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Devils Hole, Nevada: revisited

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Among the ever increasing number of caves visited and studied by paleoclimate scientists around the globe one site is special for a number of reasons. First described in the literature in 1988, Devils Hole is a geometrically simple cave developed along an extensional fracture in the Amargosa Desert of SW Nevada. The deeper portion of this cavity is phreatic and part of a regional aquifer whose lowest discharge point is Death Valley. Landmark studies by Ike Winograd′s team examined thick calcite crusts present on the walls of this and a neighboring cave (termed Devils Hole #2) and retrieved one of the most remarkable (and thought-provoking) isotope proxy records covering the last half million of years (1992). More recently, Coplen (2007) scrutinized the stable isotope systematics at Devils Hole. His results suggest that this setting represents a rare example of inorganic calcite precipitation essentially at isotopic equilibrium.
We obtained permission from the Death Valley National Park Service to study and sample Devils Hole #2. While previous studies were based on samples from the phreatic zone we cored the calcite crust just above the groundwater table in an attempt to extend the original record further back in time and to obtain direct paleowater isotope data.
Stable isotope data obtained along one core show a very high degree of similarity with the published DH11 core and a first set of U-series dates confirms the stratigraphy down to 476 ka. Older calcite also shows glacial-interglacial oscillations in both carbon and oxygen isotopes. A tentative correlation with Antarctic and deep-sea isotope records suggests that the lower part of the calcite is ca. 800 ka old (i.e. MIS 20). The cores show petrographic evidence of falling groundwater levels during MIS 9, 7 and 5e, but there are no indications of major hiati. Interestingly, growth at our drill location ended shortly after 20 ka BP, i.e. much later than at the subaqueous site in Devils Hole proper where DH11 was retrieved (ca. 60 ka BP). This observation is consistent with Winograd et al. (2006) who extended the original DH11 stratigraphy up to the mid-Holocene using additional samples drilled in the phreatic part of Devils Hole #2.

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