Trace element indicators of paleoclimate in the last 1000 years in Southern Spain

C.BOUSONO[1], I VADILLO[2], J. PISONERO[3], A. MORENO[4], M.IGLESIAS[3], H. CHENG[5], R. LAWRENCE EDWARDS[6], H. STOLL[7]

[1] Oviedo, Department of geology, Oviedo-Asturias, Spain (celiacampa@geol.uniovi.es)
[2] Málaga, Ecology and geology department, Málaga-Andalucía, Spain (vadillo@uma.es)
[3] Oviedo, Physics department, Oviedo-Asturias, Spain (pisonerojorge@uniovi.es), (miglesias@geol.uniovi.es)
[4] Dpt. of Geo-environmental Processes and Global Change CSIC (amoreno@ipe.csic.es)
[5] Xi'an Jiaotong, Institute of Global Environmental Change, Xi'an, China (cheng021@xjtu.edu.cn)
[6] University of Minnesota, Dpt. of Earth Sciences, Minneapolis, MN, United States (edwar001@umn.edu)
[7] ETH, Dpt. of earth sciences, Zürich, Switzerland (heather.stoll@erdw.ethz.ch)

A large geochemestry were analyzed in a stalagmite from Ardales Cave (SW-Spain) to assess paleoclimate. The stalagmite was actively growing in 2007 upon collection and U-Th dates suggest that began forming 1000 years ago. Large variations in Mg/Ca ratios occur on both seasonal and multidecadal timescales. We infer that in dry periods there would be a matrix flow drip component that has a long residence period with the dolomite hostrock and very high values of Mg/Ca, in wet events would exist a fissure flow drip that would dissolve preferentially the calcite or it could also be a very incongruent solution. This is supported by the contrast of high Mg/Ca in modern drip waters in period of very low flow compared to low Mg/Ca in drip waters during higher infiltration and more rapid drip. Dripwater contrast reflects not only PCP but the residence time of matrix flow in the dolomitic host rock. To explain the range of Mg/Ca values in the stalagmite, slightly larger variations dripwater Mg/Ca, or a similar range of dripwater Mg/Ca and a small range in partitioning coefficient, would be required.

Other trace elements in the stalagmite show influences of growth rate and colloidal transport. Where growth is fast, Sr correlates inversely with Mg while P correlates positively with S and Y. We have interpreted Sr as influenced by growth rate, P and Y indicate infiltration by colloids, and P and S would indicate moments of higher or lower oversaturation of the drop. The correlation among elements differs in slower growing sections.