Assessing the applicability of ESR dating of quartz grains from karstic infilling sediments

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Similarly to Optically Stimulated Luminescence (OSL) dating, the ESR signal measured in quartz may be reset by optical bleaching, allowing thus to date the moment when the sediment has been last exposed to sunlight. Actually, there is quite a wide range of ESR dating studies of optically bleached quartz grains from fluvial, eolian and littoral context, but so far the specific application to karstic environment has never been reported.

Taken into account that many prehistoric sites have been discovered in caves, their study provides an important source of evidence about the first human settlement in Europe. In that regard, ESR dating of quartz extracted from cave sediments might provide some useful chronological information, especially in the case of azoic, not volcanic or too old deposits that preclude the use of other numerical methods such as luminescence or Ar/Ar.

The present study reports ESR dating results of quartz grains from the Gran Dolina site in Atapuerca (Spain). The sedimentary infilling of Gran Dolina represents one of the most complete Pleistocene sequences with a thickness of about 18m divided into 11 lithostratigraphic units including several archaeological levels. In particular, the upper part of the sequence (from TD6 to TD10 levels) has been extensively dated in the recent years by means of various techniques such as combined ESR/U-series, luminescence (TL, IRSL, TT-OSL), U-series and magnetostratigraphy. Consequently, the data set available is an excellent independent age control to evaluate the consistency of the ESR age estimates that have been obtained. This comparison will provide a good overview of the real potential of this application in cave environment.