Geophysical Research Abstracts
Vol. 17, EGU2015-11791, 2015
EGU General Assembly 2015

Ground thermal conditions along a vertical transect with contrasted topography in a high mountain Mediterranean environment (Puigpedrós massif, eastern Pyrenees), from 2003 to 2014

Ferran Salvador-Franch (1), Montserrat Salvà-Catarineu (1), Marc Oliva (2), and Antonio Gómez-Ortiz (1)
(1) Universitat de Barcelona, Spain (fsalvador@ub.edu), (2) Universidade de Lisboa, Portugal (oliva_marc@yahoo.com)

During the Last Glaciation glaciers shaped the headwaters and valley floors in the Eastern Pyrenees above 2100-2200 m. Since the deglaciation of these high mountain environments, periglacial processes have generated rock glaciers, patterned ground and debris slopes. The role of soil temperatures is decisive regarding the contemporary activity of several processes: cryoturbation, solifluction, frost weathering, etc. Nowadays, periglacial processes are driven by a seasonal frozen layer extending 4-5 months. At 2100 m the seasonal frost reaches 20 cm depth, while at 2700 m reaches 50 cm depth. However, soil temperatures, and thus, periglacial processes are strongly controlled by the large interannual variability of the snow cover.
With the purpose of understanding the rhythm and intensity of soil freezing/thawing we have set up several monitoring sites along a vertical transect from the high plateaus (2700 m) to the valley floors (1100 m) across the southern slope of the Puigpedrós massif (2914 m), in the Eastern Pyrenees. The monitoring of soil temperatures extends from 2003 to 2014. TinyTalk, UTL and Hobo loggers have been used in this study. These loggers were installed at depths of -5, -20 and -50 cm at five sites: Calmquerdós (2730 m), Malniu (2230 m), La Feixa (2150 m), Meranges (1600 m) and Das (1097 m). Air temperatures used as reference come from two automatic stations of the Catalan Meteorological Survey (Malniu, Das) as well as from two loggers installed in La Feixa and Meranges. Data shows the control of snow cover on the depth of the frozen layer and on the number of freeze-thaw cycles. Air temperatures at 2000-2200 m show a mean of 150 freeze-thaw cycles per year. In La Feixa, with very thin snow cover, only 67 cycles are recorded at 5 cm depth and 5 cycles at 50 cm depth. In Malniu, located at a higher elevation showing a thicker and longer snow cover, only 17 freeze-thaw cycles per year are recorded at 5 cm depth, with no cycles recorded at 50 cm depth. Soils remain unfrozen during years with a very thick snow cover. The snow cover is also largely conditioned by the microtopography and exposure to the dominant winds. These factors condition the distribution, duration and intensity of the frozen ground and, thus, determine the intensity of periglacial processes in these areas.