Temporal variations of environmental parameters in two caves used as natural observatories in north of Spain

M.J. TURRERO[1*], A. GARRALÓN[1], L. SÁNCHEZ[1], P. GÓMEZ[1], A.I. ORTEGA[2] AND J. MARTÍN-CHIVELET[3,4]

[1]Research Centre for Energy, Environment and Technology/CIEMAT, Avda. Complutense 40, Madrid, Spain (*correspondence: mj.turrero@ciemat.es; antonio.garralon@ciemat.es; lorenzo.sanchez@ciemat.es; paloma.gomez@ciemat.es)

[2]National Research Centre on Human Evolution/CENIEH, Paseo Sierra de Atapuerca 3, Burgos, Spain (anaisabel.ortega@cenieh.es)

[3]Fac. Geological Science, Complutense University, Madrid, Spain (j.m.chivelet@geo.ucm.es)

[4]Institute of Geociences (CSIC, UCM), Madrid, Spain

Kaite and Cueva Mayor caves in northern Spain are being monitored for callibrating paleoclimate studies based in speleothems, and used as natural observatories to control key environmental variables of the karst systems. These variables provide insights to inorganic geochemical processes occurring at present time in the system, and to factors that may perturbate the physicochemical equilibrium of the karst.

This study is based on a continuous seasonal multi-parametric monitoring in both caves, which has yielded a record of several years of stable isotopes in rainfall, drip water and present calcite, as well as CO_2 and $\delta^{13}C$-CO_2 signals in the atmosphere and cave air.

CO_2 concentration in the air outside the cave is 438 ± 60 ppm in Kaite and 437 ± 64 ppm in Cueva Mayor. $\delta^{13}C$-CO_2 signal is -13 ± 3 ‰ in Kaite and -14 ± 4 ‰ in Cueva Mayor. CO_2 concentration in the air inside the Kaite cave ranges from 500 ppm in the area closest to the entrance to 1300 ppm towards the end part of the cave where main monitoring system is installed. $\delta^{13}C$-CO_2 signal varies in the same way fro -18 to -30 ‰. In Cueva Mayor, variations range from 800 ppm to 25000 ppm in the smaller and closest to the end galleries and $\delta^{13}C$-CO_2 signal varies from -20 to-30 ‰.

Both caves acts as sinks of CO_2 which accumulates in areas where very scarce ventilation exists. The increase of CO_2 correlates with a $\delta^{13}C$-CO_2 decrease. Both present-day growing of calcite and CO_2 concentration inside the cave show seasonal cycles and show a robust inverse correlation.

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