



## **Hydrological modelling and SAR monitoring of the snowpack for the avalanche risk prevention**

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In late spring, when melting is pronounced and can cause avalanches triggered by the low shear resistance at the base of the snowpack, in the late afternoon and night the surface layer refreezes and becomes transparent to emission from the lower layer at low frequencies of the microwave range of the electromagnetic spectrum. The snowpack base remains wet for longer time in the afternoon and possibly night. A similar reasoning can be applied for radar backscattering signals. To investigate the possibility to Synthetic Aperture Radar monitoring to detect wet snow avalanche hazard six ENVISAR-ASAR images from 2003 to 2006 over the Cordevole test site, in the Dolomites (Italian Alps), were processed by CNR-IFAC and wet/dry snow maps were produced. Then, the hydrological energy-balance model PDSM was used to simulate liquid water content, temperature, density and height in two layers of the snowpack for the same dates of the satellite pass (from march to may). The model is forced by hourly records of meteorological variables (precipitation, humidity, wind speed, air temperature, global radiation) and verified with in situ snow measurements and observations. By using a threshold of the simulated liquid water content, a classification between wet and dry snow was made on the basis of the model and compared with SAR-derived maps. Finally, we compared the avalanche frequency in the area of the test-site to verify the correspondence with the backscatter signal. Results, although very preliminary, seem promising.