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POSTER PRESENTATION

CSEM Response in a Gas Hydrate Stability Zone

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Controlled Source Electromagnetic (CSEM) is a geophysical method for measuring the electrical resistivity of the subsurface, providing information that can be integrated with other subsurface data to reduce the uncertainty in offshore exploration. A powerful horizontal electric dipole source is towed over a predetermined grid of multi-component receivers placed 1 to 3 km apart on the seabed, at water depths down to 3.5 km. The dipole source transmits a carefully designed, low-frequency electromagnetic signal into the subsurface that can illuminate targets through more than 4 km of rock. The receivers record refracted EM energy from the subsurface and that data is processed and inverted to produce a resistivity volume of the subsurface. This resistivity cube is then further integrated and interpreted with seismic and well data.

In a proven petroleum system, the presence of resistors anomalously higher than the background resistivity can often be directly correlated to hydrocarbon saturated reservoirs (Archie's Law). CSEM data can be used to differentiate prospects with high and low hydrocarbon saturation making it a valuable complement to seismic AVO analysis as part of the prospect de-risking process.

In complex structural settings, where salt, basalt, or hydrates hamper seismic imaging, CSEM and Magnetotelluric (MT) data are inverted together and integrated with seismic, well and non-seismic data to improve the seismic velocity model and image quality. In a gas hydrate environment, CSEM is effective in identifying saturated hydrates and free gas accumulations.

The panels in this poster session will use case studies to provide a visual representation of basic CSEM principles, CSEM, data acquisition and applications of CSEM (& MT) from "source to seep" using hydrocarbon and non-hydrocarbon related case examples.