

## **Sediment-palaeosol successions in Calabria and Sardinia suggest spatially differentiated palaeo-vegetation patterns in southern Italy during the Last Glacial period**

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Several lakes on the southern Italian peninsula provide valuable palaeoenvironmental archives of the Last Glacial period. These archives include, e.g., the long high-resolution record from varved lake sediments of Lago Grande di Monticchio, the bigger one of two maar lakes situated on top of Mt. Vulture. Its pollen record indicates (1) temperate deciduous forest during MIS5.2–MIS5.1 (St. Germain 2); (2) frequent vegetation fluctuations, then *Artemisia* steppe during MIS5.1–MIS4; (3) alternations between open steppe (stadials) and wooded steppe (interstadials) during MIS3; and (4) open steppe during MIS2 (Last Glacial Maximum).

However, only few palaeosol records of this period have been reported from southern Italy in the literature so far. Such records would allow for gaining insight also into spatial patterns of the vegetation cover during this period that should have formed, e.g., according to relief, elevation, and continentality gradient (related to the much lower coastline during the last glacial period). So far, we have studied three sediment-palaeosol successions in southern Italy, two in the Calabria region, and one in north-western Sardinia. All of them have developed in alluvial fan deposits resting on littoral sediments of the Last Interglacial period (MIS 5).

The southernmost succession studied is located near Lazzaro (south of Reggio di Calabria). It is exposed in an alluvial fan overlying the MIS5.5 terrace. Due to strong tectonic uplift (1.3 m ka<sup>-1</sup>) the alluvial fan has been dissected by the same creek which previously had built it up. Therefore, its internal structure is exposed, exhibiting a detailed sediment-palaeosol sequence. The palaeosols are mainly characterized by accumulation of soil organic matter (SOM), bioturbation and secondary carbonates. They represent Chernozem- and Phaeozem-like soils that most likely formed under steppe to forest steppe. SOM of the two uppermost Lazzaro palaeosols was <sup>14</sup>C-dated to 26.8–28.8 ka cal BP and 28.9–30.3 ka cal BP, respectively. Thus, the formation of these soils falls into the period for which the lacustrine record indicates alternations between open and wooded steppe. The second palaeosol-sediment succession was found in a similar geomorphological situation near Piale, ca. 30 km north of the Lazzaro profile. In this case, the major part of the alluvial fan was removed by the creek (flowing from east to west), so that only its southernmost edge is preserved. SOM of the two lowermost palaeosols embedded in it was <sup>14</sup>C-dated to 44.8–45.8 ka cal BP and 45.2–46.2 ka cal BP, respectively. The palaeosols of the Piale profile are very dark, almost carbonate-free, and several of them are characterized by an aeolian component (volcanic ash).

The third sediment-palaeosol succession is exposed at the north-western coast of Sardinia, ca. 1.5 km north of Porto Palmas. The succession has developed in alluvial fan deposits that are constrained in a narrow valley, thus forming a valley infilling. Where the valley opens into the sea, this infilling is exposed in a high cliff. The sediment-palaeosol succession is sandwiched between marine deposits at the bottom (attributed to MIS 5c), and a sandy cover on top, dated to 23±4 ka by optically stimulated luminescence (OSL). <sup>14</sup>C dating was performed on charcoal fragments that were abundant in several horizons. Interestingly, in contrast to the two sediment-palaeosol successions in Calabria, the palaeosols exposed in NW Sardinia do not represent dark steppe and forest steppe soils. The NW Sardinian Late Pleistocene palaeosols are brownish, reflecting rather forest environments. This difference suggests somewhat more humid and less continental conditions in this area compared to Calabria, during the Last Glacial period. However, more of these terrestrial archives along the coast of S Italy would need to be studied to gain a deeper understanding of spatial patterns of Last Glacial vegetation and environments.