

Reply to Editor comments on

“An Estimate of Ice Wedge Volume for a High Arctic Polar Desert Environment, Fosheim Peninsula, Ellesmere Island”

by Claire Bernard-Grand’Maison and Wayne Pollard

General comments:

Dear Ms. Bernard-Grand’Maison,

Thank you for your revisions. The reviewer's comments have been well incorporated into the revised version and its contributions and innovations are clear. I have a few minor corrections for you to consider before publication. Please see the detailed comments in the attached Comments to the Author.

Best regards,

Peter

Dear M. Morse,

Thank you for accepting our manuscript for publication in *The Cryosphere*. We have applied most of your suggested corrections. See detailed responses below.

Regards,

Claire Bernard-Grand’Maison and Wayne Pollard

Specific comments:

P1/L25: thermal protection from vegetation, a substantial surface organic soil layer, or thick snow cover. (Not just vegetation).

Changes made as suggested.

P2/L15: During the freezing season, rapid... / formation of cracks in frozen ground.

Changes made as suggested.

P5/L30: An Environment...

Changes made as suggested.

P5/L31-32 – P6/L1-2: The caption in Figure 3 refers to four surficial geology classes, but only one pooled class is shown to highlight where IW might be. Can you indicate in the Fig. caption that the surficial geology data are simplified, and here you can perhaps indicate the % area covered by the marine sediments that dominate. I think this way you can get away with not showing all of the surficial geology classes on the map. Perhaps say here: The area is mostly ... bedrock occur (Bell, 1996). Surficial geology of the area is dominated (???) by unconsolidated ice-rich silty-clay marine sediments below ~150 m a.s.l., but local fluvial, glacial, and glaciofluvial deposits are present.

The caption of Figure 3 has been modified to indicate that the surficial geology data is simplified: *“Surficial geology data has been simplified and is from a map produced by Bell (1992).”*

The sentences in Section 2 (Study Area) have been changed following the suggestion. The dominance of the marine sediments is estimated to be ~ 60%. The text has been changed to: *“The surficial geology of the area is dominated (~60%)*

by unconsolidated ice-rich silty-clay marine sediments below ~150 m a.s.l, but local fluvial, glacial, and glaciofluvial deposits are present.”

P6/L5: Change coldest to lowest and warmest to highest

Changes made as suggested.

P6/L8: Sparse vegetation (patchy low shrubs)

Changes made as suggested.

P14/L10: As with this earlier study...

Changes made as suggested.

P15/L18: our local observations relate directly to widespread permafrost thaw and development of thermokarst terrain... observed

Changes made as suggested.

P16/L9-13: Firstly, compared to manual delineation, two GIS-based semi-automated techniques – the Thiessen polygons methodology presented in Ulrich et al. (2014) and the Watershed Segmentation methodology, newly developed in this study – permit an acceptable approximation of IW volume in remote Arctic locations.

Changes made as suggested.

Figure 2 caption: Perhaps delete this text (“in a high-centered polygon environment”). Keeps things simple, and not tied to high or low centered environment, focuses on epigenetic IW, rather than state of polygons.

The authors agree to delete this text to keep it simple so the representation in a) can be interpreted by the reader.

Figure 3: Compression artifacts are evident on this Figure, especially when printed. Perhaps this is related to the PDF copy that I receive, but please ensure that the final figures are nice and crisp.

Compression artifacts are visible from the conversion of the document to PDF but the original figure is crisp.

Figure 3 caption: Perhaps delete this text as these classes are not shown on the map.

This text was deleted and the mention to the simplified geology classes was added. The caption is now changed to: “Surficial geology data has been simplified and is from a map produced by Bell (1992).”

Figure 4: Compression artifacts are evident on this Figure, especially when printed. Perhaps this is related to the PDF copy that I receive, but please ensure that the final figures are nice and crisp.

Compression artifacts are visible from the conversion of the document to PDF but the original figure is crisp.

Technical comments (minor wording changes, typos, etc.):

All the changes have been applied to the manuscript and improve its clarity.