

Case History Glücksstadt Graben

North Germany and the southern North Sea are crossed by graben systems oriented approximately north-south and so far geological concepts consider them to have developed in the Triassic.

Since the seventies fossil oil and gas exploration in Schleswig-Holstein has led to an intensive survey of the Glücksstadt Graben.

Under the project “MT-North Germany”, for the first time soundings were done in the Glücksstadt Graben with the magnetotelluric method (MT).

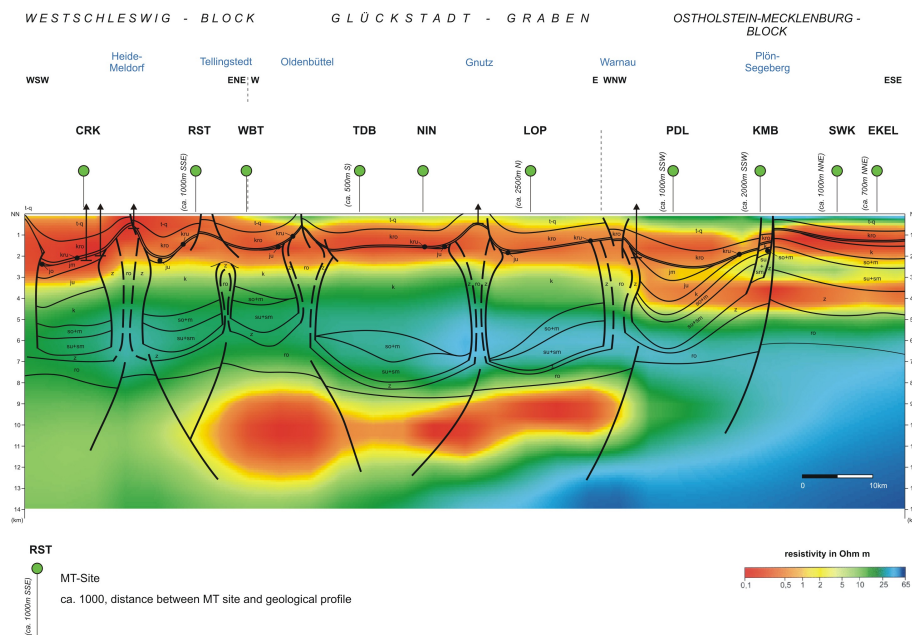


Figure 1 2D Model across the Glücksstadt Graben joint with Geology

Remarkable is the coincidence between the subsidence of the graben and the presence of highly conducting layers in a depth of 9-10 km.

Today, we assume that the graben structure was already formed in the Lower Carboniferous and the measured high conductivity is due to the occurrence of black shales also known to be found in the Emsland and further areas of North Germany.

In the course of earth history the graben repeatedly subsided and therefore the good Lower Carboniferous conductor is to be found here ca. 2-3 km deeper than in the Emsland.

For this reason, as has already been shown for the Emsland, the occurrence of potential parent rock for fossil gas may be expected.

The results of the MT are an integral part of the following card of the Lower Carboniferous and clearly show the Glücksstadt Graben (GG) in its course to Kiel.

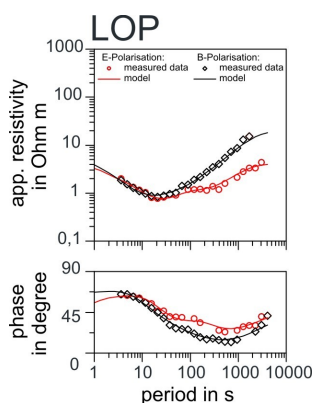
Instruments of the Metronix Company, i.e. ADU-06 and MFS-06 up to a period of 4096 sec were employed.

HOFFMANN, N., JÖDICKE, H. & GERLING, P. (2001): The distribution of Pre-Westphalian Source Rocks in the North German Basin - Evidence from Magnetotelluric and Geochemical Data. – *Geologie en Mijnbouw, The Netherlands Journal of Geosciences*, **80**,1: 71-84, Dordrecht.

HOFFMANN, N., JÖDICKE, H. & HOREJSCHI, L. (2005): Regional Distribution of the Lower Carboniferous Culm and Carboniferous Limestone Facies in the North German Basin. - Derived from Magnetotelluric Soundings. – *Z. dt. Ges. Geowiss.*, **2**.



Figure 2 Paleogeography and Tectonics of the Lower Carboniferous of the North German Basin



The station LOP situated over the graben structure indicates a distinct dispersing of phase and resistivity at lower frequencies.

The 2D modelling illustrates that the existence of a good conductor in about 10 km depth can explain these results.

(L. Hengesbach (née Horejschi), 2006)