Geophysical Research Abstracts
Vol. 16, EGU2014-11717-1, 2014
EGU General Assembly 2014

High-resolution area-wide sea-floor mapping: The paleo Elbe valley (S North Sea) revisited

Svenja Papenmeier and H. Christian Hass
Alfred-Wegner-Institue, Germany (svenja.papenmeier@awi.de)

The North Sea Basin is shaped by multiple glacial advances and retreats that left complex sequences of glacio-fluvial and sub-glacial deposits, cut by sub-glacial tunnel valleys. Today, the submerged valley of the Elbe forms one of the most prominent structures of the southern North Sea. Flanked by huge moraine deposits of older glacials, the valley developed to its present form during the Weichselian sea-level lowstand (-130 m below present). Melt waters that discharged in north-westerly directions along the Scandinavian Ice Sheet fed the paleo Elbe at that time. During the Holocene the valley drowned in the rising sea. Here we present an area-wide high-resolution map of the seafloor and high-resolution shallow seismic data covering 1,600 km2 of the paleo Elbe valley (PEV) including its eastern levee.
The data allow to shed new light on the PEV development including the historical process of sedimentary infill with the successive Holocene sea level rise in detail. Shallow seismic data with transect distances of 400 m and several cross sections allow 3-D visualization. The eastern flank of the valley is characterized by a relatively steep slope with one or more terraces. At its levee a significant sediment change is present on the modern sea floor, representing moraine and marine deposits. High resolution sidescan sonar data of this area show a much higher heterogeneity and complexity in sediment and habitat distribution as assumed before. Holocene marine sediments form a patchy and thin drape east of the valley floor. The western slip-off slope of the valley slope is much smoother than the eastern undercut slope. As yet, significant sedimentological changes at the present seafloor are not known for the western side of the PEV. Shallow seismic data show the base of the PEV. There are conspicuous internal seismic reflectors above the base, inclined in northeastern direction. They indicate a sedimentary infill of the valley from the southwest when the southern part of the Dogger Bank was flooded during the early Holocene sea-level rise. In this process the steeper eastern slope acted as a natural barrier towards the northeast and averted sediment transport beyond the eastern boundary of the PEV.