

# A Field Analog of CO<sub>2</sub>-Closed Conditions in a Karstified Carbonate Aquifer (Nerja Cave Experimental Site, South Spain)

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**Abstract** We present new data that illustrate the hydrochemical evolution of groundwater along a flow line in the Triassic marbles around the Nerja Cave, South Spain. Water dissolves calcite and dolomite, and then CaSO<sub>4</sub>. The environment is locally rich in CO<sub>2</sub> (up to near 60,000 ppmv) and consequently the water increases significantly its content in Ca<sup>2+</sup>, Mg<sup>2+</sup>, HCO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>2-</sup> along the flow, with EC values between 500 and 900 μS/cm. The pH values are typically in the 7–8 range, and the equilibrium PCO<sub>2</sub> of the water varies between 10<sup>-1.5</sup> and 10<sup>-2.5</sup> atm. In the considered flow line there is a relatively deep borehole (S2: 380 m; 280 m saturated) that shows pH values around 10 and equilibrium PCO<sub>2</sub> of 10<sup>-6</sup> atm, with EC values generally in the 150–200 μS/cm range. Most of its solutes derive from rainwater concentration, together with the dissolution of carbonate minerals in a system closed to CO<sub>2</sub>. For this reason we consider S2 to be

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