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# Paleo-climate reconstruction of the Gran Dolina site (Sierra de Atapuerca, Spain) using Hydrogen stable isotope of authigenic clay minerals.

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## Résumé

Gran Dolina is a key site to understand Early and Middle Pleistocene human evolution in Europe. This site is a cave that belongs to the second level of the Sierra de Atapuerca multi-level karst system and shows a 25 m thick Early and Middle Pleistocene sedimentary infilling. It is divided in twelve lithostratigraphic units, named from bottom to top TD1 to TD11 (Trinchera Dolina), including the TD8-9 unit (Campaña et al. 2017).

The stable isotopes are been widely studied in several materials for palaeoenvironmental research (Horbe 2011; Sheldon & Tabor 2009). The isotopic composition of hydrogen in authigenic minerals is a useful tool for reconstructing past paleo-environments. In this work, the  $\delta D$  record from authigenic clay minerals was obtained with the aim of reconstructing the paleo-climate of Gran Dolina site.

45 samples were taken from Gran Dolina site, from TD1 to TD11 litho-stratigraphic units. Each sample was treated to remove carbonates and organic matter. The samples were measured by a ThermoFinnigan thermal conversion elemental analyzer (TC-EA) which is linked to a ThermoFinnigan Delta V + isotope ratio mass spectrometer (IRMS), following the procedures described by Sharp et al. (2001) and Vandavelde et al. (2013).

The measurement of stable isotopes in clay minerals is not exempt from problems. High variations between measurements taken in different days have been reported, although a similar pattern was observed. The data obtained shows that the  $\delta D$  values are higher in autochthonous sedimentary facies (TD1 and TD2) than in the rest of Gran Dolina. Among the allochthonous sediments, it is to be noticed the very negative  $\delta D$  values from the top of

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\*Intervenant

TD4 and in TD6.2, the sub-unit where hominin remains were found (Bermúdez de Castro et al. 2008). Also, a progressive increase in  $\delta D$  value is observed in TD10 unit. These  $\delta D$  variations can be related to climate changes.

The hydrogen isotope composition in authigenic clay minerals is a powerful proxy to reconstruct paleo-climate changes, although the actual methodology has some problems. Further investigations are necessary to clarify the data obtained in this study.

**Mots-Clés:** Clay minerals, Hydrogen isotope, Gran Dolina, Early and Middle Pleistocene, Sierra de Atapuerca.