Die Küste, 76 (2009), 1-256

Errata

Corrigenda "Die Küste" 74
Fehlerberichtigung „Die Küste" 74
ICCE 2008 Edition - Synoptic Overview of the German Coastal Zone

Please note the following revisions:
Bitte beachten Sie folgende Korrekturen:

Page 31:
The correct list of authors includes Alexander Bartholomä as third author.
Die korrekte Autorenliste enthält Alexander Bartholomä als dritten Autor.

MANFRED ZEILER, KLAUS SCHWARZER, ALEXANDER BARTHOLOMÄ and KLAUS RICKLEFS
Seabed Morphology and Sediment Dynamics

Page 64:
The colour code is missing in Figure 4.
In Abbildung 4 fehlt die Farbskala.

Fig. 4: Seasonal North Sea circulation pattern, BSHcmod model data, 4-year average based on daily residual currents. The colours give the persistence in percent

Page 104:
The lower table is incorrect and is replaced by the table Warnemünde.
Die untere Tabelle ist falsch und wird durch die Tabelle Warnemünde ersetzt.

Fig. 5: Time series of mean water and high water levels at the Travemünde and Warnemünde gauge stations

Page 144:
The gauge Helgoland is missing in Figure 1.
In der Abbildung 1 fehlt der Pegel Helgoland.

Fig. 1: The island of Helgoland and Düne ('dune') (aerical Photograph © AWI, 2003)

Page 148:
The quality of Figure 4 has been improved.
Die Qualität von Abbildung 4 wurde verbessert.

Fig. 4: Development of Helgoland (main island) since 1890 (after KRUMBEIN, 1975)

Die Küste, 76 (2009), 1-256

Die Küste, 76 (2009), 1-256

Seabed Morphology and Sediment Dynamics

By MANFRED ZEILER, KLAUS SCHWARZER, ALEXANDER BARTHOLOMÄ and KLAUS RICKLEFS

Contents

1. Introduction

The German coasts extend along two different seas, the tide-dominated North Sea and the intra-continental non-tidal Baltic Sea. While the North Sea has an open transition to the Atlantic Ocean, the Baltic Sea has its only connection to the world's oceans through the North Sea and the shallow and narrow Danish straits and sounds (Fig. 1). Both shelf seas are not only different in their hydrographic characteristics, but also in their geological development (SCHWARZER et al., 2008, this volume), their sediment conditions and their geo-morphological features.

Although the seafloor in the German sectors of North and Baltic Sea is built up mainly of loose Quarternary deposits, the driving forces leading to environmental changes are quite different. While in the North Sea the sedimentological and geomorphological development (morphodynamics) is ruled by tides and waves, waves and wind driven currents are relevant for the seafloor conditions and sediment dynamics in the Baltic Sea. In both seas, however, phases of storm-induced high water levels often lead to severe changes of the coastal geomorphological environment. For the German North Sea coast this holds especially for storms from (north-)westerly directions, which can induce water levels of up to five meters above mean sea level usually for the duration of one or two tidal cyles. For the western Baltic Sea coast, storms from north-easterly directions have the strongest influence on coastal changes. Here, high water levels and therefore hydrodynamic extremes can last for days (SCHWARZER, 2003).

2. North Sea

The German Bight is a meso-tidal to low macro-tidal environment with a tidal range between two and four meters. According to geo-morphological features and sedimentological environments, the German sector of the North Sea can be divided into the three zones: the offshore waters, the tidal flats of the Wadden Sea and the funnel-shaped estuarine river mouths (Fig. 2). In the meso-tidal environment, the barrier island chain of the East Frisian as

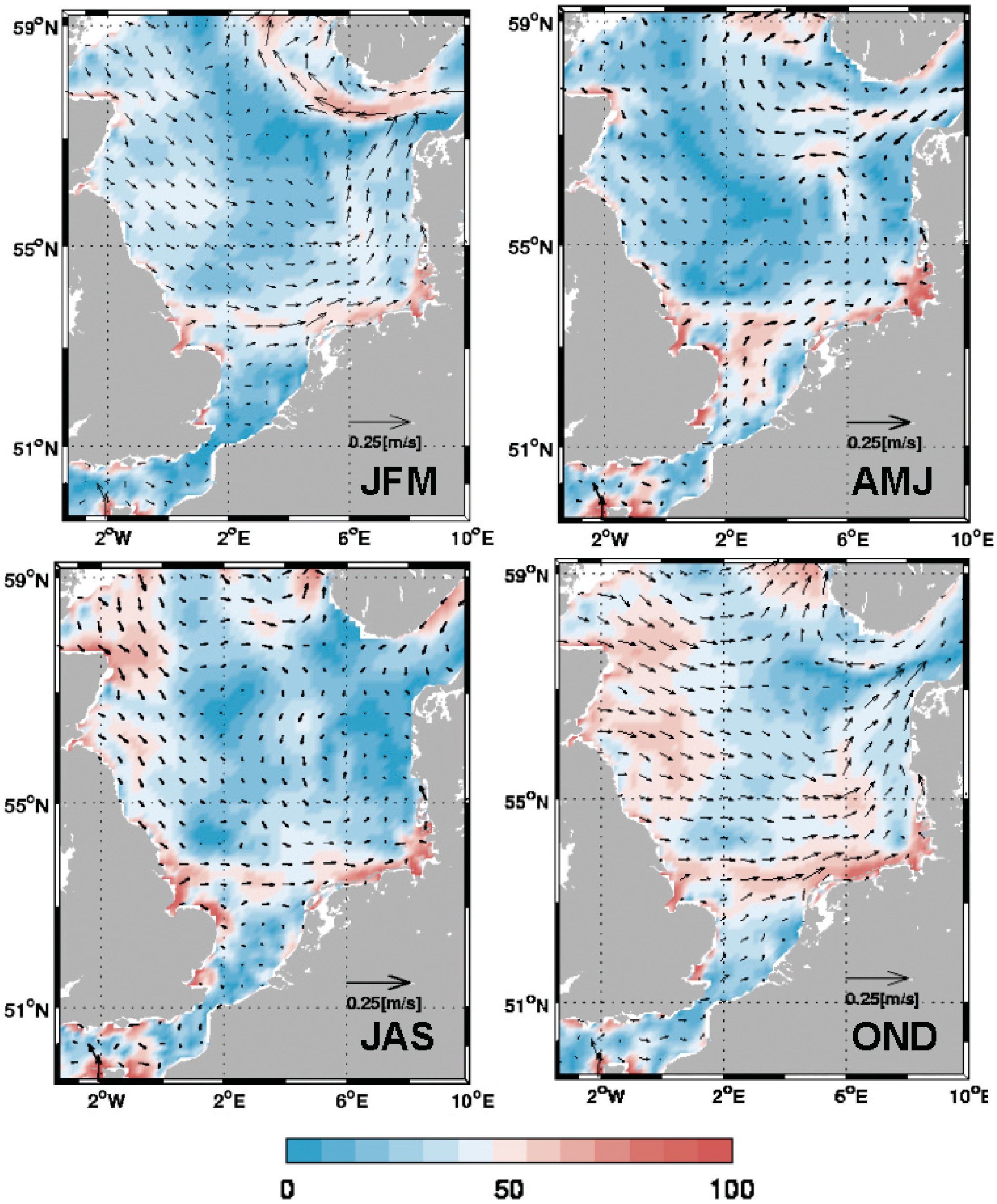
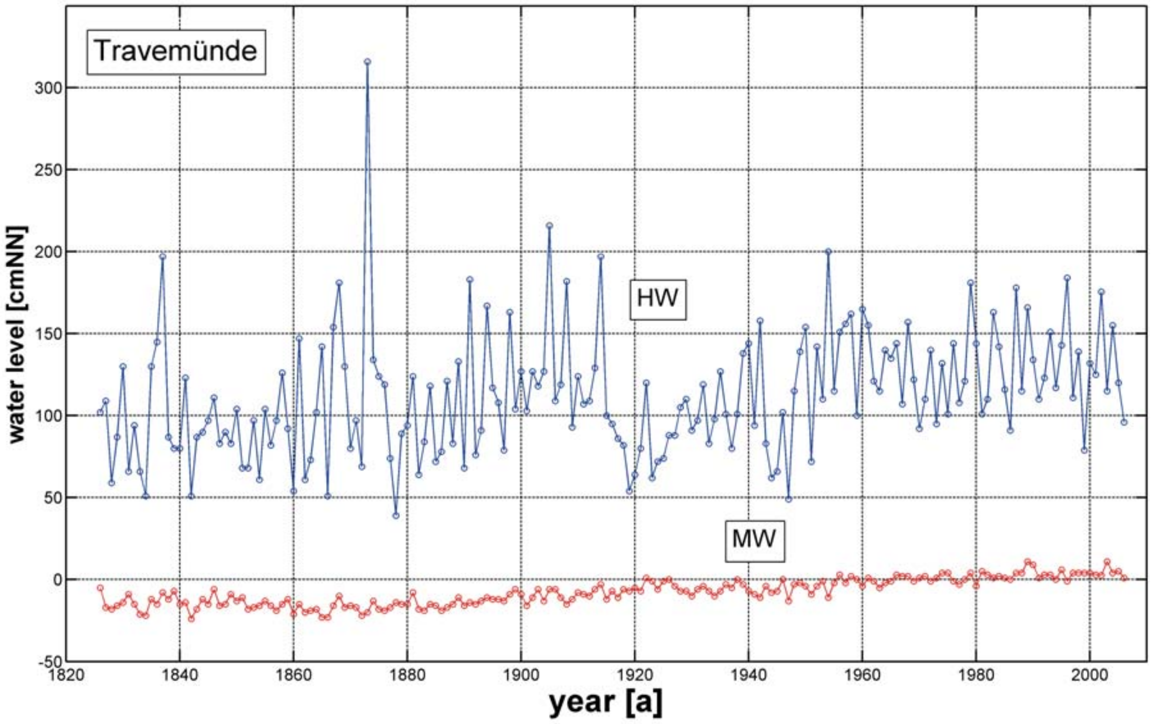


Fig. 4: Seasonal North Sea circulation pattern, BSHcmod model data, 4-year average based on daily residual currents. The colour gives the persistence in percent

In the long-term mean (1950–1986) the highest wind speeds in the German Bight occur in November (9 m/s) and decrease until February to 7 m/s. During March there is a local maximum of 8 m/s, then the values decrease rapidly to a value of about 6 m/s between May and August. Then the values increase again until they reach their maximum at the end of autumn (BSH, 1994). This seasonal cycle based on monthly means is conferrable to the sea state. At the light vessel 'German Bight' the percentage frequency distribution of both wave and wind direction shows a maximum for winds and waves from the West-south-west and a second maximum for East-south-east (Löwe et al., 2003).



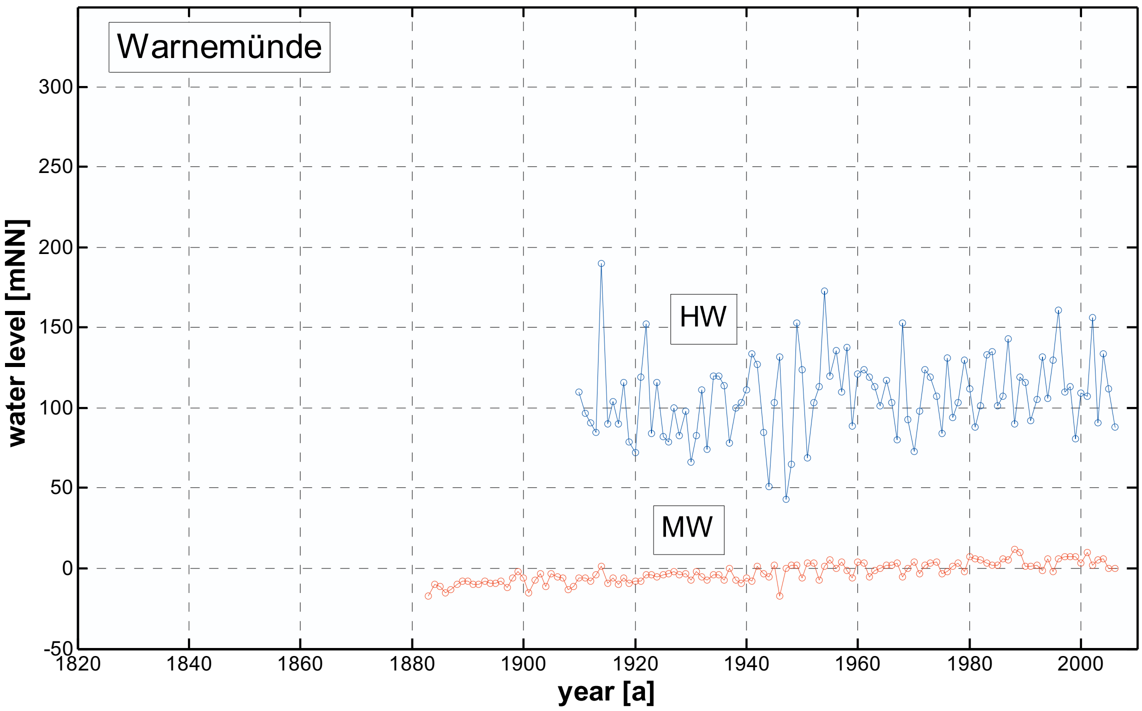


Fig. 5: Time series of mean water and high water levels at the Travemünde and Warnemünde gauge stations

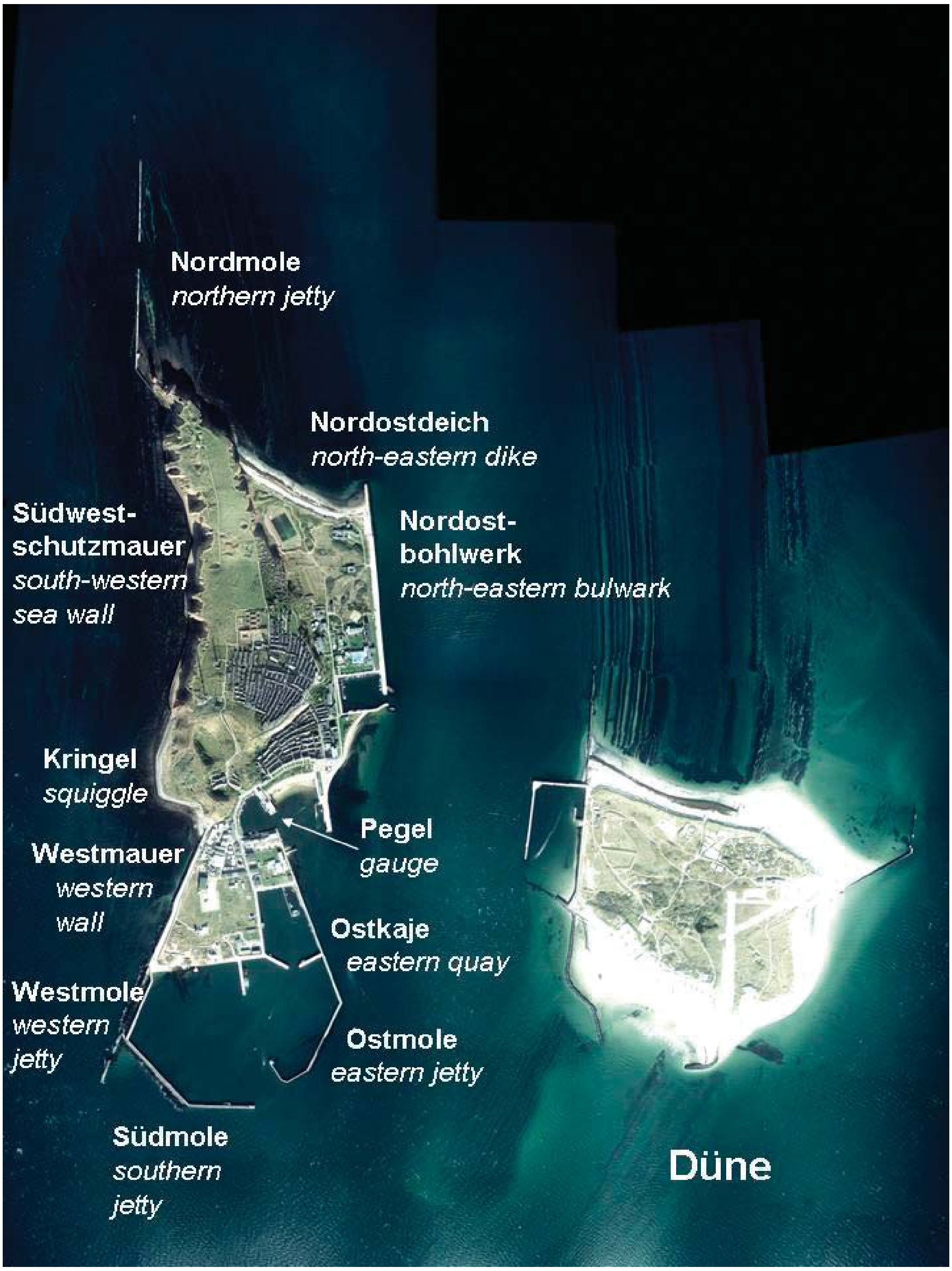


Fig. 1: The island of Helgoland and Düne ('dune') (aerial photograph © AWI, 2003)

2. Geology

The geological history of Helgoland starts in the Upper Permian (Zechstein) approx. 255 Mio. years ago. In an arid climate, enormous salt deposits were generated by repeated evaporation over a shallow inland lake. At that time, the present Northern Germany was located close to the equator and – as a consequence of the continental drift – migrated towards its present position only during the further course of history.

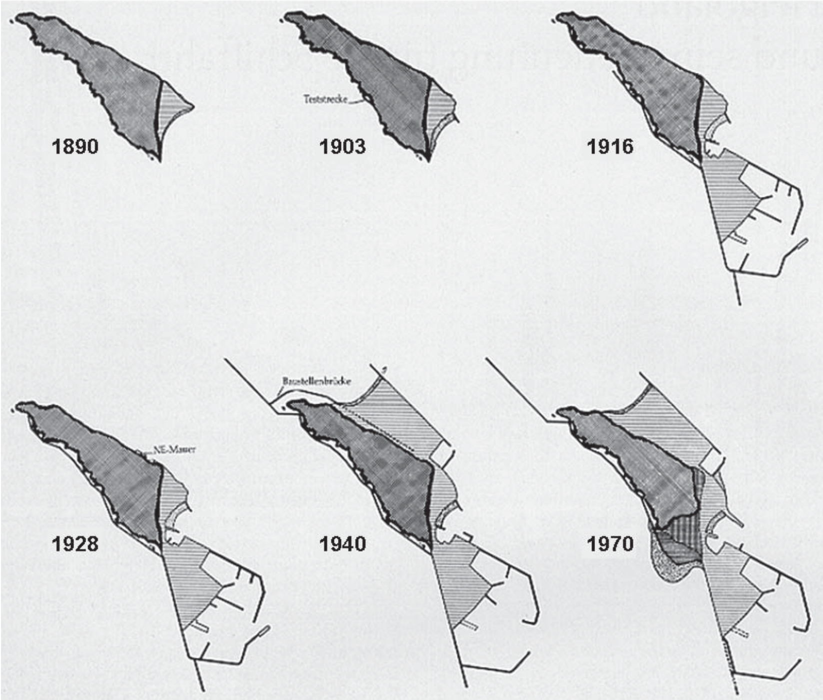


Fig. 4: Development of Helgoland (main island) since 1890 (after KRUMBEIN, 1975)

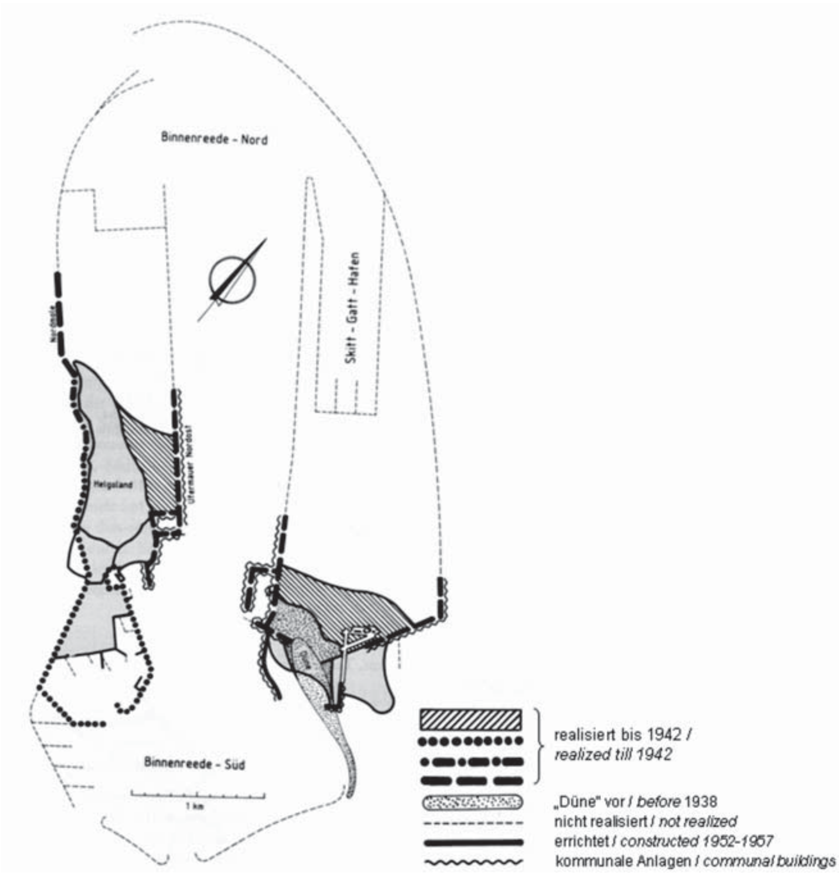


Fig. 5: Design of the mega-port 'Lobster Claw (Hummerschere)' and the realized structures (SCHINDLER and LINDEMANN, 1990)