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On the determination of net bedload transport patters in a natural tidal inlet system (Knudedyb in the Danish Wadden Sea)

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An airborne swath topography survey using a LIDAR (Laser Induced Detection And Ranging or Light Detection And Ranging) system and a ship borne swath bathymetry survey using a multibeam echosounder (MBES) system were carried out within a 100 km2 quadratic section of the natural tidal inlet system Knudedyb in the Danish Wadden Sea. On the basis of the LIDAR data a detailed (0.5 m grid cell size) digital elevation model (DEM) of the dry-lying areas around low water (with the intertidal flats being of primary concern) was generated; whereas the MBES data were used to generate a detailed (also 0.5 m grid cell size) DEM of the tidal inlet main channel.
The spatial distribution and characteristics of bedforms in a coastal system potentially yield information on the net bedload transport patterns in the system. The sandy main channel and intertidal flats of the Knudedyb tidal inlet are covered by bedforms. Bedform characterisation using a random field statistical approach (2D spectral analysis, cf. Lefebvre et al. 2011) as well as a discrete approach, in which the geometric variables of individual bedforms are determined (cf. Ernstsen et al. 2010), will be applied to the high-resolution DEMs. Based on these analyses net bedload transport patterns in the Knudedyb tidal inlet system will be determined. The findings will be used to investigate a potential exchange of sand between the main tidal channel and the adjacent intertidal flats.

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