



TLS monitoring of snowpack distribution in a mountain forested areas: Analysis of canopy disturbance on snow evolution.

Jesús Revuelto (1,2), Juan Ignacio López-Moreno (1), Cesar Azorin-Molina (1), Esteban Alonso (1), and Alba San Miguel (1)

(1) Instituto Pirenaico de Ecología (IPE-CSIC), Zaragoza, Spain, (2) Univ. Grenoble Alpes, CNRS-IRD, LTHE, UMR5564, Grenoble, France

Forested mountain areas at high elevations show important interaction with snowpack distribution and its evolution in time, and thus in many cases are the limit of the cryosphere in mountain zones. Such interactions have significant consequences in the hydrologic response of mountain rivers. Thereby observing the evolution of snowpack in forested areas has a big importance from a basic science perspective and also for water management. This work presents a detailed comparison of small scale effect of forest characteristics on snowpack distribution in Central Pyrenees, before and after a strong modification of canopies features. The snowpack distribution has been obtained using a novel remote sensing technology (Terrestrial Laser Scanner, TLS), with high spatial resolution (0.25m) over a 1000m² study area for 27 survey dates along three snow seasons. Between the second and the third snow season a strong canopy pruning was performed in the study site, and thereby the snowpack evolution with both canopy configurations was compared.

A Principal Component Analysis has been applied to analyze the snowpack distributions observed during the study period. Results obtained have shown that despite large differences in Canopy radius (1.2 m) and Canopy height (2.5m), not a different snowpack evolution was observed. For both Canopy configurations the variable with higher importance on snowpack distribution is the snow depth amount. The change in forest structure has important implications in the decrease of Canopy areas and the increase of Open areas (proportionally to Canopy change), but not a different interaction with forest structure was observed.

The canopy pruning realized in the study site is typically accomplished for fire risk reduction and this shows the consequences that such action has in snowpack distribution and that hereby these may have in water management possibly delaying peak runoff.