

# Controlled Source Electromagnetic Imaging in Complex Environments

MacGregor, Lucy, and Anthony Greer, OHM Ltd, Aberdeen, United Kingdom

CSEM surveys have been used successfully in a variety of settings including West Africa, Southeast Asia, The Gulf of Mexico and the North Atlantic. Early surveys concentrated on Tertiary reservoir systems in deepwater areas. These demonstrated that in areas of relatively simple geological structure, including deepwater turbidites and channel systems, positive results could be obtained from CSEM surveys. However these settings represent only a small proportion of potential exploration targets. In particular to date the method has been limited to relatively deep water (300m or more). This is because in shallow water, signals that have interacted with the (extremely resistive) air can have a severe impact on the recorded signals and can dominate the response. To test possible solutions to the airwave problem a survey was carried out in 115m of water in the North Sea, on a known gas reservoir lying at around 1600m below seafloor. Initial inversions of the result give an image of the subsurface which unambiguously resolves the presence of resistive structure associated with the gas reservoir. The image is improved by including structural information on the subsurface from seismic data, and adding additional information on the geo-electric background from CSEM receivers off-target. When this is done, resolution of both the lateral extent of the reservoir, and the resistivity within it improve dramatically. Final results agree well with the resistivity of the gas reservoir measured in well-log data. By extending the operating envelope into shallow water the range of potential exploration and appraisal targets has been dramatically increased.