



Improving time-lapse seismic repeatability: CO₂CRC Otway site permanent geophone array field trials

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The proposed Stage 2C of the CO₂CRC Otway project involves injection of a small amount (around 15,000 tonnes) of CO₂/CH₄ gas mixture into saline aquifer (Paaratte formation) at the depth of ~1.5 km. The seismic time-lapse signal will depend largely on the formation properties and the injection scenario, but is likely to be relatively weak. In order to improve time-lapse seismic monitoring capabilities by decreasing the noise level, a buried receiver arrays can be used. A small-scale trial of such an array was conducted at Otway site in June 2012. A set of 25 geophones was installed in 3 m deep boreholes in parallel to the same number of surface geophones. In addition, four geophones were placed into boreholes of 1 to 12 m depth. In order to assess the gain in the signal-to-noise ratio and repeatability, both active and passive seismic surveys were carried out.

The surveys were conducted in relatively poor weather conditions, with rain, strong wind and thunderstorms increasing the noise level. We found that noise level for buried geophones is on average 20 dB lower compared to the surface ones. Furthermore, the combination of active and passive experiments has allowed us to perform a detailed classification of various noise sources.

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