



Improved imaging of the subsurface through joint inversion of seismic, magnetotelluric and gravity data

Max Moorkamp (1), Bjoern Heincke (2), Marion Jegen (2), Richard Hobbs (3), and Alan Roberts (3)

(1) University of Leicester, Department of Geology, Leicester, United Kingdom (mm489@le.ac.uk), (2) Geomar, Helmholtz Centre for Ocean Research Kiel, (3) Durham University

Creating accurate and comprehensive images of the Earth's subsurface is one of the current challenges in geophysical research. Many geophysical methods used for imaging the subsurface are approaching their theoretical limit of resolution given the constraints on feasible measurement locations and time and thus combining several different techniques in integrated modelling approaches has gained the focus of attention. However, combining techniques that are sensitive to different physical parameters such as velocity and conductivity poses additional challenges. It requires assumptions on the relationship between them either in terms of structure, i.e. coincident boundaries, or in terms of some sort of direct relationship between the physical parameters.

We will present case studies of joint inversion approaches for marine hydrocarbon exploration that highlight the potential and demonstrate the difficulties of performing joint inversion. We will compare the efficiency of different coupling approaches, investigate the influence and benefit of prior information and assess the additional information that we can obtain. Finally, we will also provide some recipes on how to alleviate the significant computational cost of performing several inversions simultaneously.