During the past few years marine electromagnetics has moved from research to commercial applications. Several surveys have been carried out by various oil companies and quite a few are currently operational or being scheduled in different marine environments worldwide.

Marine magnetotellurics (MMT) and active source electromagnetic sounding in the frequency domain using a horizontal electric dipole source (CSEM) are used to detect the resistivity contrast between hydrocarbon saturated reservoirs and the surrounding more conductive sedimentary layers.

These technologies are showing the greater potential in the exploration of world’s deepwater basins reducing the risks between 3D seismic and exploration drilling.

The examples shown in this paper are among the very first conducted using a cooperative MMT-CSEM approach. They demonstrate the feasibility of economically developing reliable images of subsurface resistivity that can enhance the resolution of seismic depth imaging and detect the presence of embedded “thin” resistor that may represent possible hydrocarbon targets.

We will show how marine magnetotellurics (MMT) is successfully applied in the Norwegian Sea to develop the background conductivity model needed to accurately interpret CSEM data. CSEM and MMT data are sensitive to different parts of the resistivity structure. CSEM data are sensitive to “embedded” resistive structures, MMT data are insensitive to “embedded thin” resistors, however are used to constrain the resistivity of the surrounding sediments, and the basement beneath. In this respect the two methods provide complementary information about the sub-surface resistivity structure and combined can lead to enhanced resolution and reduced ambiguities. The integrated models show relevant improvements that can enhance previous interpretations and reduce risk. The new models facilitate exploration appraisal, further testing of alternative models, and can provide a robust framework for performing detailed analysis on a localized, prospect-level basis. Moreover, this data fusion approach offers an excellent opportunity to reduce exploration costs.