

Reducing Exploration Risk with Marine Electromagnetic: Hydrate Detection and Base Salt Mapping

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Marine EM methods have been enthusiastically embraced by the petroleum industry as a means to assess in situ electrical resistivity of potential reservoirs prior to drilling. As industry becomes more conversant with this new methodology, we expect to see electrical methods used much more widely to reduce exploration risk. For example, one of the early applications of marine EM was the use of magnetotelluric (MT) data to map base of salt independently of seismic data. The addition of MT data provides a means to distinguish between competing base salt models, particularly in rooted or otherwise steeply dipping geometries, and to refine velocity models. We continue to develop this use of the MT method by improving instrumentation, processing, and data collection technologies. A more recent example is the use of controlled source EM (CSEM) for detection of shallow gas hydrate. Hydrate is a drilling hazard, can potentially destabilize seafloor adjacent to production infrastructure, and for some countries is seen as a potential energy source. Electrical resistivity mapping provides one of the few mechanisms to quantify the total hydrate volume in the section prior to drilling. We have carried out preliminary studies with encouraging results.