



2D inversion of magnetotelluric data from the Lower Saxony Basin, Germany, and electrical conductivity measurements on black shale rock samples.

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Abstract

We carried out a magnetotelluric (MT) field campaign in SE Lower Saxony Basin, Germany, to test this method for imaging the regional Posidonia black shale sediments. Eighty-three MT stations were deployed along a SW-NE sixty-three kilometre long profile. 2D MT inversions of a sub-section of the profile reveal high conductivity layers at the expected depth of the Posidonia black shale, interrupted by a 10km wide resistive body. We speculate that the high electrical conductivity is due to electrolytic conduction through water filled pores and is interrupted by the known Zechstein Husum salt diapir. In addition to MT, we also made electrical resistivity measurements on a series of black shale samples from boreholes located in the Hils Syncline, Germany, and the Barnett shale from Texas, USA. Our results indicate that black shales are electrically resistive for low maturity states. Their electrical resistivity is generally anisotropic and porosity controlled.

Keywords: Magnetotellurics, Lower Saxony Basin, Posidonia Black Shale, Electrical resistivity.