



## "Proximal Sensing" capabilities for snow cover monitoring

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The seasonal snow cover represents one of the most important land cover class in relation to environmental studies in mountain areas, especially considering its variation during time.

Snow cover and its extension play a relevant role for the studies on the atmospheric dynamics and the evolution of climate. It is also important for the analysis and management of water resources and for the management of touristic activities in mountain areas. Recently, webcam images collected at daily or even hourly intervals are being used as tools to observe the snow covered areas; those images, properly processed, can be considered a very important environmental data source.

Images captured by digital cameras become a useful tool at local scale providing images even when the cloud coverage makes impossible the observation by satellite sensors.

When suitably processed these images can be used for scientific purposes, having a good resolution (at least 800x600x16 million colours) and a very good sampling frequency (hourly images taken through the whole year). Once stored in databases, those images represent therefore an important source of information for the study of recent climatic changes, to evaluate the available water resources and to analyse the daily surface evolution of the snow cover.

The Snow-noSnow software has been specifically designed to automatically detect the extension of snow cover collected from webcam images with a very limited human intervention. The software was tested on images collected on Alps (ARPAV webcam network) and on Apennine in a pilot station properly equipped for this project by CNR-IIA.

The results obtained through the use of Snow-noSnow are comparable to the one achieved by photo-interpretation and could be considered as better as the ones obtained using the image segmentation routine implemented into image processing commercial softwares. Additionally, Snow-noSnow operates in a semi-automatic way and has a reduced processing time.

The analysis of this kind of images could represent an useful element to support the interpretation of remote sensing images, especially those provided by high spatial resolution sensors.

Keywords: snow cover monitoring, digital images, software, Alps, Apennines.