



ICG2022-286, updated on 29 May 2023

<https://doi.org/10.5194/icg2022-286>

10th International Conference on Geomorphology

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Environmental significance of (paleo)soils surveyed throughout 20 years of research in the Mt. Cusna area (Northern Apennines)

Anna Masseroli¹, Guido S. Mariani², and Luca Trombino¹

¹University of Milan, Earth Sciences Department, Milano, Italy (anna.masseroli@unimi.it)

²Dipartimento di Scienze Chimiche e Geologiche, Università degli Studi di Cagliari, Cagliari, Italy

Because of the close relationship among soils features and their forming factors, soils and paleosols are a useful archive both to reconstruct past environmental conditions and to gather information on the morphodynamic processes affecting landscape evolution through time. The formation of complex paleosols sequences is deeply affected by the combined effect of different soil forming factors that, shaping pedogenesis, leave marks that can be interpreted and used to reconstruct the climatic and environmental history of the landscape.

By integrating geopedological, geomorphological and geoarchaeological data gathered in over 20 years of research, we aimed to reconstruct the environmental Holocene history of the Mt. Cusna area (Northern Italian Apennines). We collected chemical, physical and micromorphological data of about 70 soil profiles into a georeferenced database, which maps different soil characteristics from both modern soils and paleosols. The integration of soil data with other types of available data, as geomorphological map, previous paleoenvironmental and geoarchaeological reconstructions, allowed to highlight natural and anthropogenic trends and model the dynamics of past climate history, past environmental conditions, and the reciprocal distribution of landforms and paleosurfaces.

We have defined the occurrence of different phases of biostasy, characterized by the absence of erosion and/or deposition on the slope, the presence of vegetation cover, and the soil development, alternated with phases of rhexistasy, characterized by slope instability and soil erosion and burial. The soil and paleosols variability across the study area mirrors the different impact of soil forming factors on pedogenesis (e.g., vegetation cover, human impact, slope dynamics), supporting a detailed characterization of the succession of different environments conditions through space and time.

These results highlight how soils can represent an important archive for paleoenvironmental information as well as geomorphological dynamics and demonstrate that a multi-disciplinary approach is necessary to properly characterize soils and retrace environmental changes.