

A multivariate data analysis approach to understand the climate-change impacts by using a speleothem from Southern Iberian Peninsula

FERNANDO JIMENEZ-BARREDO, DR.¹, DR. ALTUG HASOZBEK, PHD¹, DAVID CASTRO-REIGIA², FRANCISCO J. JIMENEZ-ESPEJO³, MARIA D. SIMÓN-VALLEJO⁴ AND MIGUEL CORTÉS-SÁNCHEZ⁴

¹Consortio CENIEH

²Chemistry Department. Science Faculty. Universidad de Burgos

³Consejo Superior de Investigaciones Científicas

⁴Department of Prehistory and Archaeology. Universidad de Sevilla

Presenting Author: fernando.jimenez@cenieh.es

Speleothems are a valuable source of paleo-records due to their inorganic element content and profile. The elemental variations in speleothems can be a supplementary input to interpret the related climate proxies. Element ratios such as Ba/Ca and Mg/Ca are often used as indicators of climate conditions over time. This study presents a record of 12 selected elements from a U-Th dated speleothem from the South Iberian Peninsula using ICP-OES and HR ICP-MS analysis of 144 samples. By investigating element ratios and correlations in different zones of the stalagmite, Principal Component Analysis, Correlation Analysis, Kruskal-Wallis and Bonferroni tests were applied to elucidate patterns and establish possible relationships. Our results indicate that the main components identified by PCA analysis are related to hydric conditions and detrital presence in the samples. The Kruskal-Wallis and Bonferroni tests reveal the extent to which different zones of the stalagmite differ in terms of elemental composition and identify similar patterns related to climate conditions. All p-values for every element were < 0.05 . These preliminary results suggest that the climate conditions have likely changed over time. Future research will involve adding more variables (elements) and increasing the spatial resolution of the sampling.