



## **Steppe to forest steppe ecosystems during the last glacial period in S Italy - evidence from sediment-paleosol sequences, compared to lacustrine archives and marine data**

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During fieldwork on marine terraces near Lazzaro (Calabria, Southern Italy) in 2010 we discovered an alluvial fan overlying the MIS 5.5 terrace. Due to strong tectonic uplift (1.3 m ka<sup>-1</sup>) the alluvial fan was dissected by the same creek which previously had built it up. Thus, the internal structure of the fan was exposed, exhibiting a detailed sediment-paleosol sequence. The paleosols are mainly characterized by accumulation of soil organic matter (SOM), bioturbation and secondary carbonates. They represent Chernozem- and Phaeozem-like soils that very likely formed in steppe to forest steppe ecosystems. Strong carbonate accumulations occur in the lowermost part of the profile, between 513 and 693 cm depth. Their thickness and in parts massive character suggest that slope water contributed to the carbonate accumulations.

Similar environmental conditions as reflected in the Lazzaro paleosols were reconstructed from the pollen record of Lago Grande di Monticchio, which indicates from 87.98 to 82.73 ka (MIS5b-a) a temperate deciduous forest (St. Germain 2); from 82.73 to 59.00 ka (MIS5a-4) first frequent vegetation fluctuations then Artemisia steppe, from 59.00 to 25.90 ka (MIS3) alternation between open steppe (stadials) and wooded steppe (interstadials); and from 25.90 to 14.30 ka (MIS2) again open steppe (Last Glacial Maximum).

SOM of the two uppermost Lazzaro paleosols was <sup>14</sup>C-dated to 26.8-28.8 cal ka BP and 28.9-30.3 cal ka BP, respectively. Thus, the formation of these soils falls into the period for which the lacustrine record indicates an alternation between open and wooded steppe. It is still an open question whether the sedimentation that interrupted the ecologically stable times of soil formation was triggered by fluctuations in climate and vegetation cover or by tectonics. The observation that the ages of the paleosols match a period of frequent environmental oscillations suggests that the phases of sedimentation are to a certain degree driven by fluctuations in climate and vegetation cover causing geomorphological instability.

In 2012, a second paleosol-sediment sequence was found in a similar geomorphological situation near Piale, c. 30 km north of the Lazzaro profile. SOM of its two lowermost paleosols was <sup>14</sup>C-dated to 44.8-45.8 cal ka BP and 45.2-46.2 cal ka BP, respectively. The paleosols of the Piale profile are very dark, almost carbonate-free, and several of them are characterized by addition of volcanic ash.

All paleosols and sediments of the two profiles were analyzed for texture, soil organic carbon (SOC), carbonate content, Fed, total elemental composition (XFA on fused discs) and micromorphology. Analyses of the ash and four luminescence datings are in progress.

Another valuable archive for Southern Italy is the foraminifera and pollen record of the core GNS84-C106 obtained from the Gulf of Salerno. Di Donato et al. (2008) reconstructed somewhat cooler and considerably drier climatic conditions for the last glacial period, compared to the present climate in the region.

We conclude that Chernozem- and Phaeozem-like soils developed during the last glacial period in Southern Italy under more continental and drier climate conditions than today and under a vegetation cover that shifted between steppe and forest steppe.