

Geochemistry of freshwater stromatolithes reveals spatial and temporal variability of groundwater chemistry in the semi-arid Cuatro Ciénegas basin, NE Mexico.

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The Cuatro Ciénegas basin (CCB) is an intra montane basin located within the Chihuahuan desert of north-eastern Mexico. The CCB is part of the Coahuila Platform, which mainly consists of Lower Cretaceous shallow water carbonate and evaporitic rocks deformed during the late Cretaceous-early Paleocene Laramide orogeny. In the CCB, faults allow groundwater to ascent from the highly permeable carbonate strata of the Aurora and Cupido formation to the surface, which gathers in over 300 small pools (pozas) in an otherwise exceedingly dry area. Previous studies showed a highly variable hydrogeochemistry of the ascended groundwater due to mixing of highly evolved deep waters from the Cupido-Aurora karst aquifer, and locally recharged young groundwater originating from the adjacent mountain ranges. The water chemistry is largely effected by evaporation. Due to the geographic isolation of the ecosystem, over 70 endemic species are today identified in the CCB, which is also one of the few places on Earth with recent freshwater stromatolithes. Paleostromatolithes and tufa are preserved in lacustrine terraces near the Poza Tierra Blanca (PTB) and indicate times of higher groundwater discharge. In the uppermost terrace of PTB, 7.24 ka [1] to 10.55 ka [2] old human footprints were found, which are thus among the oldest in the Americas.

This study aims to examine the temporal and spatial evolution of the groundwater discharge in the CCB. For this purpose, the lacustrine terraces of the PTB are mapped by photogrammetry, age dated and analyzed for its geochemistry. Water and sediment samples are removed from PTB to examine the recent relation between sedimentary and ambient water geochemistry. The data obtained provide new important insights into the temporal and spatial variability of the hydrogeochemistry in the CCB and leads to a better understanding of the paleoenvironmental conditions.

[1] Felstead *et al.* (2014) *J. Archaeol. Sci* **42**, 250-259. [2] González González *et al.* (2011) *IV Simposio Internacional El Hombre Temprano en América*, 51-57.