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Marine terraces and related soil development near Metaponto, southern Italy

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This contribution to the session “Relevance of Quaternary landscape formation for modern geosystems” reports a study on the linkage between Quaternary landscape formation - in this case the formation of 11 Pleistocene marine terraces in southern Italy - and modern geosystems - in this case the soils on these terraces. In a first step, the soil development stages on terraces of known age were studied. Then, the soil development stages on so far undated terraces were compared to those of the dated terraces in order to estimate their ages by “pedo-dating”.

This was done on a sequence of marine terraces bordering the Gulf of Taranto. The terraces had been mapped and sedimentologically investigated by Brückner (1980) who distinguished one Holocene terrace (T0), ca. 2 – 8 m a.s.l., and eleven Pleistocene terraces (T1 – T11), ranging in elevation between approximately 25 and 400 m a.s.l.. All terraces were assumed to have formed subsequently as a result of the interference between the Pleistocene glacio-eustatic sea-level oscillations and tectonic uplift which prevented later interglacial sea-level maxima from reaching the same relative height as earlier sea-levels. Various findings enabled age estimates for several terraces. T1 was attributed to MIS 5a, based on Th/U datings of molluscs (Brückner, 1980). Terrace T1 is covered by loess which was OSL-dated to 16 – 27 kyr BP (Zander et al., 2003, 2006), i. e. the Last Glacial Maximum. T2 was probably formed during MIS 5e, as suggested by the mollusc *Strombus bubonius*, an approximate index fossil for MIS 5e (or older interglacials). The top layer of T8 contains a 500 – 600 kyr old volcanic

ash of the Phlegraean Fields. The Brunhes/Matuyama reversal was identified between T10 and T11. Brückner (1980) estimated the ages of the other terraces based on the oxygen isotope curve of Emiliani & Shackleton (1974) and the respective maximum terrace elevation. Recently, the concept of the subsequent formation of the terraces has been questioned by Bentivenga et al. (2004). These authors interpret the Metaponto terrace staircase as one single Mid-Pleistocene terrace body which was later tectonically dissected and the terrace fragments then moved to different elevations above sea level.

Our ongoing project is investigating the soil development on the Metaponto terraces in order to ascertain if all terraces represent different sea-level maxima or if some of them are of the same age. So far, twelve soil profiles have been described and sampled for chemical, mineralogical and micromorphological analyses. The results (e.g. increasing clay illuviation, rubefication and Fe_d/Fe_t ratios, decreasing silt/clay ratios) clearly indicate different ages concerning the lowest and the highest terraces, while for some of the intermediate terraces the discussion is still open. More soil profiles will be studied on these terraces in March 2008 in order get a clearer picture of the terrace formation and soil development.

The presentation given at the EGU conference will especially focus on the changes in the macro- and micromorphological characteristics of the soils from the lowest to the highest terraces.

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