

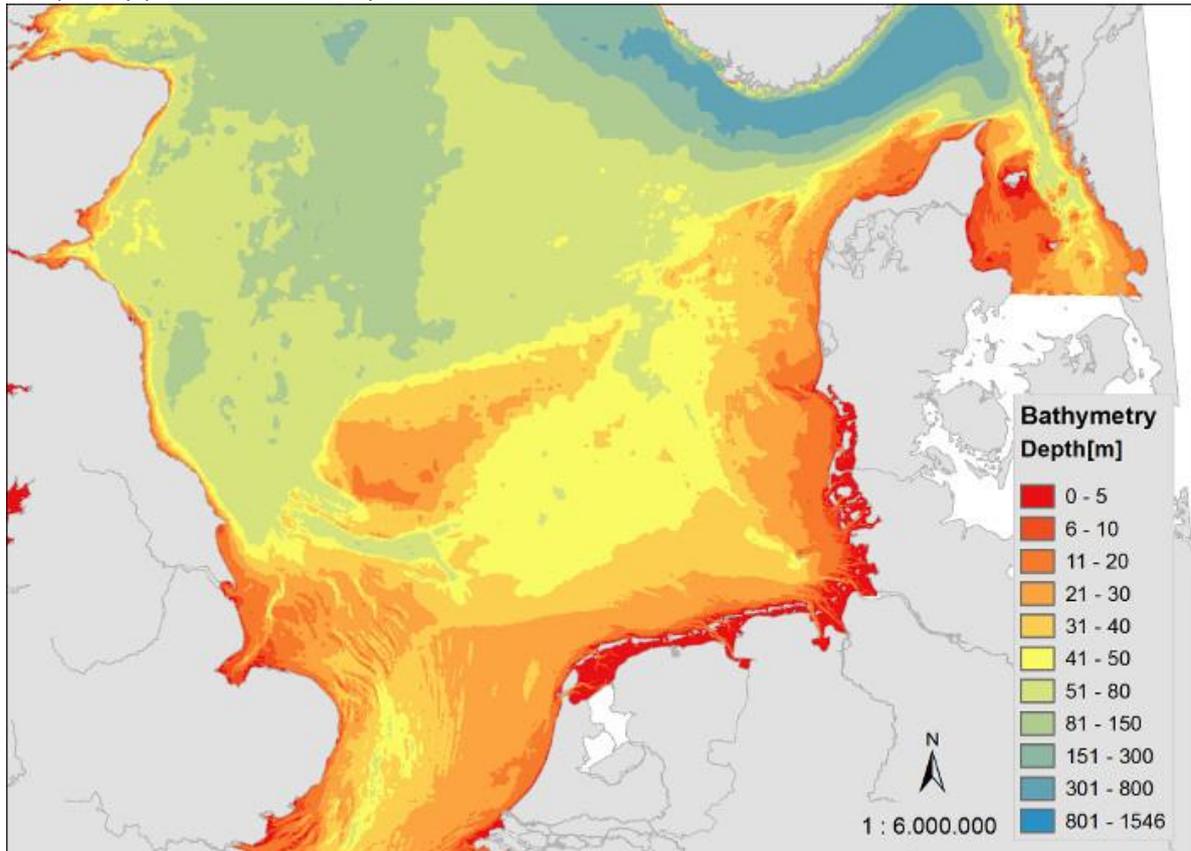
Bathymetry North Sea

GENERAL OVERVIEW	
Dataset name: <i>3D hydrodynamic model of the southern North Sea</i>	
Project: <i>North Sea – Observation and Assessment of Habitats (NOAH)</i>	
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DATASET SPECIFICATIONS	
Dataset Parameter(s) and supplied Unit(s): <i>Bathymetry [m]</i>	
Date(s) available: --	
Validated: Yes	Version Date: 19.03.2014
Current State: <i>final</i>	
Format: <i>Raster (TIFF)</i>	
Citation: <i>Pätsch, J., H. Burchard, C. Dieterich, U. Gräwe, M. Gröger, M. Mathis, H. Kapitza, M. Bersch, A. Moll, T. Pohlmann, J. Su, H. T. M. Ho-Hagemann, A. Schulz, A. Elizalde and C. Eden (2017). "An evaluation of the North Sea circulation in global and regional models relevant for ecosystem simulations." Ocean Modelling 116: 70-95. doi.org/10.1016/j.ocemod.2017.06.005</i> <i>Casulli, V. & Stelling, G. (1998) "Numerical Simulation of 3D Quasi-Hydrostatic, Free-Surface Flows." J. Hydr. Engng., 124, 678-686</i>	

DATASET DETAILS

Abstract

The water depths were obtained from a Digital Elevation Model (DEM). It is a combination of the GEBCO_08 grid and > 60 high-resolution data sets of bathymetric soundings (W. Puls, unpublished data). The goal was to provide a standard description of bathymetry for long-term climate reconstructions. Present-day changes in the bathymetry of the North Sea are restricted to movements of large sand bars the deposition of suspended sediments in local depressions. These data were collected for the development of a regional 3D hydrodynamic model of the North Sea (TRIM) (Casulli et al., 1998).



The water depth in the North Sea roughly shows two general trends: (1) the water depth increases from south to north, and (2) in a cross-section from west to east, the water depths are highest in the middle of the cross-section. The general trends are disturbed by two special features: the shallow Dogger Bank and the deep Norwegian trench.

The water depth in the North Sea is mostly smaller than 200 m which means that the North Sea is a shelf sea. The exception is the Norwegian trench with a maximum depth of 725 m. With respect to the bathymetry, the North Sea can be divided into three parts: first the Norwegian trench, second the shelf area north of a line Flamborough Head – Cape Skagen (roughly the 60 m isobaths) and third the area south of that line.

The characteristic topographic features in the southern area are

- linear elongated sandbanks in the eastern part (e. g. Norfolk Banks, Flemish Banks) which may be up to 50 km long, 6 km wide and 40 m high. They are generated by strong tidal currents (Verweis auf Bild mit currents).
- With a minimum water depth of 15 m, the Dogger Bank forms a huge barrier between the southern and the northern North Sea. Its functioning as a barrier was even more distinct during the Ice Age when the sea level was more than 100 m below the present-day sea-level. The drainage of river water from the mainland (including the waters of the great ice-

age river Urstrom) to the north was forced to flow around Dogger Bank, thus carving two river valleys around Dogger Bank: the Outer Silver Pit and the northern part of the Pleistocene Elbe Rinne.

- The Oyster Grounds is a spatially extended depression with a maximum depth of more than 50 m. During the Ice Age, the drainage of the mainland rivers to the north was at some times obstructed by ice barriers between Scotland and Jutland. This damming led to a freshwater lake in the Oyster Grounds. The lake drained into the English Channel by cutting a riverbed into the dry beds of the Southern Bight and the Dover Strait.

In the northern part of the North Sea, the water depth decreases towards the north from about 60 m to more than 200 m in the Fladen Ground. The bottom topography looks rather rugged, including pits and deeps. This rugged appearance is the result of processes during the glacial periods. An example is Devils Hole, a group of trenches with a depth of up to 150 m below the ambient sea bottom. These north-south trending trenches are 20 to 30 km long. They were carved as "tunnel valleys" during the last glaciation by high energy melt waters. In fact the North Sea is full of such tunnel valleys, but most of them are filled up with sediment. Another example of glacial relicts in the northern North Sea is the moraine ridge along the south-western edge of the Norwegian Trench which extends between Jutland Bank and Ling Bank. The smallest water depth of the moraine ridge is between 50 and 60 m.

The Norwegian trench has its highest water depth of 725 m in the Skagerrak. Towards the North Atlantic, the depth in the trench first decreases to 270 m (so-called sill depth). Thereafter the depth increases to about 400 m at the trench's mouth to the North Atlantic. The Norwegian trench was formed during the Pleistocene by fluvial erosion and by glaciers and ice sheets moving toward the Atlantic Ocean.

The present bathymetry of the North Sea is a product of processes during the Pleistocene and during the transition period from the Pleistocene to the Holocene. Present-day topographic changes are restricted to the movement of large sand bars (e. g. off the Dutch coast) or to the deposition of suspended sediments (mud) in local depression (Oyster Ground, Fladen Ground, Norwegian trench).

Acquisition and Processing Description:

The bathymetry map was calculated and interpolated using the pre-processor of TRIM 3D Model (Casulli *et.al.* 1998).

The data points represents a quasi-regular grid. The grid-spacing varies between 400 m in the open sea and 50 m in German estuaries.

The bathymetry has been compiled primarily with bathymetric data from the following institutions:

Landesvermessungsamt Schleswig-Holstein, Kiel, Germany
 Flemish Hydrography, MDK - Coastal Division, Oostende, Belgium
 Danish Hydraulics Institute, Horsholm, Denmark
 Kystdirektoratet, Lemvig, Denmark
 Royal Danish Administration of Navigation and Hydrography, Farvandsvaesenet, Copenhagen, Denmark
 Bundesamt für Seeschifffahrt und Hydrographie, Rostock - Hamburg, Germany
 Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein, Husum, Germany
 Niedersaechsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Norden - Norderney, Germany
 Wasser- und Schifffahrtsamt Hamburg, Germany



NOAH

North Sea Observation and
Assessment of Habitats

Wasser- und Schifffahrtsamt Emden, Germany
Wasser- und Schifffahrtsamt Lauenburg, Germany
Wasser- und Schifffahrtsdirektion Nordwest, Aurich, Germany
Royal Netherlands Navy, Hydrographic Office, The Hague, Netherlands
General Bathymetric Chart of the Oceans (GEBCO)

Notes and Limitations:

The bathymetric data has been produced for-non-navigation applications only.