

MAG021-16

Room: 201A

Time: May 26 14:30-14:45

## Time-lapse high-resolution seismic monitoring during a small-scale carbon dioxide gas injection test

Tomio INAZAKI<sup>1\*</sup>, Kano Naomi<sup>1</sup>, Toshiyuki Tosha<sup>1</sup>, Sugiyama Takeshi<sup>2</sup>

<sup>1</sup>GSJ/AIST, <sup>2</sup>CKC

Monitoring of the behavior of carbon dioxide (CO<sub>2</sub>) during injection and storage is essential for the safe geological sequestration. Time-lapse seismic reflection techniques have played an important role in such monitoring of CO<sub>2</sub> geological sequestration. Indeed, delay in two-way time and decrease in reflection intensity of the target layers was widely observed during the injection of CO<sub>2</sub>. However it was valid for the injection at large depths, and was not so clearly monitored for the injection of CO<sub>2</sub> at shallow depths where CO<sub>2</sub> was stable in a gas phase and easily dissolve into groundwater. We then conducted time-lapse geophysical monitoring experiments during CO<sub>2</sub> injection at shallow layers to confirm the applicability of geophysical methods. High-resolution seismic reflection technique was adopted as the proposed monitoring method and applied to a small-scale field test.

In this test, CO<sub>2</sub> gas was injected into a depth of about 47.5 m of the groundwater observation well in the AIST Tsukuba Central 7. We set 3 seismic lines, on which 40 Hz geophones were planted at 1 m intervals, adjacent to the injection well. P-waves were generated by hitting surface pavement using a wooden hammer. A total of 250 shots data were recorded and in-line traces were processed using seismic data processing package named VISTA (Gedco, Inc.). CMP stacked time sections clearly imaged the target horizon in which CO<sub>2</sub> was injected. Faint changes during the test were observed in the two-way times and reflection intensities of the target layer. Possible interpretation of the observed result will be proposed in our presentation.

Keywords: CO<sub>2</sub> geological sequestration, time-lapse monitoring, high-resolution seismic reflection surveying, P-wave, CO<sub>2</sub> gas injection test