



## **Soil properties in the sorted patterned ground of Piata Lazin, NW Italy**

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Most of the patterned ground phenomena occur in permafrost areas, whose distribution in alpine environments at middle latitudes, is strongly controlled by local climatic conditions, and specifically by snow cover. There are problems in determining the amount of precipitation at a given site in mountain permafrost areas, because snow can be redistributed by wind or avalanches. Surface soil conditions also affect permafrost distribution. Dry blocky surfaces, peaty soils and soils with a thick organic horizon tend to favour permafrost development. The dimensions of patterned ground show significant spatial variability, depending on microclimate and soil conditions.

The field study was undertaken in the Gran Paradiso National Park, at an elevation of 3028 m ASL, on a gentle slope plateau, exposed to wind. The dimension and distribution of stone circles was determined through field survey (October 2008). The soil temperature (10 cm depth) during the winter season 2007-2008 was measured by data loggers UTL-1. Nivo-meteorological data were recorded by an automatic weather station located 3 km away (2400 m ASL). Topsoil samples were taken across a section in two stone circles, considering the border of stones and the finer materials in the centre.

The number of stone circles was estimated equal to 233/ha, with diameters ranging from 0.5 to 5 m. The diameter of stones on the borders ranged between 5 and 25 cm. Miniature sorted circles ( $d=10$  cm) were recognized in the finer materials in the centre. The mean soil temperature from October 2007 to April 2008 was equal to  $-4^{\circ}\text{C}$ , with a minimum of  $-11.5^{\circ}\text{C}$  recorded the 17th December 2007, under a thin snow cover accumulated late in the fall season. The soil skeleton content decreased from the borders to the centre, ranging respectively from 42-70% to 33-39%.

The area is affected by intense soil frost action especially during winter, presumably due to the lack of snow cover caused by the wind action. The frequency of freeze/thaw cycles may cause the segregation of stones and the concentration of fines into separate domains, which appears to be still an active process in the area.