

**MARINE MAGNETOTELLURIC (MMT) MAPPING OF BASEMENT AND SALT BODIES IN
THE SANTOS BASIN, BRAZIL**

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The marine magnetotelluric (MMT) method is rapidly emerging as a practical electromagnetic tool for investigating the deep resistivity distribution beneath the sea-floor and aid the exploration for hydrocarbons especially in areas of poor-seismic data. Remarkable advances in field instrumentation over the last few years now permit the use of MMT for hydrocarbon exploration in the marine environment (Constable et al., 1998; Sandberg et al., 2008). The MMT method has been successfully used to achieve marine exploration objectives such as imaging sub-basalts, carbonates and subsalts in situations where seismic imaging is poor. The high contrast in electrical resistivity between salt bodies and the surrounding sediments makes for a good target and provides an opportunity to test the applicability of the MMT method in oil exploration studies. The deep water basins in offshore Brazil are the sites of giant oil and gas discoveries, and should provide excellent test sites for evaluating the MMT method.

Recent subsalt oil discoveries in the deep waters of the Santos basin in Brazil have received considerable attention due to the extent of the resource reserves and the challenges in exploration and production in such environment. This paper presents the first large-scale MMT survey that was acquired recently in Brazil by WesternGeco Electromagnetics in cooperation with Observatório Nacional/MCT and Petrobras as part of a major project on improving depth imaging by integrating multiple geophysical measurements in the Santos Basin. The regional gravity anomaly map shows a clear NE-SW structural trend in the area of study. 2D inversion of the MMT data across this trend would seem to be satisfactory. The 2D inversion model clearly shows resistivity anomalies that correctly delimit the position and depth extent of the known salt bodies. Our result thus provides an important practical validation of the MMT method in the deep marine environment of Santos basin. This study has demonstrated the feasibility of economically obtaining a reliable image of subsurface resistivity in the depth range of current interest in hydrocarbon development in offshore Brazil. MMT data fidelity processing procedures were developed that so far yielded high quality data.