



Quartz grain surface analysis for paleoenvironmental reconstruction in Western Iberia mountain environments (Serra da Estrela, Portugal).

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This work deals with the genesis and paleoenvironmental significance of relict slope deposits in Serra da Estrela, Central Portugal and is part of a wider sedimentological and dating approach. The aim is to identify what microstructures indicate frost weathering, which mechanisms are responsible for their development and the effectiveness of frost weathering across an altitudinal profile. Our goals are to contribute to the better understanding of the morphogenetical significance of the different types of slope deposits, clarifying the role of cold environment processes and develop a chronological framework for the Late Quaternary evolution of the slope environment of the mountains of Western Iberia.

Quartz grains, 0.5 mm in diameter, were collected from samples from stratified, head and debris-flow deposits. Cailleux (1942) analysis, with modifications from Gozdzik (1980), was performed allowing assessing frosting and rounding, as well as the effects of later frost weathering in vertical profiles from slope deposits. Grains were also analysed using a scanning electron microscope (SEM) following Mahaney (2002). The effects of frost weathering comprise several microstructures such as breakage blocks, conchoidal fractures and fresh surfaces. Breakage blocks microstructures are the most common. Two types of frost weathering were distinguished: weathering of the P type is mainly initiated on convex fragments of grains as the result of ice segregation, and F type is linked to the volumetric expansion of ice and usually observed within concave linear microstructures.

The frost action index (FAI) was estimated from the rate of microstructures from frost weathering. FAI varies between 0 and 3. The values of the sediments from the slope deposits vary between 1.2 and 2.05.

This approach was for the first time applied on slope deposits from Serra da Estrela. There is a clear correlation between deposits in weathering type. Samples that display intensive physical weathering in the Cailleux analysis, are linked to weathering of the P type (effect of grains moving relative to each other) and also have the highest value of frost-weathering intensity.

We interpret these samples taken from paleosols and openwork gravels layers to be related to transport by solifluction processes.