

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

Anonymous Referee #1

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The manuscript investigates the capability of TanDEM-X InSAR to derive iceberg sub-aerial morphology and infer total volume. The validation of InSAR DEM is performed by comparison with airborne (Operation IceBridge) lidar DEM. In Referee’s opinion the manuscript can be interesting to the readers but it requires improvements before publishing.

Specific comments and questions: 1. Page 3, line 15: “This work utilizes data from the twin constellation TanDEM-X. . .” It can be recommended to avoid using “constellation” because it is commonly called as TanDEM-X mission.

2. Referee might suggest to the authors the inclusion of additional recent reference on the topic of the manuscript: I. Zakharov, T. Puestow, D. Power and M. Howell, 2109. "Icebergs in Sea Ice With TanDEM-X Interferometry," in IEEE Geoscience and Remote

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Sensing Letters. doi: 10.1109/LGRS.2019.2892896.

3. Page 5, line 15: “The total iceberg volume then can be inferred from this subaerial volume, which is 11% of the total volume. . .” This number has to be validated. The recent results on iceberg profiling using ship based lidar and sonar demonstrated that sail-to-keel ratio has different values (<http://oceansltd.com/iceberg-measurements/> and <https://www.onepetro.org/conference-paper/OTC-27473-MS>)

4. “In a final alternative approach, we classified icebergs according to minimum, expected, and maximum keel depth (Figure 9).” The results of keel estimation were also not validated in the manuscript. In Referee’s opinion the results on keel depth and iceberg total volume have to be validated before publishing.

5. A minimum keel depth as that for tabular icebergs is defined assuming a rectangular cuboid. However, according to Figures 3 and 4 the surface of icebergs has more complicated shape. In this case the question is how accurate the assumption?

6. Page 9, line 30: “Post geocoding, we slightly shifted the DMS DEM (translation) to visually match the InSAR DEM and calibrated the height of both datasets to zero height in an area of no icebergs. . .” What is the value of shift and inaccuracies such as spatial translational and rotational offsets?

Strength of the manuscript lies in the comparison InSAR DEM with airborne lidar data. However, the authors included results on estimation of iceberg total volume and keel (underwater portion). This is not feasible using InSAR DEM and was not validated in the manuscript. Therefore, I suggest make changes before publishing it.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-59>, 2019.

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