

# EM geophysics for hydrocarbons: Inversion applications and current research at UBC-GIF

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## Abstract

Electrical conductivity can be diagnostic parameter for hydrocarbon exploration. Time and frequency domain airborne EM surveys provide broad-scale reconnaissance information, which can be followed up by ground surveys. In this talk we present an example where airborne EM data have been inverted to show potential areas of shallow gas accumulation. DC resistivity data have also been inverted, and the conductivities obtained from the two methods are compared. Practicalities of inverting both types of data are discussed. The presentation concludes with an example of inverting TEM data over a tar sands region and also an introduction to our current research in 3D controlled source EM surveys in marine environments.

## References

- [1] Farquharson CG, Oldenburg DW, Routh PS, 2003, *Simultaneous 1D inversion of loop-loop electromagnetic data for magnetic susceptibility and electrical conductivity*, GEOPHYSICS, 68, 1857-1869.
- [2] Farquharson CG, Oldenburg DW, 2004, *A comparison of automatic techniques for estimating the regularization parameter in non-linear inverse problems*, GEOPHYSICAL JOURNAL INTERNATIONAL, 156, 411- 425.
- [3] Farquharson CG, Oldenburg DW, *Non-Linear inversion using general measures of data misfit and model structure*, GEOPHYSICAL JOURNAL INTERNATIONAL, 134, 213-227.
- [4] Napier S, *Shallow Gas Exploration with Electromagnetic Systems: Airborne Frequency Domain EM and DC Resistivity Surveys*, Undergraduate Thesis, UBC, 2003.
- [5] Cristal J, *GEOTEM Surveying and Inversion Applied to Oil Sands Exploration Kearn Lake, Athabasca Region, Alberta*, Undergraduate Thesis, UBC, 2003.