# Coupled measurements of elastic, electrical and thermal properties for monitoring water content and textural changes in clay-rocks

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**Abstract:** Among the critical issues related to the long term safety assessment of radioactive waste disposal, the study of the so-called Excavation Damaged Zone (EDZ) is of a particular importance. Seismics, microacoustics, DC-resistivity method and the complex resistivity method are the most promising methods in clay-rocks.

A laboratory investigation has been undertaken from samples taken in Bure underground research laboratory (in the Paris Basin from the argillo-calcareous formations of the Callovo-Oxfordian), which is under study by the Agence Nationale de Gestion des Déchets Radioactifs (ANDRA) to assessing the feasibility of a deep repository for radioactive waste. Elastic properties (obtained from the P and S elastic waves velocity), complex electric conductivity at low frequency (91 mHz-12kHz) and thermal conductivity on the same core sample are measured during the following desiccation path: (a) in a first step (desaturation phase); the sample is dried at ambient temperature;(b) in a second step (heating phase), the same sample is heated by four temperature levels by an oven: 65, 75, 85, 95˚C and 105˚C.

The experimental results confirm that all the measured petrophysical properties are sensitive to the submitted hygro-thermal loading and are analysed for the in situ monitoring of water content in clay-rocks. Moreover, the interest in performing coupled

measurements on the same core is shown and discussed.