# INTEGRATION OF GEOPHYSICAL DATA: WELLS, SEISMIC AND ELECTROMAGNETICS

*Lucy MacGregor[1*], Peter Harris[2], James Tomlinson[3]*
*OHM Ltd, lucy.macgregor@OHMsurveys.com[1],Peter Harris,*
*p.harris@rocksolidimages.com[2], James Tomlinson, james.tomlinson@OHMsurveys.com[3]*

Improved reservoir management and production optimisation demands require accurate characterisation of reservoir properties and their changes through time. However, when only a single data type is considered, ambiguities in the interpretation can remain. Integration of disparate geophysical data types allows the strengths of each to be exploited. Here we will concentrate on three contrasting methods: surface seismic, marine controlled source electromagnetic (CSEM) and well-log data.

Seismic data are commonly used to provide images of the sub-surface, and develop high resolution geological models of structure and stratigraphy. However seismic data alone in many situations cannot give a complete picture of the reservoir. Analysis of marine CSEM data allows remote mapping of the resistivity structure beneath the seafloor. The CSEM technique lacks the fine structural resolution of seismic data, however the method is particularly sensitive to the properties and distribution of fluids within the earth. Well logs provide a high resolution measurement of the properties of a reservoir in the strata local to the well. However often measurement of reservoir properties across the extent of a field is desirable.

Experience shows that applying structural constraints derived from seismic data is effective in improving the resolution of resistivity profiles obtained from inverting CSEM data. This allows us to combine resistivity with seismically-derived impedances in order to estimate rock and fluid properties. Property estimates require calibration with well logs and a good understanding of the rock physics since this provides a framework within which seismic and EM data can be interpreted. By integrating complementary sources of information estimates of rock and fluid properties such as gas saturation and porosity can be obtained with greater confidence than from any one data type alone.

## PRESENTER PROFILE

**Lucy MacGregor** has over ten years' experience as a leading researcher in CSEM and its application to the detection and characterization of fluids in the earth, and leads the R&D group at OHM. She has extensive experience in the development and application of data processing, modelling and inversion techniques to CSEM problems in a variety of environments. She has a PhD from the University of Cambridge for research in the field of CSEM, and has worked on Marine EM methods at the Scripps Institution of Oceangraphy, and the National Oceanography Centre, UK, before co-founding OHM in June 2002.

*Email: lucy.macgregor@OHMsurveys.com*