

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

**Anonymous Referee #3**

Received and published: 24 April 2016

### **Short summary**

This paper aims at providing a timely review of marine geomorphometry. The intention is to raise awareness of the science of geomorphometry in marine environments, to review the existing literature on marine geomorphometry, to highlight differences from terrestrial geomorphometry, and to outline and recommend future research directions within marine geomorphometry. Overall the paper is structured according to the five steps outlined by Pike et al. (2009) in chapter 1 of the seminal book on geomorphometry edited by Hengl and Reuter.

### **General comments**

As I was invited to review the paper after two other reviews were already available, I have tried not to repeat the comments and suggestions of the two other referees which

C1

I both agree with. I instead try to focus on other issues of the paper. Overall I very much agree with the authors that there is a need for a review on marine geomorphometry. It is a discipline which is blooming immensely in these years, and this will for sure be the case in several years to come. However, I do have some comments of overall and general character:

- 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 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.

- 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 generically 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

C2

the DEMs. Hence, consider highlighting data properties and not different technologies.

- 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.

- RE Domain: The exact spatial domain of the review is unclear. There is a strong 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 too superficial. This was also highlighted by referee #1 although not in relation

C3

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.

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

I have not included any specific comments to the separate sections and also no comments for technical corrections. Due to the somehow fundamental character of the general comments from all three referees, it seems more relevant to initially restructure and refocus the paper, before more detailed corrections are suggested.

I sincerely hope that the authors will take up the challenge to revise the paper. Marine geomorphometry is a blooming field and we need an overview within the community, and we need this paper to ease communication with other disciplines that could benefit from marine geomorphometry.

---

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

C4