



The use of water marks mapping to understand flood overflow events inside karstic cavities: Cueva Fría and Cueva Rosa (Asturias, NW Spain)

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Several karst systems in Asturias (NW Spain) present evidence of fluvial deposits cemented in speleothems that may provide good chronology of past flood events inside the caves. This flood record is under research in two karstic caves of this region, Cueva Fría and Cueva Rosa, which have in common the presence of a perennial stream inside the cave and a low gradient of the cave passage. Immediately after a flood overflow event, water marks, foam and detritus are visible at different heights on the cave walls and correspond to heights of bottlenecks in overflow drainage through the cave passage. Flood events also deposit sand and gravel on terraces on the cave wall and move large volumes of sand in the cave bed. We have noted that detrital particles (like sand or silt particles) are preserved as inclusions inside the stalagmites and that their abundance inside coeval stalagmites decreases as altitude and distance from the perennial stream increase, supporting its fluvial affinity. However, not all the stalagmites that contain detrital particles are located close to the perennial streams.

In this work, we have mapped the water marks preserved in the cave walls to reconstruct water levels associated to flood overflow events of different magnitude. We have found that water mark correlation along the cave passage is very useful to define the hydrological behaviour and flood model of the cave during these extreme events. The water mark mapping and correlation have been also useful to prove that during periods of high rainfall, the movement of the sand-bars inside the cave can cover partially or completely active stalagmites, facilitating the cementation process and trapping abundant detrital material inside the stalagmite carbonate. ^{14}C and U/Th dating of the stalagmites can provide a chronology for the detrital rich layers, so that the abundance of fluvial material in the stalagmites can reveal periods of enhanced vs. reduced flooding in the cave over the past several thousand years (Holocene).