[JJ] Evening Poster | H (Human Geosciences) | H-SC Social Earth Sciences & Civil/Urban System Sciences

[H-SC05]CCUS (Carbon Dioxide Capture, Utilization, and Storage) for Climate Mitigation

convener:Masao Sorai(Institute for Geo-Resources and Environment, National Institute of Advanced Industrial Science and Technology), Ziqiu Xue(Research Institute of Innovative Tech for the Earth), Masaatsu Aichi(東京大学大学院新領域創成科学研究科)

Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

The prevention of the global warming, which is the urgent challenge facing the world, requires the full-out efforts of science and technology. This session focuses on the CCUS (Carbon Dioxide Capture, Utilization, and Storage) as one of the useful countermeasures for the CO2 emission reduction. It not only targets various scientific phenomenon caused by the capture and storage of CO2, CO2 utilization, and CO2-EOR/EGR, but also discusses the latest R&D developments of each method for the environmental impact assessment, safety assessment, the measuring, monitoring and verification (MMV), and public acceptance.

The main theme is the recognition of key issues toward the practical use of CCUS, in addition to the deepening of our knowledge about the CO2 behavior on the underground.

[HSC05-P03]Detection CO_2 flooding by optical fiber; Example of a long core specimen

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Keywords:Optical fiber measurement, X-ray CT, CO2 flooding, CO2 saturation

We challenged the detection of CO_2 by optical fiber in a laboratory experiment using porous sandstone. We also observed the fluid movement in the specimen by performing CT image analysis at the same time. It is possible to obtain the specimen porosity and fluid saturation process by using CT image analysis. Berea sandstone (diameter: 34.85mm, length: 288mm) was used in this study. Porosity of specimen determined by X-ray CT imaging is 19.70%. This specimen has thin layers parallel to the specimen axis, and the permeability is about 130 mD. The experiment was conducted under the pressure and temperature conditions that simulate underground environments; pore pressure: 10MPa, temperature: 40 degrees Celsius. The confining pressure selected in this study is 15MPa. The specimen was first saturated with KI aqueous solution (11.5 wt%). For the CO_2 flooding, we maintained the upstream CO_2 injection rate at 0.05 mL/min. The CO_2 flooding was carried out until the total fluid injection reaches about 3PV (pore volume). Optical fiber measurement and X-ray CT imaging were performed in all experimental steps. Figure shows the detection results of CO_2 in optical fiber measurement and X-ray CT imaging. According to the results, the movement of CO_2 detected by optical fiber measurement is in good agreement with that obtained by X-ray CT. This suggests that optical fiber measurement is effective for detecting the movement of CO_2 in the rock.

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