

Interactive comment on “Coastal dynamics and submarine permafrost in shallow water of the central Laptev Sea, East Siberia” by P. P. Overduin et al.

Anonymous Referee #2

Received and published: 6 January 2016

Overall assessment:

This is a well organized, presented, and written paper. It is topical for The Cryosphere Discussions and will be of interest to broad readership. The combination of techniques/tools used, the topic, and the field site location lead to a strong study. I recommend publication after addressal of a few comments/concerns.

I urge the authors to provide a more holistic view/approach in the presentation of their results. For example, they ignore the sediment composition, ice content, and geomorphology of their coastal zone in their approach. This is described a bit more in the next paragraph and in my more specific comments.

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I disagree that “past erosion rates are similar to the long term mean rates observed over the past sixty years.” (p. 3755, lines 11-13). Changes in ice extent, storm fetch, wave and storm trajectories and the composition of permafrost coasts all play a role in heterogeneous erosion rates. The authors themselves have presented similar results in other studies. Perhaps they should say that the easiest and most “assumptive” approach is to assume linear rates but that to ascribe rates over time for

Comments keyed to the text: p. 3742 20: “profiles trace permafrost flooded” makes no sense

p. 3743 5:

p. 3744 26: “probably” is a wimpy word. Be stronger. How about “likely” or cite a study to be even more strong.

p. 3751 12: “The three periods with the most rapid rates were observed in the past nine years (2006–2007, 2007–2009, 2010–2011).” (p. 3755, lines 11-13). What does this say about the “past erosion rates are similar to the long term mean rates observed over the past sixty years” comment?

p. 3753 16: “huge” is a simply awful word. Provide dimensions, scale, comparative perspective, or a photo.

p. 3754 12: the “no” as in “number” is not needed. It is not provided for any of the other core mentions.

p. 3756 13: “based on four years of”? As currently written, and with the number “4” it is unclear what this means.

17: “chosen as our field site”

p. 3757 line 5 and onward talks about the differences between western and eastern shores’ p. 3758, line 25 onward also talks about differences between eastern and western shores.

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The differences in shore morphology, composition, and response to erosive forces is a potential strength of this paper. I recommend making the comparison a separate paragraph(s), perhaps even with a separate heading, to provide a more holistic view of the differences in morphology, ice content, sediment composition, bathymetry, wave fetch, freshwater inputs, and overall characteristics of the two areas. For example, p. 3757, lines 29 and 30 address a local characteristic likely endemic to that site/location. Can these unique characteristic be used to better predict/address how and where erosion will occur along the coasts?

p. 3757 8: "on flooded" makes no sense

24: "The IBP table position"

p. 3759 3: "affect the degradation rate."

4: "are at least"?

p. 3760 23: no comma needed after "coast"

27: "year-round and degradation rates"

Conclusions:

Again I feel the paper misses an opportunity to state how and where and why small scale processes or characteristics along the coastal zone can react to or armor against erosive forces. Ice content, slope, position, bathymetry, sediment characteristics, etc. This paper could move the ball forward.

The paper ends with: "other factors being equal, greater rates of coastal erosion generally lead to a shallower inclination of the IBP table close to shore. These results show that IBP degrades most rapidly immediately after it is inundated year-round, and that degradation rates slow over time. On this basis, it is likely that degradation rates for most of the Siberian shelf permafrost are less than 0.1 ma^{-1} . Combined geophysical surveys and drilling are required to better study the salt water diffusion into the

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permafrost after inundation."

I recommend identifying what in here is new or novel (not that much as it is currently written) and then stressing that. How and where might the combined approach here be used elsewhere? What is missing or needed? End with more of a bang to make this a more impactful paper. Think about what is presented as text in the caption for Figure 8c. Expand on that.

Figure 1b. This is a great Figure but comes across as TINY in my version. I hope it can be larger in size in final print?

Figure 5. In the legend it says "freshet" and in the caption is says "freshwater." Be consistent.

Figure 6. Figure 3 has a mark at 15 mega-ohms. I suggest providing the same mark here.

Figure 7. I assume "a" means "annum"? Why not just say "years"?

Interactive comment on The Cryosphere Discuss., 9, 3741, 2015.

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