Geophysical Research Abstracts
Vol. 15, EGU2013-10537, 2013
EGU General Assembly 2013

Area-wide seafloor mapping in the SE North Sea using hydroacoustics

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Mapping seafloor properties has become increasingly important for understanding marine ecosystems and providing basic data for sustainable management. However, the knowledge regarding the distribution of seabed environments in the German part of the North Sea is still fragmentary. It is mainly derived from single case studies and from a 1:250,000 scale map based on grab samples published in 1981. In recent years, hydroacoustic devices became a powerful tool to quickly obtain reliable information of the seafloor. In the years 2007-2012 various hydroacoustic surveys were performed in order to map the seafloor in the coastal zone of the NE German Bight comprising an area of approximately 1,500 km^2. Measurements were carried out with a sidescan sonar (Imagenex YellowFin, 330 kHz) at a resolution of 25 cm. For ground truthing several hundred sediment samples were taken. The seafloor in the investigation area is mainly characterized by fine and medium sand. West off Sylt relics of former Pleistocene moraines stretch perpendicular to the coast in westerly directions. These relics consist of wide bands of coarse to medium sand and are basically linked to the morphological structures such as ridges and channels. The truncated push moraines from the Saalian glacial represent the seaward extension of the recent moraine core ('Geest') of Sylt. In addition a great number of smaller scaled structures, generally known as sorted bedforms were detected. Sidescan sonography of the same area carried out in two consecutive years reveals that these bedforms are dynamic and therefore subject to flow-directed movement across the seafloor. They are linked with large-scale sediment transport that occurs in this highly dynamic area as a result of vigorous tidal currents. Ongoing investigations aim at relating the occurrence of different bedforms to current speed and net sediment transport direction to calculate sediment budget. These govern erosion and accumulation processes that are crucial for the existence of the North Frisian Islands.