the convenience of exploring the use of different threshold values. Finally, the variation of snow at selected transects through the period 2000-2006, obtained using MODIS images with NDSI filter, is compared to the gaged streamflow. Those transects are defined inside the boundaries of the watershed and can be understood as a temporal witness of the presence of snow, consequently a time series is generated using the percentage of pixels with snow in the transect in each of the images. The obtained results allow the use of new methodologies for forecasting the streamflow through the analysis of transects.

*Key words: Remote sensing, MODIS images, snow covered area, snowmelt runoff data.*