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Hydrology and Earth System Sciences
Discussions

# *Interactive comment on* "Processing and accuracy of topobathymetric LiDAR data in land-water transition zones" *by* M. S. Andersen et al.

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Final author comments:

We have in the meantime, as mentioned in the previous author's response to the referees, addressed the issues and specific comments raised by the referees, and reorganized the manuscript. We have included the morphometric analysis in order to demonstrate the application for mapping morphological units in high energy intertidal environments, and specifically in relation to the vast intertidal flats in the Wadden Sea, which are otherwise impossible to map with full coverage in high detail.

We have analysed the DEM using a modification of the tool Benthic Terrain Modeler (BTM). Initially, stage (the elevation in relation to tidal range) was used to divide the area of investigation into the different tidal zones, i.e. subtidal, intertidal and supratidal.



Subsequently, morphometric units were identified and characterised by a combination of statistical neighbourhood analysis with varying window sizes (using the Bathymetric Positioning Index (BPI) from the BTM, moving average and standard deviation), slope parameters and area/perimeter ratios. Finally, these morphometric units were classified into six different types of landforms based on their stage and morphometric characteristics, i.e. either subtidal channel, intertidal flat, intertidal creek, linear bar, swash bar or beach dune.

We hereby demonstrate the potential of using airborne topobathymetric LiDAR for seamless mapping of land-water transition zones in challenging coastal environments with high water column turbidity and continuously varying water levels due to tides. Furthermore, we demonstrate the potential of morphometric analysis on high-resolution topobathymetric LiDAR data for automatic identification, characterisation and classification of different landforms present in coastal land-water transition zones.

Finally, this paper addresses one of the main themes outlined in the review paper of this issue "Characterising the ocean frontier: A review of marine geomorphometry" under the section "The future of marine geomorphometry", namely the filling of the gap between land and water. Hence, we remain arguing that the paper is of relevance for the community, and we believe that it is valuable to present the complete processing line from raw LiDAR data processing to automatic landform classification based on a geomorphometric analysis.

With kind regards on behalf of all authors,

Verner B. Ernstsen

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