

Integrated Electromagnetic Methods for Exploration, Reservoir Characterization and Monitoring

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During the last two decades Eni applied natural source electromagnetic methods oriented especially to onshore exploration. Several thousands of magnetotelluric soundings have been acquired on land in complex geological settings, where seismic methods alone revealed their limitation in providing satisfactory imaging. Also DC data have been collected in difficult exploration areas, aimed at improving the solution for static corrections of seismic data. Moreover during the last ten years also several Marine MT surveys have been performed. In the last few years more robust and systematic results have been collected by Eni, after a full understanding of the importance of quantitative integration of electromagnetic, seismic and gravity data. Many tests and applications of Controlled Source EM methods have been performed, using both time domain (on land) and frequency domain (offshore) approaches.

The acquisition workflows have been designed in order to acquire electromagnetic data sets that can be successfully integrated with the seismic information. Innovative procedures of joint, cooperative and sharp/constrained inversion have been set in order to provide a fully integrated interpretation of electromagnetic, seismic and gravity data. In this paper the general integration approach used in Eni is presented and some significant case histories are discussed.