Geophysical Research Abstracts, Vol. 8, 08160, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08160


# Effect of desaturation and heating on the low-frequency electrical properties of Tournemire argilites

**A. Ghorbani** (1), P. Cosenza (1), N. Florsch (1), A. Revil (2)

(1) UMR 7619 Sisyphe, Université Pierre et Marie Cure-Paris6, France, (2) Department of Hydrogeophysics and Porous Media, CNRS-CEREGE, France

Argilites are desirable formations for geologic containment of long-term and exothermic radioactive wastes. In this context, the main objective of this study is to examine the ability of Spectral Induced Polarization (SIP) to monitor both the water content changes and the microcracking induced by heating.

Four samples were taken from the underground facility of the French Institute for Radioprotection and Nuclear Safety (IRSN), located at Tournemire. Two samples have been drilled perpendicular to the bedding planes and the others parallel to the bedding planes. These samples in a near-saturated state were subjected to two desiccation path: (a) desaturation phase; the samples were dried at ambient temperature conditions and (b) heating phase; the same samples were heated by four temperatures (70 to 105$^{\circ}$C). The low-frequency complex resistivity ($10^{-1}$-$10^{4}$ Hz) was monitored by a four-electrodes device constituted by Ag-AgCl medical electrodes.

The results show that the resistivity amplitude was extremely sensitive to water content changes: the amplitude at the end of the desaturation phase has been multiplied by 3 to 5. During the heating phase, it increased from the initial state more than two orders of magnitude. The Frequency Effect, pFE, was lowly sensitive to water content changes during the desaturation stage while it increased two orders of magnitude during the heating phase. This result confirms that spectral signature is extremely sensitive to textural changes (induced microcracking) that occurred during heating. Moreover, the data corroborate the strong anisotropy of this material.

The results of quantitative modelling show that Cole-Cole model can not be used to fit the experimental data obtained in the heating phase: a generalized formulation of this model is required and applied.