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SMALL-SCALE VARIATIONS IN SEDIMENT CHARACTERISTICS OVER THE DIFFERENT MORPHOLOGICAL UNITS OF TIDAL SAND WAVES OFFSHORE OF TEXEL

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Beds of sandy coastal seas are dominated by large rhythmic bedforms. Tidal sand waves are highly challenging bedforms to understand given their migration rates (several meters per year) and dimensions (several meters height and several hundreds of meters in wavelength). Almost all experimental investigations addressing the formation and behavior of these sand waves neglect the non-uniformity of bed material. Moreover, scarcely any information is available on the seabed-sediment composition along a sand-wave field, especially when focusing specifically on the different morphological units (trough, slopes and crest) over multiple seasons. To help fill this knowledge gap, a sand-wave field located in the North Sea was investigated in June and October 2017. Sediment samples were collected to measure grain-size characteristics and sediment permeability over a transect spanning 16-18 sampling stations covering 4 sand waves (Figure 1). Results show significant variations in both parameters between the different areas of the sand wave (crest, trough, lee and stoss slopes), indicating a distinct sediment-sorting process that corresponds to increasing permeability and also coarsening of bed material towards the crests. The range in the median grain size (D50) was much greater than found in previous studies. We discuss the potential implications of this finding on the benthic distribution, biochemistry and morphodynamics of tidal sand waves.



Figure 1. Sediment collected from the North Sea using a 30-cm-diameter boxcore, with subsamples taken for sediment analyses (photo: C. Cheng).