

Evaluation of micro-fabric network within marine sediments based on a rock magnetic technique and its tectonic implications

*Yasuto Itoh¹, Osamu Takano², Machiko Tamaki³

1.Department of Physical Science, Graduate School of Science, Osaka Prefecture University, 2.Japan Petroleum Exploration Co., Ltd., 3.Japan Oil Engineering Co., Ltd.

Magnetic techniques that use anisotropy of magnetic susceptibility (AMS) act as a proxy of preferred permeable orientation in basin-filling sediments, when it is applied on samples impregnated with a finely-ground magnetic suspension. The unique method for quantifying heterogeneity in rocks is reviewed and its value for reconstruction of the preferred direction of pore fluid flow is reassessed critically. The authors also present results of their experiments, which dealt with secondary fracture networks developed in tight sandstones burying a foreland basin on an arc-arc collision zone in central Hokkaido. Micro-focus three-dimensional density imaging of test pieces of the Miocene Kawabata Formation has shown a substantial variation in pore fabric reflecting inhomogeneous impregnation of magnetic fluid within rocks. Directional analysis of AMS ellipsoid implies tectonic control on rupture development under strong trans-compressive regime.

Keywords: permeability, magnetic susceptibility, anisotropy, sedimentary basin, fracture, tectonics