The Equilibrium Line Altitude (ELA) in the southern fringe of the Alps during the Last Glacial Maximum

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Reconstructing the paleoclimate of the Last Glacial Maximum (LGM) is one of the major tasks for understanding extreme climate periods of Earth's recent past. Improved proxy records are key for enhancing LGM paleoclimate modeling. The reconstruction of paleoglaciers using the geomorphological survey of glacial landforms and through the application of specific GIS tools (e.g., GLaRe) can yield to the calculation of the Equilibrium Line Altitude (ELA), from which local paleotemperature or palaeoprecipitation can be inferred.

To date, the chronology of the Alpine LGM is largely based on the study of the major end-moraine systems and related megafans, almost completely overlooking possible contributions from smaller glaciated areas. Along the outer southern fringe of the Alps there were a number of LGM glaciers that were isolated from the major Alpine Ice Sheet. The reconstruction of these paleoglaciers in key sectors of the Alps can provide important paleoclimate information, thanks to their potentially higher sensitivity and rapid dynamic response to the variation of climatic forcing. However, their investigation has been attempted only in few, scattered and restricted areas, without the application of a homogeneous approach and comparable methods.

In the present research, the PhD candidate will focus on small paleoglaciers detached from the major Alpine Ice Sheet in the southern side of the Alps, investigating their geomorphic and sedimentary evidence, as well as their chronology. The main goals are: to estimate local and regional ELAs in order to infer paleoclimate variations during the LGM; to use calculated ELAs for better depicting the evolution of the Alpine LGM glacial system.

Methods that will allow to reconstruct the shape of Alpine paleoglaciers and to date their maximum advance during the LGM include the processing and interpretation of high-resolution DTMs and remote sensing images with advanced GIS tools, field survey, and the application of a wide array of dating techniques spanning from radiocarbon, exposure and luminescence dating. The recent developments of these methods have been greatly enhancing the possibility of mapping and assessing reliable ages of LGM glacial landforms that can be used for ELA reconstructions.

The ideal candidate may have a strong geomorphological background and interest in field work, the application of remote sensing and GIS processing tools and dating techniques.

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