[JJ] Evening Poster | H (Human Geosciences) | H-CG Complex & General

[H-CG27]Nuclear Energy and Geoscience

convener:Eiji Sasao(Tono Geoscience Center, Japan Atomic Energy Agency), Tsutomu Sato(Faculty of Engineering Hokkaido University), Ryuta Hataya(一般財団法人　電力中央研究所)
Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Handling of geological hazard assessments represent a major environmental concern in the modern society due to constructing nuclear facilities and their radioactive wastes, and also related to the management of contaminated biosphere after nuclear disasters. The session rational is to provide a forum to deal with various aspects of scientific and engineering aspects of nuclear power. The session in this year focuses on radioactive waste disposal and covers not only scientific aspect such as characterization of geological environment but also engineering aspects such as microbe-nuclide, mineral-water, and cement-water interactions. In addition to this, themes on seismic hazards at nuclear facilities, environmental behavior of radionuclides emitted from disabled nuclear plants, and volume reduction and reuse of cesium contaminated soils are welcomed.

[HCG27-P04]Assessment of hydraulic connectivity of fractures in mudstones by single-borehole investigations

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Assessing the hydraulic connectivity of fractures by single-borehole investigations is crucial to radioactive waste disposal, but is still a challenge as such connectivity is difficult to measure directly. This study presents geological, hydrological, hydrochemical, and rock mechanical data for three faulted/fractured mudstones (the Koetoi, Wakkanai, and Palfris formations) and proposes a new methodology for assessing the hydraulic connectivity of fractures. The methodology consists of three steps: a) dividing the formation into two domains with a ductility index (DI) of >2 and <2 (DI is defined as the effective mean stress normalized to the tensile strength of intact rock), b) estimating the hydraulic connectivity of fractures by analyzing pressure change obtained by packer tests and geological interpretation, and c) verifying the estimation using pore pressure and water chemistry/geochemistry. The first step is necessary because the failure mode of damage-zone fractures in fault zones can differ between the DI >2 and DI <2 domains, which may lead to significant differences in the hydraulic connectivity of fractures. During the second step, potential domains in which the hydraulic connectivity of fractures is limited are identified where upward trends, characterized by slopes of ~0.5–1.0, are observed during the middle to late period of elapsed time on log–log plots of semi-log pressure derivatives. Although the third step can be performed in various ways, this study employs the presence of pressure anomalies and the absence of young external water. Analyses of the three formations demonstrate the applicability and reliability of the proposed methodology.