Development of 3D integrated fracture and geologic modeling of rock body to clarify regional hydraulic structure

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To evaluate the safety of geological disposal of radioactive waste, it is important to understand the regional hydraulic structure in underground. The permeability of crystalline rock is dominated by the facture structure. However, when the stability on the very long-time scale is considered, the properties of the rock matrix and the alteration part cannot be ignored. This study proposes a three-dimensional hydraulic structure model which integrated multiple geological information. We selected Mizunami area in Gifu Prefecture as the case study site. Many geological investigations were carried out in this site by JAEA to understand the deep underground properties. Using these data, Kubo et al. (2013, 2019) were proposed the method for 3D fracture modeling and hydraulic parameters estimation. In this presentation, additional measurement data and statistical analysis results are added to them, and a new composite geological model which integrates them is proposed. For fracture modeling, we apply GEOFRAC which is 3D fracture simulation method using geostatistical techniques. The source of GEOFRAC model is fracture observation data from deep borehole investigations. By relating the GEOFRAC model with hydraulic test data, the hydrogeological structure is estimated in wide area. Statistical analysis results and measured data using a permeameter interpolate this correlation. Moreover, the observation result of the boring core indicated the possibility in which the element which controls the permeability apart from the fracture structure existed.

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