Soils and paleosols in dynamic landscapes

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Soil formation derives from the interconnection of a wide and diverse range of factors, spanning from the mineralogical and geochemical composition of the parent material to terrain morphology, vegetation cover, climate and the activity of animals and humans through time. In specific applications, the study of soil formation and evolution can focus on single processes, in order to contribute to the investigation of defined, e.g., agricultural, environmental and geological topics.

In a geomorphic perspective, soils are effective indicators of the stability of the different portions of the Earth surface in terms of erosional and depositional processes. As well, a buried soil embedded within a depositional succession may represent a valuable evidence of the presence of a hiatus in sedimentation. In this latter case, the degree of development of the soil can be a unique indicator of the duration of the sedimentation gap in order to understand the driving factors of surface stability. In stratigraphic terms, buried soils may allow to recognize the existence of unconformities and to define their ranking, providing sound basis for an allostratigraphic subdivision and correlation of sedimentary bodies.

This PhD project is intended to explore how soils can help to decipher periods and patterns of long-term landscape stability/instability in areas of high geomorphic activity, where active tectonics and Plio-Quaternary climatic changes have been continuously and profoundly shaping landforms, including loess deposition. The PhD student will carry out field surveys and sampling of soil profiles and sedimentary sections. She/he will carry out geochemical and micromorphological analysis of selected samples, with the aim of defining soil chronosequences on timescales 10^3-10^6 yr. Remote sensing and GIS modeling of LiDAR DTMs will allow her/him to contrast geopedological information with landform characteristics and patterns. Buried soil will be specifically considered for their stratigraphic meaning and for extracting paleoenvironmental proxy information.

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