The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2019-59-RC3, 2019

The Cryosphere Discussions

Interactive comment on "Iceberg topography and volume classification using TanDEM-X interferometry" *by* Dyre O. Dammann et al.

Anonymous Referee #3

Received and published: 7 May 2019

Summary

The paper investigates the capability of single-pass SAR interferometry from TanDEM-X bistatic acquisition for deriving sub-areal morphology and volume of icebergs. The results are validated using Operational IceBridge airborne data. The manuscript is well organized and clear in its explanations. The article yet again demonstrates the capability of the InSAR technique for cryosphere applications. TanDEM-X interferometry has been demonstrated for iceberg (eg. Zakharov et al., 2017)) and sea ice topographic mapping (e.g., Yitayew et al., 2018), and the current article, in particular the capability of deriving volumetric information signifies the potential of the technique for cryosphere applications and hopefully lead to more similar studies over other regions.

I would suggest to consider the following comments before publishing the paper.

General comments: P3, L21. It is noted that the icebergs in the area are "frozen into the landfast sea ice as seen from, . . .". Land fast ice can have topographic features such as ridges which can be as tall as a few meters and that of course influence the classification result presented. Have the authors checked for such structures?

P6, L9. Please comment the significance of the eight-day difference between the acquisitions of the satellite and the validation data on the validation process.

P9, L29-30. ". . . we slightly shifted the DMS DEM (translation) to visually match the InSAR DEM. . .". How accurate is to apply a manual shift (visually matching)? Why can't the geolocation information of both acquisitions be used to accurately align the two measurements? Is this related to the accuracy of the navigational system of the aircraft? Please discuss.

Specific comments:

P2, L23: "... strictly pertaining to the nadir-view two-dimensional shape . . ." Of course, a SAR image is the projection of the 3D info on a 2D plane. However, the scene as imaged by SAR is viewed from an angle (SAR is side looking). Please make it less ambiguous.

P3, L17. I don't think lambda is defined anywhere before that as the wave length. Also, please use "meter-scale" instead of "m-scale" throughout the paper.

P3, L28, [-pi, pi]. (Typo. inverted bracket)

P5, L21. Define L in "d=2.91Lˆ0.71"

P11, L15-16. ". . . High Resolution Side Swatch Mode". Probably should be replaced by "High Resolution Wide Swatch Mode"

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