Study of Quaternary sediments in the Pakistan Himalaya

(Proposer: Prof. Valerio Olivetti)

The Quaternary sediments of the Himalaya serve as crucial archives for reconstructing past climatic and environmental changes. This study aims to investigate these sediments using a multi-proxy approach, integrating sedimentological, geochemical, and chronological analyses to infer paleoclimatic variations. By examining depositional patterns, weathering intensity, isotopic signatures and sediment provenance, we seek to establish links between sedimentary processes and climatic shifts during the Quaternary period. The research will focus on key sedimentary sequences provided by loess-paleosol, alluvial and glaciogenic deposits, offering insights into monsoonal dynamics, glacial-interglacial cycles, and their impact on landscape evolution.

Particular attention will be given to the Holocene sedimentary deposits of the Swat Valley in northern Pakistan, a region with a rich archaeological and historical record. These deposits provide crucial evidence for understanding past environmental conditions and their influence on human settlement patterns, subsistence strategies, and cultural evolution. The Swat Valley, often referred to as the "Valley of the Buddha" due to its historical significance as a center of early Buddhist civilization, has witnessed continuous human occupation from the Neolithic period to the present day. By analyzing Holocene sedimentary sequences, the project aims to reconstruct past hydrological and climatic conditions that may have influenced settlement dynamics, agricultural practices, and trade routes. Fluctuations in monsoonal intensity and glacial retreat cycles are likely to have played a crucial role in shaping the valley's geomorphology, affecting resource availability and habitability.

To establish a comprehensive paleo environmental framework, this research will utilize sedimentological analyses to characterize depositional environments and weathering patterns. Multi-methodological approach includes geochemical characterization of sediments through ICP-MS, stable isotope and provenance analysis. Provenance analysis can potentially include U-Pb dating, thermochronology and heavy mineral analysis offering insights into sediment transport pathways and source-area evolution. Radiocarbon (C-14) dating of organic-rich sediments and OSL on the detrital component can be used to construct a chronological framework, enabling correlation between sediment deposition and key phases of human occupation in the region.

Swat Valley and the Quaternary deposits

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Funding source:
- DOR Olivetti