The Alhama-Jaraba system as a natural analogue for CO_2-geological sequestration

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Geological disposal and storage of carbon dioxide is at present considered to be one of the main strategies to mitigate the impact of the emissions of this gas on global warming. Deep porous rock formations saturated with brackish or saline solutions are generally regarded as the most effective geological reservoirs for the long-term storage of carbon (Metz *et al.*, [1] and references therein).

Although valuable information on the hydrogeochemical processes expected throughout the interactions between the CO_2-enriched solutions and the hosting rocks can be obtained from modeling exercises and laboratory experiments, the only direct source of information about the long-term behavior of geological storages for CO_2 in deep aquifers are natural analogues.

In this work, a classical and simple geochemical methodology combining the results from ion-ion plots, speciation-solubility calculations, mass-balance and reaction-path calculations is successfully applied to the study of the features and hydrogeochemical processes determining the evolution of a Spanish thermal complex (the Alhama-Jaraba system) which can be considered as a natural analogue for a deep geological carbon storage placed in carbonate rocks. The geological structure and general hydrogeochemical behavior of this system provides with a good opportunity to explore the long-term water-rock interactions expected in carbon storage sites.

All the processes identified in the Alhama-Jaraba thermal system are to be very relevant for the long-term expected evolution of a carbon storage in deep carbonate aquifers. As shown in this study, the aplication of classical geochemical tools provide with an excelent startpoint for understanding the behavior of prospective storage systems and for optimizing the design of monitoring measures.

[1] Metz *et al.* (eds) (2005) Carbon Dioxide Capture and Storage. *Special Report of the Intergovernmental Pannel on Climate Change*.Cambridge University Press, UK.431 pp.

Dust inputs to the (sub-)tropical North Atlantic Ocean; Influence on ocean biogeochemistry

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The (sub)-tropical North Atlantic receives high dust inputs, originating in the Sahara. This presentation will discuss findings from the January-February 2008 UK-SOLAS cruise. The cruise was undertaken in winter, when dust inputs to the ocean are enhanced due to strong northeasterly tradewinds bringing dust from NW Africa and a more southerly position of the intertropical convergence zone (ca. 5-10ºN). The nutrient concentrations in the study region were at nanomolar levels (nitrate 3-260 nM; phosphate 2-99 nM). Two major dust events were encountered during the cruise, resulting in an enhanced supply of Fe, Al, P and N to the surface waters.

Enhanced surface water dissolved Al (up to 50 nM) and Fe (up to 0.37 nM) concentrations were observed in regions subjected to enhanced dust inputs. The dust inputs did not yield immediate important changes in the bacterial community structure or their productivity. The dust inputs however had a strong influence on nitrogen fixation (diazotrophy), with the oligotrophic waters of the study regions showing enhanced levels of diazotrophy. The diazotrophs have high iron requirements which are met by the supply of atmospheric iron.