Geophysical Research Abstracts
Vol. 13, EGU2011-6563, 2011
EGU General Assembly 2011

Patterned ground soils in the Apennines, a vanishing landscape?

Stefania Cocco (1), Giorgia Brecciaroli (1), Alberto Agnelli (2), and Giuseppe Corti (1)

(1) Università Politecnica delle Marche, Scienze Ambientali e delle Produzioni Vegetali, Ancona, Italy (s.cocco@univpm.it, 0712204856), (2) Dipartimento di Scienze Agrarie ed Ambientali, Università degli studi di Perugia, Italy

After the last glaciation (Würm), most of the mountainous glaciers disappeared and the previous glaciated areas were submitted to periglacial conditions while, at lower altitudes, periglacial conditions changed to temperate conditions. Periglacial conditions are those characterized by 1) so intense freezing/thawing cycles that are able to produce drastic modifications of soil surface and turbation of the soil horizons, 2) a mean annual air temperature lesser than +2°C, and 3) a scarce snow-cover. Most of these areas may also host a type of permafrost (continuous, discontinuous, sporadic, isolated).

Because of this, periglacial environments at low latitudes occupy restricted niches that actually represent threatened vanishing landscape of particular interest. These areas may be small and isolated and probably do not have a sufficient inertia to overcome the forecasted climatic warming. While in the last years there has been the evidence of increasing soil temperature at high latitudes (Chudinova et al., 2006) and permafrost melting (Sazonova et al., 2004; Christensen et al., 2004), most of processes occurring in the areas under periglacial conditions at low latitudes are still poorly known. Because of this, these areas are worthy to be studied as they represent a sensitive index of the climatic warming. The aims of this work were to (i) document the presence of patterned ground soils at high altitudes in a Mediterranean environment of the Central Apennines (Italy), and (ii) characterize these soils and their organic matter to monitor through basal respiration experiments the feedback between these soils of periglacial environments and the predicted global warming. Physical and chemical properties a part, the basal respiration experiments indicated that the soil microbial community was active at 5°C, while at 20°C or 30°C respiration was very poor. Nonetheless, after 20 days at both 20°C and 30°C, the microflora re-activated when the samples were placed at 5°C. The experimental temperatures were selected as they are possible within the annual range of temperatures. Measurements of CO2 evolved from the soil surface by CO2-chamber appeared to confirm this results.

These results suggested that, in the mountainous environments submitted to periglacial conditions, the evolution of CO2 derived from the mineralization of the soil organic matter following the global warming could not be as strong as hypothesised by studying soils submitted to different climatic conditions.