Earth **Surface**
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Discussions

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comment

Interactive comment on "Unsupervised detection of salt marsh platforms: a topographic method" *by* Guillaume C. H. Goodwin et al.

Anonymous Referee #1

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Overall Quality (General Comments):

The authors present a novel approach to autonomously (unsupervised) detect the spatial extent of marsh platform areas from a high resolution salt marsh DEM in a GIS environment. While the method seems somewhat useful, their approach is limited in that it is only applicable for marsh surfaces characteristic of steep scarps, as in erosional landscapes. Nevertheless, the unsupervised approach (TIP) presented by the authors is easy to follow and is repeatable, and can be very useful in change-detection analysis of natural and constructed salt marshes, particularly erosional landscapes, assuming that a high resolution DEM is available. Therefore, I think this paper can become a nice addition, pending the authors address the specific comments and technical suggestions outlined below.

Discussion paper

Specific Comments:

1. I worry that the authors may underestimate the level of detail needed to accurately resolve the decimeter scale topography of the marsh platform in the requisite DEM. The authors rely heavily on widely available Lidar DEMS for the TIP method despite the fact that the overall relief of the marsh platform is often missed completely by Lidar sensors. Perhaps it doesn't really matter here since the authors are establishing marsh platform identification on the scarp perimeters...but, I wonder if there are any ways you might improve on your method to extend its usefulness to other marsh landscapes (those without scarps, and those characteristic of "patchy", discontinuous areas of marsh platform that might be heavily dissected by intertidal creek networks.

2. The method presented here is only useful in marsh landscapes characteristic of steep scarps (as in erosional environments). I think that the title should reflect that in some way.

3. Perhaps you could include more descriptive information on the geomorphology of your study sites. For instance, you have high resolution DEMs for all, why not calculate drainage density, or some other metric to describe how heavily dissected the marsh platform is? Then, your results could vary as a function of drainage density and tidal range? Maybe...

4. The paper could use some organizational finesse to improve the flow of the narrative. There are many instances where results are stated in the Methods section, and there is no Discussion section, but discussion elements are mixed in with Results. I would also consider adding a separate section for "Validation" following or within the Methods section to describe how you evaluated the performance of the TIP method. It seems very out of place in its current position (Results and Discussion). See specific comments below.

5. The Results section is a bit messy. Perhaps consider organizing into a more logical manner. For instance, I like the idea of presenting results as a function of tidal range (or

drainage density – see comment #3)...start with S1, describe, then go on to S2...and so on. Then, in a separate section (see comment #4) you could demonstrate the effects of using the filter on TIP results. I think this approach would be fine, because you already told us that you don't want to use the filter...and that's OK.

Technical Comments:

ABSTRACT:

P1L3: The productivity and even survival of salt marsh...(remove "even")

P1L3: ...of salt marsh vegetation...(why vegetation here? Why not landscape? Seems out of place.)

P1L5: Determining platform boundaries...(Determination of platform boundaries...)

P1L7: saltmarsh (salt marsh...make this change throughout. There are several instances of saltmarsh vs salt marsh.)

P1L15: ...allows the accurate... (allows for the accurate)

P1L20: ..., it also suggests... (what is 'it'?)

INTRODUCTION:

P2L9: awkward, consider revising...perhaps something like, "...makes monitoring the evolution of salt marshes imperative for management strategies and scientific endeavors...".

P2L34: Right...but marsh platform slopes are on the order of 30cm total relief...and the overall structure is often misrepresented by lidar sensors with a nominal accuracy of +/- 15cm.

P3L17: ...horizontal resolutions...(do you mean horizontal extents? These are two very different things.)

P3L18: remove dash after "short".

C3

METHODS:

P3L27: can you provide any technical specs for the lidar survey? Seasonality? Tides? Etc. . .

P4L4: stronger than what?

P4L6: . . .provides. . .(change to provide)

P4L8: what do you mean by "numerous"? How many more channels are at this site compared to the others? Consider using more physical descriptors throughout your study site description. What are the respective areas?

P4L10: What do you mean by "levels"? Elevation? Water level?

P4L19: Why three times the horizontal resolution of the DEM? Why not 5 or 6?

P4L29-32: At what scale is this problematic? 100's of kilometers? 10's of kilometers? I thought we were focused on relatively small areas of marsh landscape. . .what are the relative sizes of each study site (see also comment P4L8 above).

P5L6-20: Can you briefly describe what each of these means physically and the importance of information provided by each?

P5L23 (and throughout): be careful to avoid stating results in Methods section.

P5L24: what is "pdf"? define.

P6L20: large number of true scarps? Or do you mean large number of misidentified scarps that are actually creek banks?

P7L7: why 11?

P7L16 (and throughout): results presented in Methods section

P7L27 (and throughout): revise without the use of "we"

P8L2: . . .pansm. . .(typo? Do you mean "pans")

RESULTS:

P8L11 (throughout): Methods presented in results section. Consider providing a separate subsection in Methods for "validation" and then share results in the proper Results section.

P8L12-15: I'm guessing TP, FN, etc... are obtained from subtracting? Maybe show that in Methods.

P8L26: ...the manual digitization...did you even discuss that in your Methods section? What software was used? Scale?

P9L14: describe one figure at a time, and in chronological order.

P9L19-29: discussion in Results section. Consider revising.

P10L6-7: Isn't this simply a transition zone between marsh platform and tidal flat?

P10L8: ...saltings...why are you defining this here? You referred to "salting" earlier with no definition. Define earlier.

P10L17: ...yes, but it's limited to erosional landscapes with obvious scarps.

CONCLUSIONS:

P11L9: ...algae...why is this here?? Did you test for this or are you speculating? Maybe you could instead say that your method works independent of such environmental factors...it's implied, but not exactly tested for in this paper.

FIGURES:

Figure 3: remove duplicate axis labels. For instance, a single "pdf" on the y-axis would suffice. Same for "x (m)" on the x-axis. Why is there a negative value on right-hand y-axis? P* values range from 0-1, yes?

Figure 5: be mindful of keeping tenses consistent in your caption.

Figure 7: duplicate axis labels…remove.

Figure 8: maybe a table would be a nice complement to this figure?

Figure 9: why do you say "determined area"? Why not "unsupervised" or "TPI" area? Similarly, why do you say "reference" perimeter? Why not "Digitized"?

Figure 10: scale?

Figure 11: duplicate axis labels…..remove.

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Discussion paper