
**Inversion and interpretation of marine
Controlled Source Electromagnetic (CSEM)
and Magnetotelluric (MT) data**

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The use of the geophysical electromagnetic method in a marine environment has become remarkably attractive, as there have been many advances to applications for hydrocarbon exploration. This project will examine the use of marine Controlled Source Electromagnetics (CSEM) and Magnetotellurics (MT), and will investigate their effectiveness in hydrocarbon exploration. CSEM transmits synthetic electromagnetic signals into the ocean floor and the fixed seafloor receivers then measure the reaction of the earth's magnetic field. CSEM can be applied to hydrocarbon exploration since layers of rock containing high amounts oil and/or gas will have

an electrically resistive signal. Magnetotellurics is an electromagnetic method in which the responses to changes of the earth's natural time-varying magnetic field are measured. MT is less sensitive to layers or structures at shallow depths than CSEM, but can identify conductive units or formations where CSEM would respond to more resistive units.

This project will be concentrated on data sets made available online by the Scripps Institution of Oceanography, located in La Jolla, California, USA. The data sets are from surveys collected over the San Diego Trough, which is located approximately 50 km west of San Diego, and has a water depth of over 1 km. The data sets will be analyzed and conductivity models will be produced by inversion. The inversions will be done using Occam inversion codes. 1-D inversions will be applied to the CSEM data and 2-D inversions to the MT data. Interpretation of the inversions will be done in conjunction with bathymetry and coastal relief models as well as with seismic lines.