# SULFIDIC GROUND-WATER CHEMISTRY IN THE FRASASSI CAVES, ITALY

**Author(s):** Galdenzi, S (Galdenzi, Sandro); Cocchioni, M (Cocchioni, Mario)[1]; Morichetti, L (Morichetti, Luciana)[1]; Amici, V (Amici, Valeria)[1]; Scuri, S (Scuri, Stefania)[1]

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**Abstract:** A year-long study of the sulfidic aquifer in the Frasassi caves (central Italy) employed chemical analysis of the water and measurements of its level, as well as assessments of the concentration of H(2)S, CO(2), and O(2) in the cave air. Bicarbonate water seepage derives from diffuse infiltration of meteoric water into the karst surface, and contributes to sulfidic ground-water dilution, with a percentage that varies between 30% and 60% during the year. Even less diluted sulfidic ground water was found in a localized area of the cave between Lago Verde and nearby springs. This water rises from a deeper phreatic zone, and its chemistry changes only slightly with the seasons with a contribution of seepage water that does not exceed 20%. In order to understand how the H(2)S oxidation, which is considered the main cave forming process, is influenced by the seasonal changes in the cave hydrology, the sulfide/total sulfur ratio was related to ground-water dilution and air composition. The data Suggest that in the upper phreatic zone, limestone corrosion due to H(2)S oxidation is prominent in the wet season because of the high recharge of O(2)-rich seepage water, while in the dry season, the H(2)S content increases, but the extent of oxidation is lower. In the cave atmosphere, the low H(2)S content in ground water during the wet season inhibits the release of this gas, but the H(2)S concentration increases ill the dry season, favoring its oxidation in the air and the replacement of limestone with gypsum on the cave walls.