

Evidence of Pleistocene submarine discharges in the Aguadulce cliffs (Almería, SE Spain)

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ABSTRACT

Submarine Groundwater Discharge (SGD) can be defined as the flow of water through continental margins from the seabed into the ocean. In the discharge area, the mixture of continental freshwater and marine saltwater, with very different properties, favours that a wide variety of physical and chemical processes occurs. Although the studies examining these processes in current mixing zones are common, there are few studies investigating the influence of these processes in the fossil record. The proposed criteria for recognizing these mixing zones in the sedimentary record are (Baceta et al., 2001): (1) the existence of evidences that materials have been under the phreatic surface, (2) development of porosity by dissolution, (3) formation of sulfides or oxides precipitates as indicators of different redox conditions, and (4) evidence of an alternation between dissolution and precipitation of carbonates. The town of Aguadulce (Almería, SE Spain), is named Aguadulce - freshwater in Spanish – due to the historical submarine groundwater discharges in this area, which disappeared due to overexploitation of the aquifer from the 60s. In this work, a cliff located just above those ancient springs is studied. The observations have been made in a band at the height of 30 - 40 m above sea level, in which a strong rock dissolution that can overcome 60 % is observed. Dissolution surfaces are impregnated by manganese oxides, on which grow precipitates of calcite, dolomite and finally, aragonite crystals, indicators of changes in the redox conditions and the saturation index of carbonates over time. All this karst development is beneath a Pleistocene marine terrace located 40 m a.s.l., and it is interpreted as dissolution reactions and mineral precipitation occurred in a zone of freshwater-seawater mixing during the Pleistocene.

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