

Oil and gas case studies

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Aarhus Geophysics is involved in interpretation of airborne geophysical data for Oil and Gas applications including:

- Stratigraphic interpretation of near-surface (up to 500 m), based on state of the art inversions of airborne EM data
- Integrating electrical resistivity inversions with shallow seismic measurements and using shallow seismic for additional constraints for the inversions of AEM data
- Finding shallow reservoirs
- Assessing groundwater quality in reservoirs
- Finding shallow and deep-seated saline aquifers for hydraulic fracturing
- Finding oil sands
- Solving geotechnical problems

Aarhus Geophysics has been recently involved in several large projects for oil and gas in Alberta and British Columbia, Canada. Figure 1 shows interpretation of SkyTEM data, flown in northern British Columbia, Canada and inverted for electrical resistivity by Aarhus Geophysics. The purpose of this interpretation was to find new water reservoirs for hydraulic fracturing.

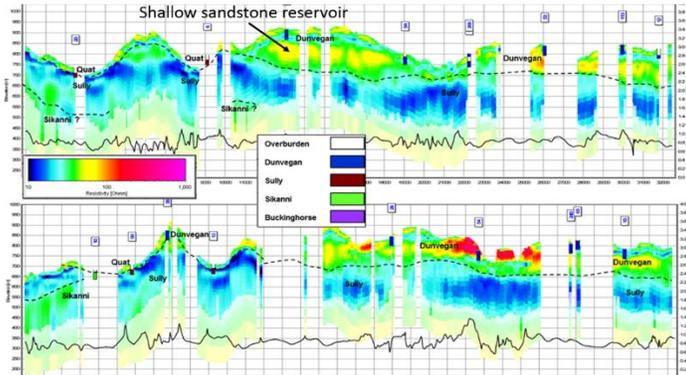


Figure 1. Interpretation of SkyTEM data collected over Peace river basin, BC, Canada.

For most accurate results (especially with stratigraphic interpretation it is important to use constrained inversion. Shallow seismic data may be used as such, as shown in Figure 2.

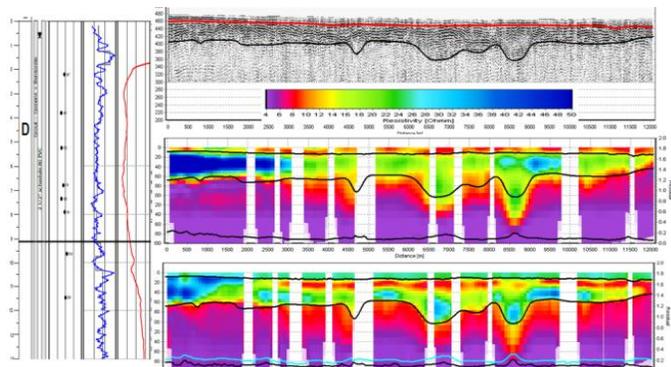


Figure 2. VTEM survey (Spiritwood valley, SK, Canada). Top: Seismic section with interpretation; middle: original VTEM inversion; bottom: recalibrated inversion; left: downhole resistivity log.

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Aarhus Geophysics has been involved in interpretation of airborne EM data flown over oil sands in northern Alberta. Figure 3 shows general stratigraphy.

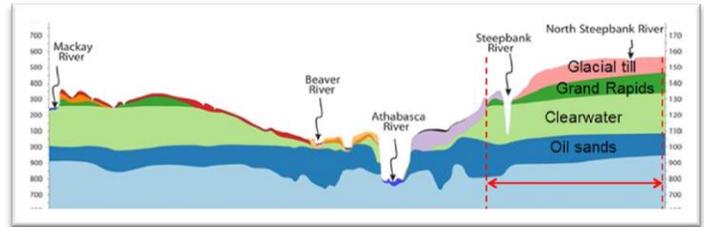


Figure 3. Generalized stratigraphy in Athabasca basin, AB, Canada..

The area was surveyed with HeliTEM multipulse system targeting oil sands, then the TDEM data were inverted by Aarhus Geophysics and interpreted as shown in Figure 4.

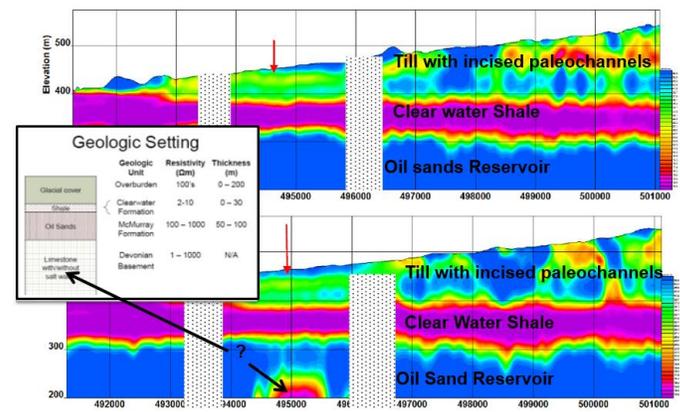


Figure 4. Interpretation of HeliTEM inversion results.

Voxel models may be constructed based on inversion results and geological interpretation, as shown in Figure 4, where reinterpreted VTEM data collected over Spiritwood valley, MB, Canada were used to construct a 3D pseudo-lithological volume.

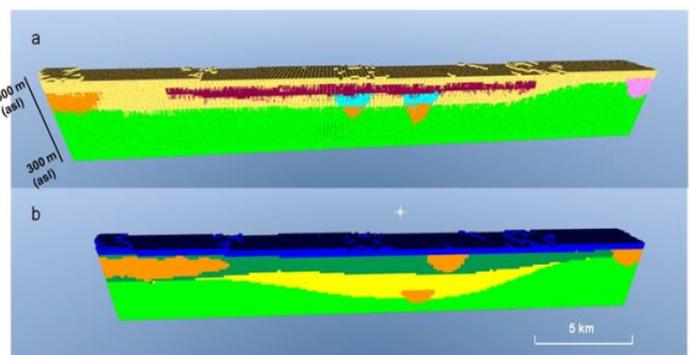


Figure 5. Top: Voxel model constructed from updated waveform with a priori (ERT) information incorporated. Bottom: voxel model based on original VTEM inversion results.