

EGU24-17584, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-17584>

EGU General Assembly 2024

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Classification of Phreatic Overgrowths on Speleothems (POS) from the Mallorca littoral caves

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Phreatic Overgrowth on Speleothems (POS) are a specific type of speleothem that growth at the surface of the brackish lakes in littoral caves. These lakes are direct or indirectly related to the height of the sea level, therefore, the POS precipitates at the height of the sea in the moment of their growth. This condition makes the POS a perfect marker of past sea level.

These speleothems are very unusual and have only been found in few caves around the world. Up to the present, most of these deposits have been located on the island of Mallorca, where the largest collection of this type of speleothems have been studied.

This study presents a complete classification of POS in hand-size scale and in thin section. The first one is based on the internal and external morphology of the POS and its acquired shape depending on the substrate on which these precipitates grow. The second one, related to the thin section study, allows to recognize a variety of crystalline fabrics: needle-like aragonite crystals (An), fibrous fascicular optic calcite (Ffo), columnar fascicular optic calcite (Cfo), columnar calcite (C), mosaic calcite (Mc), mosaic calcite with aragonite needles (MCan) and micrite (M) and microsparite calcite fabric (Ms). , Some of these fabrics were previously described in other speleothems (as stalactites or stalagmites) and others are new, not previously described in speleothems.

All this information shows several important ideas: 1) most of the POS precipitate around previous stalactite-type vadose speleothem; 2) aragonite POS are mainly globular and fan shaped in their external and internal morphology, respectively, and aragonite mineralogy only appears in needle-like crystal fabric; 3) calcite POS are related to branched internal and external morphology and present more variability in their crystal fabric, being the mosaic type the most common. The data obtained have been used to identify some relationships between the precipitation conditions of POS and the features of these precipitates. This classification and the conclusions of the precipitation conditions demonstrate the importance of POS as a proxy. Moreover, this study helps to understand the precipitation process of POS and can be implemented and reviewed in POS deposits of other parts of the world.