Toward high spatio-temporal monitoring of reservoirs using a continuous and controlled seismic source

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Monitoring of injected CO_2 behavior in field-scale (m-km) is one of the important issues in CO_2 geological storage. During and after CO_2 injection into reservoirs, we should monitor the spatial distribution of injected CO_2 to ensure that injected CO_2 is stored in reservoirs without CO_2 leakage. For monitoring of CO_2 storage sites, active source time-lapse (repeated) seismic surveys have been commonly used because of their high spatial resolution, but their monitoring interval is long because of high cost for each survey. Therefore, accidental incidents of CO_2 injection reservoirs (e.g., CO_2 leakage) cannot be immediately detected from the time-lapse seismic monitoring.

To overcome this issue, we have been developing continuous monitoring system with high temporal resolution and accuracy. In my presentation, I will overview development of our monitoring system. Because of high temporal resolution and accuracy, our monitoring system has the potential to identify CO_2 leakage through shallow subsurface immediately. Our approach can be also used to identify change in shallow subsurface related to environmental influences (e.g., rainfall or ground freezing) which contribute to improving monitoring accuracy of reservoirs. Furthermore, we have performed monitoring of subsurface reservoirs and some trials toward high spatio-temporal monitoring.