Experimental study on karst formation: role of flow, chemical stress and rock hetrogeneities

Linda Luquot*[1]

[1]Geosciences Montpellier – Université de Montpellier, Centre National de la Recherche Scientifique – France

Résumé

The formation of underground cavities, called karsts, resulting from carbonate rock dissolution, is at stake in many environmental and societal issues, notably through risk management and the administration and quality of drinking water resources. Facing natural environment complexity, we propose a laboratory study combining hydro-chemical monitoring, 3D imaging, and non-invasive observation of electrical properties, showing the benefits of geoelectrical monitoring to map karst formation. The present study predominantly focuses on the differences in dissolution patterns depending on the mineralogy and on the structure of different carbonate rock types, as well as on the experimental hydrodynamic conditions. To this end, three distinct carbonate rock types are selected for their differences in structure and mineralogy: chalk, crinoidal limestone and dolomite. Acid injections are conducted on samples cored from these three rock types at atmospheric conditions. With the same acidic fluid, four Péclet conditions, associated to different flow rates depending on the rock type, were applied to the samples. Samples are characterized with laboratory and images methods before and after these experiments, during which chemical, hydraulic and electric properties are recorded. The rock properties evolution, associated with the initial structural and mineral differences between the three rock types and the experimental conditions, is analyzed in order to determine the influence of each of these parameters on the dissolution patterns induced by the acid injection.

*Intervenant