



Uplift and Subsidence in the Northwestern German North Sea and their Impact on Sedimentation and Erosion of Mesozoic to Cenozoic sediments

Fabian Jaehne, Jashar Arfai, and Rüdiger Lutz

Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany (Fabian.Jaehne@bgr.de)

Within the framework of the GPDN project (www.geopotenzial-nordsee.de) a detailed seismic mapping project focuses on the northwestern offshore part of the German North Sea sector, the so called 'Entenschnabel' area, which was not considered in former studies (Baldschuhn et al., 2001) of the German North Sea sector.

The Northwestern German North Sea is characterized by a complex rift dominated structural pattern in the Mesozoic, with the Central Graben as the main structure, resulting from a multiphase tectonic evolution. Several phases of uplift and subsidence were driven by extensional and compressional tectonic events, as well as by volcanic activity at the North Sea Dome and by extensive mobilization of Zechstein salt. These different influences on the sedimentary and structural evolution and their changes over time are distinguishable by detailed mapping of several formations. Spatial distribution of these formations and their thickness variations reveal changes of depocenters and changes of internal geometry.

In the Entenschnabel area, the Central Graben is the dominating structural element. First extensional pulses took place in the Lower Triassic followed by several phases of rifting from the Middle to Late Triassic. The age of rifting phases can be defined by thickening of syn-tectonic Triassic to Jurassic strata towards the major fault zones. During the Jurassic the main extensional phase took place in combination with extensive diapirism. Analyses of the distribution and the thicknesses of sediments in rim-synclines reveal that most of the salt structures inside the Central Graben had a main phase of growth during the Late Jurassic. The Jurassic to Cenozoic evolution of the Central Graben and surrounding areas is closely related to the evolution of the volcanic activity at the North Sea Rift Dome (Graversen, 2006). In most of the German North Sea a supra-regional uplift driven by this volcanic activity led to a major erosional event, which is defined by a major unconformity at the base of the Lower Cretaceous. In contrast the German part of the Central Graben is characterized by continuous sedimentation during this time. Another difference of the German Central Graben compared to the rest of the German North Sea is a structural inversion of parts of the graben during the Late Cretaceous. Greatest thicknesses of the Upper Cretaceous are reached on the eastern graben shoulder of the Central Graben along the Nordschillgrund High. The reason for subsidence along this long-living Triassic to Jurassic structural high has to be investigated.

Baldschuhn, R., et al. (2001). Geotektonischer Atlas von Nordwestdeutschland und dem deutschen Nordsee-Sektor - Strukturen, Strukturentwicklung, Paläogeographie. Geologisches Jahrbuch, A 153: 3-95.

Graversen, O. (2006). The Jurassic-Cretaceous North Sea Rift Dome and Associated Basin Evolution. Search and Discovery.