

Paleoglacier reconstruction of the central massif of Gredos range during Last Glacial Maximum.

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The accurate reconstruction of paleoglaciers require a well determined extent and morphology of them, one of the main problems is the absence of glacial geomorphic evidences which made possible the delimitation of the ice limits, for this reason physical-based models are useful for ice surface reconstruction in areas where geomorphological information is incomplete.

A paleoglacier reconstruction during its maximum extension is presented for a high mountain area of the western part of the central massif of Gredos range, in the center of Iberian Peninsula, this area is located 30 km west of Almanzor (40° 14' 48" N; 5° 17' 52" W; 2596 m a.s.l.), the highest peak of Iberian Central System (ICS) and covers five gorges: La Nava, Taheña- Honda, La Vega, San Martín and Los Infernos, the first three facing North, San Martín facing Northwest and Los Infernos facing West. Despite the existence of some works analyzing the extension of paleoglaciers in the ICS during its maximum extension, there is still a need to improve the understanding of this zone, to provide a more detailed knowledge of the evolution of the range and to know more in detail the full extent of paleoglaciers in this area.

For delimitate the glaciated area the most distant frontal moraines with a larger geomorphological entity that indicates a great advance or a prolonged stay and stabilization which would presumably correspond with the maximum advance of the glaciers have been mapped, for that, photo interpretation of digital aerial photographs (25 cm resolution) has been done, in some areas where the location or limits of the moraines were not clear 3D images were used, all the work was complemented with detailed field surveys. Once the ice limits have been determined is necessary to estimate the topography of the paleoglaciers, for that purpose a simple steady-state models that assume a perfectly plastic ice rheology have been used, reconstructing the theoretical ice profiles and obtaining the extent of the paleoglaciers (based on the largest moraines of the front and sides of the valley as the main indicator of the LGM), in order to reconstruct the ice surface we calculated longitudinal profiles, with these reconstructed profiles a digital elevation model (DEM) of 5 m pixel size was created and combined with actual topography in order to obtain the ice thickness at the LGM.

The combination of these physical-based models and geomorphological evidences has demonstrated to be a successful method to reconstruct the topography of paleoglaciers, the most distant frontal moraines of the studied area are located at different altitudes depending on the paleoglacier, the lower altitude of a frontal moraine is 1320 meters and the higher is located at 1570 meters, the preliminary results show that during the LGM, the studied paleoglaciers had a maximum ice thickness of 366 meters in La Vega gorge, with a total volume of $28.56 \times 10^8 \text{ m}^3$ and a mean paleoELA of 1940 meters.

References:

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