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## 3D modelling of the maximum ice extent and thickness of the palaeoglacier of Serra do Soajo, Northern Portugal

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During the Pleistocene Glacial Cycles, low mountains of the NW Iberian Peninsula, such as Soajo (1417 m) and Gerês-Xurés (1525 m), were shaped by ice caps (Pérez-Alberti, 2022). The presence of ice bodies and related movements impacted NW Iberian climatology and landscape geomorphology, being the aim of several research and controversies.

In the low-lying altitudes of the mountains in NW of Portugal and Galicia, some conditions favoured the accumulation of snow and the formation of glaciers. Firstly, their geographical position near the Atlantic, which brings cold-humid air masses due to the oceanic sub-polar fronts, and at the same time, their transversal shape as an orographic barrier (N-S) forcing the rapid rise of humid and cold air. Then, the shelter position of the valleys with dominant orientations NE, E and N with low solar radiation values.

The glaciation of the Soajo Mountain was not yet well understood. To decrease this gap was performed detailed fieldwork and desk studies interpretation to identify and map the glaciogenic landforms (e.g., moraine ridges, erratic blocks, polish surfaces, till, cirques, glacier tongues). Fieldwork was made using the API Survey to register the location, descriptions and dimensions of landforms identified in the field and laboratory. Geomorphological interpretations were supported by topographic LiDAR data (70 cm of resolution) and ortho-rectified imagery (max. of 25 cm of resolution).

Based on the published and the new data collected, this study presents a new geomorphological map of the existing glacial evidence for Soajo Mountain. In addition, it shows the three-dimensional modelling results regarding the maximum extent and the thickness of the palaeoglacier.

To accomplish the palaeoglacier reconstruction was drawn the possible Maximum Extent of Glaciation (MEG), the Palaeoglacier Surface and the Glacial Flowline. Additionally, the GlaRe toolbox calculated ice thickness (Pellitero *et al.*, 2016).

The palaeoglacier DEM result highlights a significant glacial activity despite the low altitude of the studied area. Considering the MEG, the area covered by ice was approximately 16 km<sup>2</sup>.

Four areas reveal the W-E asymmetry on ice distribution: the top Ice Field of Lamas de Vez with 181 m of ice thickness feeding by glacial overflow, the Southwestern sector of Ramiscal; the 'U' shaped Vez valley with 170 +/-10 m of ice thickness also powered by the Aveleira glacier; and the Eastern glacial sector, also fed by the Ice Field, favoured the glacial accumulation by valleys sheltered position showing a cascade glacier type with thin glacier tongues between 139 and 32 m of ice thickness. On the mountain's west slope, the isolated glacier tongue reveals a maximum ice thickness of 106 m.

### **References:**

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