

Interactive comment on “Characterising the ocean frontier: A review of marine and coastal geomorphometry” by Vincent Lecours et al.

Vincent Lecours et al.

vlecours@mun.ca

Received and published: 25 May 2016

We thank you for your time reviewing our manuscript. We are currently working on addressing the three reviewers' comments while awaiting the decision of the editor.

Please find below a point-to-point summary of your main comments and how these will be addressed. In general, the text will be thoroughly revised to make it more succinct. As can be observed in our answers to the reviewers' comments below, this will entail a reduction of chapter 2 and a revision of chapters 6 and 7.

1. RE Structure: The five steps in geomorphometry outlined by Pike et al. (2009) are highly pedagogical in relation to teaching and learning geomorphometry as a discipline. However, the choice of structuring the paper according to these five steps and combining this with the aim of attempting an exhaustive review is very challenging, and

C1

more or less a Sisyphus task, as each of the five steps would be worthy of its own review. The result is that the review/analysis of each of the five steps tends to become superficial and to some extent rather being a listing of earlier studies. Consider an alternative structure with a clear alignment between the aim and objectives of the paper and the findings and recommendations based on the analysis of the authors. In this regard the aims and objectives could be even more precisely formulated, also in order to highlight the focus of the review. Referee #2 provides many good suggestions of how to alternatively structure the paper.

We agree with the reviewer that each section would be worthy of its own review. Our objective was not to write a review of each of these steps, but to review how they integrate together to form a typical marine geomorphometry workflow. We have discussed the matter and decided to keep the current structure of the manuscript based on Pike et al. (2009). It is often observed in the community of end-users that there is a lack of understanding of the fact that each of the five steps has implications for the derivation of terrain attributes or extraction of terrain features, and consequently implications for the final application. By structuring the review following these steps, we hope that end-users can realize the role of each step in determining their quantitative terrain characteristics. However, we will make some sections, e.g. section 2 on the remote sensing techniques used to collect depth data, shorter and shift their focus towards data characteristics and how they impact the final application. In doing so, we hope to make the review less superficial and more focused on the importance of each step for the final application.

2. RE Technologies: The section on sampling technologies (section 2) could be excluded from the review. Despite the dedication of five pages to the section it remains superficial, as it attempts to encompass a very broad range of technologies, including technologies like SBES which will not play a key role in the future. The data quality is fundamental for the DEM quality, and consequently for all DEM derivatives, and the final interpretations. However, this could be described and explained more gener-

C2

ically by focusing on the general characteristics and properties of point data, which in essence is integrated areal information, as all points are related to a footprint. I very much agree with the authors that one of the key dangers in the future application of DEMs and geomorphometry in planning and management is that the planners, managers and decision makers are not aware of the properties of the data foundation of the DEMs. Hence, consider highlighting data properties and not different technologies.

We agree to remove the excessive details on data collection and processing and focus on the characteristics of the data collected within each technique, which is still very relevant to geomorphometry.

3. RE Terminology: From a reader's point of view, the impression arises that the authors stress the importance of the differences between terrestrial and marine geomorphometry, as if the identification of differences would make the field of marine geomorphometry more relevant. This even leads to the suggestion of different terminologies for DEMs. In my opinion this is contra productive and merely confusing. The acronyms DEM, DSM and DTM are generic and sufficient for all environments. A more uniting approach with suggestions for a joint terminology and vocabulary across environments would be much more meriting. One of the major potentials of geomorphometry, as for geomorphology, is that it interacts with many disciplines. Within the geomorphometry community we should aim at aligning our terminology in order to foster and ease the coupling with other disciplines. Therefore, consider highlighting both similarities and differences between terrestrial and marine geomorphometry, and aim to unite the two disciplines wherever it is possible.

We agree with this comment and will endeavour to highlight the similarities between terrestrial and marine geomorphometry, and to use a uniform terminology. In the interest of precision when using these terms, we note that DSM or DTM are more appropriate terms than DEM when referring to the marine environment.

4. RE Domain: The exact spatial domain of the review is unclear. There is a strong

C3

bias towards deep water environments with practically no review of the shallow water coastal environment. Nevertheless, the authors seem to use the coastline as the perimeter of their domain. Many studies, especially within the last decade, have used high resolution DEMs in shallow water coastal environments to quantify sediment transport, sediment transport pathways, morphology and morphodynamics. These studies are practically absent in the present review. Many of these studies are available in relation to the line of international conferences of MARID, RCEM and ICS, and in the journals JGR Earth Surface, Geomorphology, ESPL and more recently ESurf (I will not mention any specific studies here, as the list is long). Moreover, the authors mention the bridging of terrestrial and marine environments as one of the key future challenges (and actually a paper in the special issue is addressing this), but this without having reviewed the shallow water environments in the first place. Hence, the present analysis is simply to superficial. This was also highlighted by referee #1 although not in relation to shallow water. Consider defining the exact domain of the review, and then either fully include or exclude shallow water coastal environments. Specifically it even leads to erroneous information, e.g. when the authors discuss tidal corrections which are rarely used in high-precision and high-resolution shallow water environments where high-precision positioning is available and applied.

Our spatial domain does extend to the coastline, and our reference list already includes 25 papers focusing on coastal/shallow water environments. We will include a better coverage of these papers (as well as others) in the three applications of marine geomorphometry in section 6. We will also make more explicit the scope of the sub-section related to the littoral gap.

5. RE Applications: A range of applications is listed. However, the descriptions of the applications are strongly biased towards habitat mapping, and to some extent also hydrography in relation to safety of navigation. The enormous potential of geomorphometry is that it has a vast amount of applications, and some not yet realised. It would suit the review if the analysis of the authors would lead to suggestions of new ar-

C4

areas where geomorphometry has not yet been introduced and tested or highlight areas where present applications could be further developed.

The bias towards habitat mapping and geomorphology is in line with the fact that these are the two most common applications of marine geomorphometry, as illustrated in one of the figures. However, we agree with the reviewer that it would suit the review to suggest new areas of application. We will extend chapter 7 to propose new areas where marine geomorphometry may be applied with success in the near future. We also welcome specific examples that the reviewer would like to see included.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-73, 2016.