Review of:
Grounded Icebergs around Antarctica: A High-Resolution Dataset Derived from Deep Learning and Sentinel-1 Synthetic Aperture Radar
by Kaihong Jiao et al.

General judgement: This is an excellent paper! The authors present a very detailed, thoroughly thought-through algorithm for the detection of grounded icebergs and icebergs captured in fast ice, which includes efficient suggestions for handling problems such as look-alikes (small icebergs versus patches of rough sea ice or ocean clutter) and clusters of densely spaced smaller icebergs. The algorithm also considers additional information such as seabed topography and fast ice extent. Technical issues (different polarizations and different spatial resolutions of the SAR images available for the study) are discussed as well. The paper is very well written, and the figure captions are sufficiently detailed. Although this ML algorithm was developed only for use on Sentinel-1 images, it is a valuable basis also for applying it on images from other SAR sensors after corresponding training and testing. I recommend this manuscript for publication after my comments/suggestions below have been taken into account by the authors.

Comments:

Page 2 line 21: “picket fence effect” related to which process?

Page 3 lines 45-48: I do not see the immediate relation between obstruction of sea ice export on the one hand and the formation of a coastal latent heat polynya which requires free sea ice transport away from the coast. The sentence on lines 51-54 points to a reference that seems to support the formulation lines 45-48, but intuitively it is not clear. Is it possible to add a SHORT explanation?

Page 6 lines 133-135: The pixel size (I guess that is what is meant here) is 20 m for IWS and 40 m for EWS. (Which product was used: GRD-HR or GRD-MR?) However, it was found that the EWS mode reveals a stronger detection capability than IWS (page 30 line 608-610). Any idea what the reason is? The nominal NESZ is the same for both modes (-22dB). For the ESA S1 products, the ENL is smaller for IWS than for EWS (HR: 4.4 versus 2.8, MR: 81.8 versus 10.7, first number is IWS) (https://sentiwiki.copernicus.eu/web/s1-products). In your case it may be different, see question below. The main issue is that a higher ENL should intuitively increase the detection performance.

Page 6 lines 135-136: which are the default values for range and azimuth multi-looking in pyroSAR?

Page 7 Fig 1: Only one region was used for validation with the goal of assessing ”the generalisation of our proposed method across different seasons and possible limitations caused by surface melt during the summer“ (page 17 lines 68-69). Was this region chosen because of the optimal availability of suitable data which was worse in other regions? Would you expect similar results in other regions?

Page 10, section 3.1.3: I suggest to mention here the possible combinations of the image pairs (e.g. EWS with IWS, like-pol with cross-pol), and whether image sequences ≥ 3 are used.

Page 11, lines 222 and 225-227, page 15 lines 317-319, page 16 Table 2: thresholds and training parameters: Are they based on own experiments or taken from the literature? How strong does the sensitivity of detection performance depend on the selection of different thresholds and training parameters?

Page 12, line 253: How many training sessions were necessary for this study?

Page 13, line 260: The term "trajectory reconstruction" irritated me at first sight because I associated drifting icebergs. I expected a formulation like "test whether the iceberg is stationary". One could provide a hint to section 3.3.2 where a detailed explanation is given.

Page 16, section 3.4: The criteria for excluding icebergs dependent on SIC and water depth trigger the following comments: (a) It may be possible that the SIC data and/or seabed topography data are not accurate which could mean that an iceberg IS stationary although the application of the criteria excludes it with the given complementary data. Its exclusion means that I get a false negative (page 31 lines 631-634: here, the false positives are mentioned). (b) A hint of typical keel depths of Antarctic icebergs would be helpful.

Page 24, line 510: "Table 7" in parentheses?

Page 24, Table 6: In the caption for the table, it could be made clear that here sequences of *n* images are analysed and "start" and end" refer to the image number in the sequence at which an iceberg was first and last identified as stationary by the algorithm. Or point to section 4.1.2.

Page 29, line 567: ice(Fraser. => missing space

Page 31, line 634: do you really mean areas with complex "fast-ice topography" and not "seabed topography"?

Page 32, section "Future Work": (a) I am sceptical regarding the mentioned merits of altimetry. You get only a profile of surface elevation which may not be sufficient to conclude on volume and morphology of single icebergs. Altimeter data are of course a good complement for iceberg detection as such but problems will occur for smaller icebergs. (b) Multi-source image analysis includes different types of sensors (optical, thermal, radar) with different coverage and spatial resolution. For radar we have, e.g. different frequencies and polarizations. It is mentioned that cross-pol is preferable in iceberg detection, frequency may also have an impact. If you have already an idea what an optimal multi-source scenario could be, you should mention it. (c) Not clear to me: what is the "global contextual information"? How does the knowledge of distant conditions really help to improve detection of a single iceberg in its local environment?