Monitoring methane gas migration in a near surface confined aquifer using electrical resistivity tomography

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Overview

- Attempt to monitor a controlled methane gas injection in the subsurface using electrical resistivity tomography.
- 1.5 m^3 per day injection rate.
- 3 ERT lines permanently installed (Figure 1). Two in the groundwater flow direction (A to B and C to D) and one orthogonal to ground water flow(E to F).
- Four repeat surveys over the duration of the injection.
- Data analysed to find changes in resistivity over time that could be attributed to gas migration.

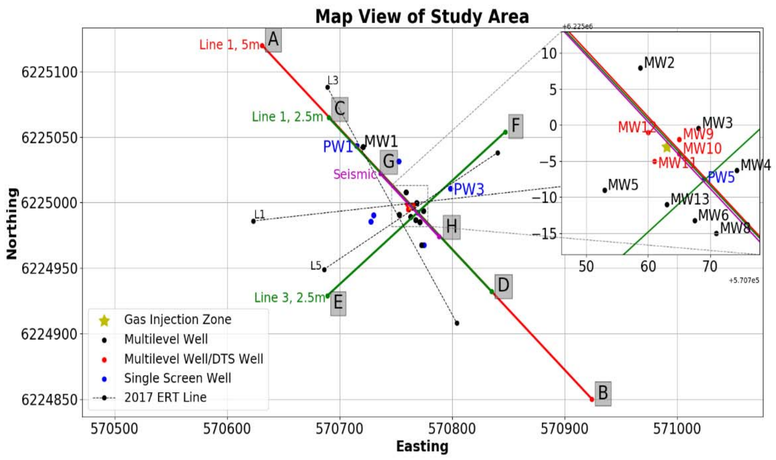

Fig. 1. Map view of the field site. Time lapse ERT lines are shown from A to B, C to D, and E to F. Ground water flow direction is along line 1 from A to B.

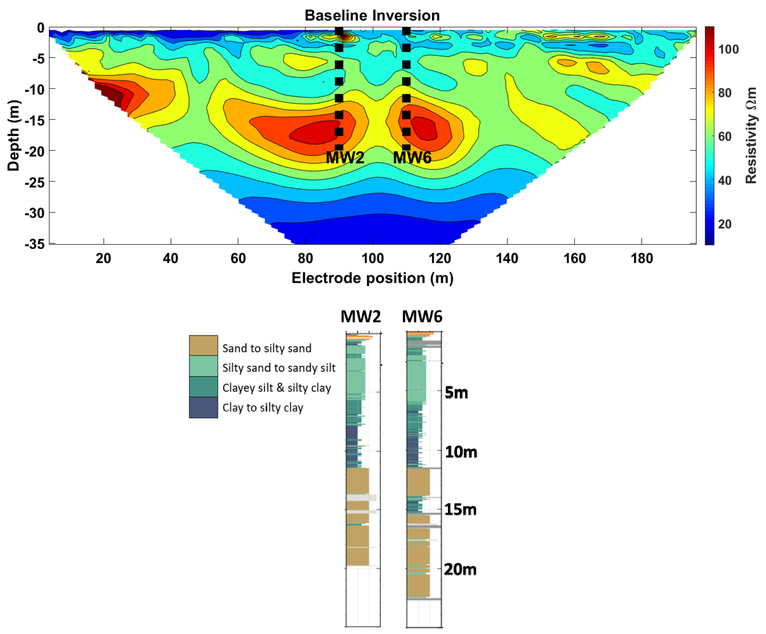

Fig. 2. Baseline inversion for line 1 2.5 m showing the locations of MW2 and MW6 projected onto the ERT line. Image below shows the core logs from the two wells.

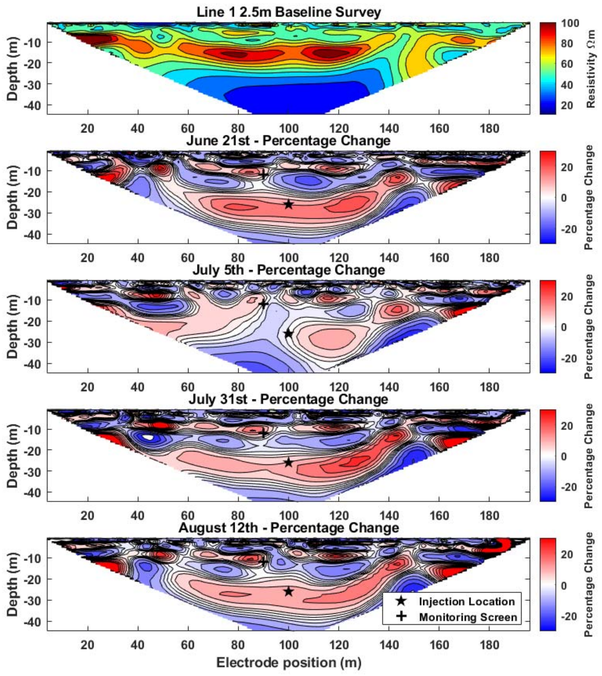

Fig. 3. Time-lapse ERT models for line 1 (2.5 m spacing) showing percentage changes relative to baseline model (Top). Increases in resistivity near the injection point and the monitoring screen of up to 25% are interpreted to be a result of the presence of gas.

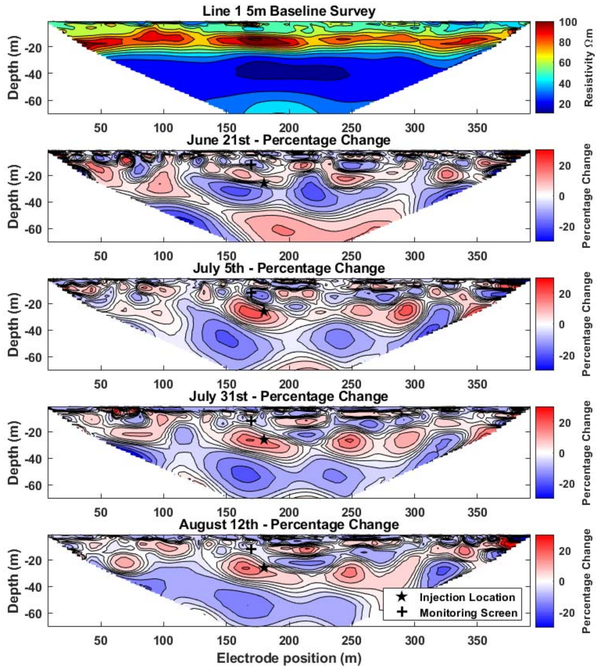

Fig. 4. Time-lapse ERT models for line 1 (5 m spacing) showing percentage changes relative to baseline model (Top). Increases in resistivity near the injection point of 25% are interpreted to be a result of the presence of gas.

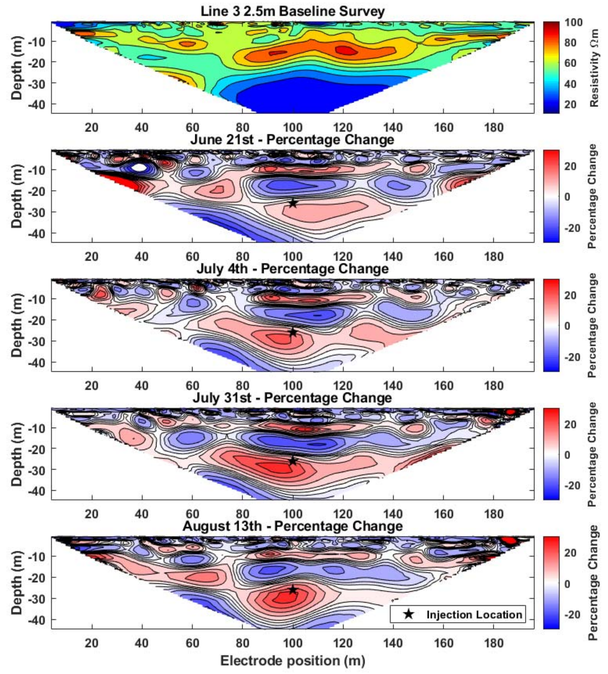

Fig. 5. Time-lapse ERT models for line 3 (2.5 m spacing) showing percentage changes relative to baseline model (Top). Increases in resistivity near the injection point of up to 27% are interpreted to be a result of the presence of gas.

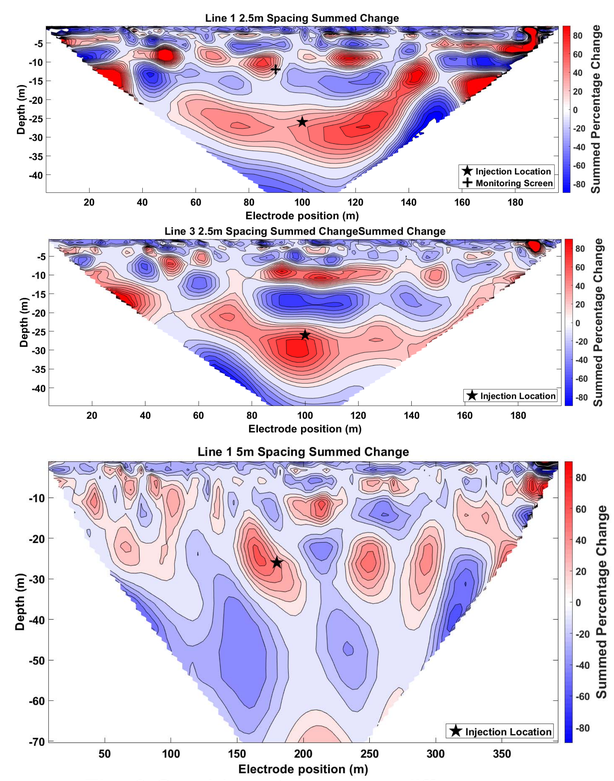

Fig. 6 Combined time-lapse differences

Acknowledgements

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