

地中貯留されたCO₂の地化学モニタリングと貯留層の地化学特性評価手法について Geochemical monitoring of CO₂ underground and an evaluation technique of geochemical features

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Mechanism of carbon dioxide (CO₂) geological storage is similar to accumulation of oil and natural gas deep underground (gas trapping). Additionally CO₂ dissolves into water in the reservoir (solubility trapping). A part of dissolved CO₂ precipitates as carbonate minerals (mineral trapping). Geochemical trapping such as solubility and mineral trapping prevent upward migration of CO₂ by eliminating its buoyancy. Amounts of solubility and mineral trapping strongly depend on storage sites. Timing of mineral trapping is still unclear. In this study, we present an evaluation technique of geochemical features at a CO₂ geological storage site, the Nagaoka site for an example. We collected core and water samples from the injection well before CO₂ injection. After cessation of CO₂ injection, formation water was collected twice from the observation well by Cased-hole Dynamics Tester (CHDT, Schlumberger). Monitoring results showed that solubility trapping occurred around CO₂ bearing layer and a condition of CaCO₃ precipitation was prepared below the layer. Laboratory experiments indicated that Ca containing silicate such as plagioclase provide Ca to precipitate with dissolved CO₂. A preliminary result of reactive transport modeling showed solubility trapping was the dominant mechanism for CO₂ trapping and mineral trapping increased with time at the Nagaoka site. Details of an evaluation technique of geochemical features will be presented at the session.