The Cryosphere Discuss., 9, C2872–C2874, 2016
www.the-cryosphere-discuss.net/9/C2872/2016/

The Cryosphere Discussions
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Interactive comment on "Sea ice drift from Sentinel-1 SAR imagery using open source feature tracking" *by* S. Muckenhuber et al.

Anonymous Referee #2

Received and published: 26 January 2016

General Comments:

The authors present an assessment of an open source sea-ice tracking package (ORB) with parameters adopted and tuned for retrieval of ice drift from Sentinel-1 SAR images. The results of the algorithm were compared with the results from two other feature-tracking algorithms (SIFT and SURF). The time intervals between the images using in the assessment are between 8 and 48 hours, and the accuracy/quality of the results is measured by comparison with 350 visually identified vectors. Motion uncertainty is ∼600 m. Based on the results, the authors thus conclude that: ". . .that ORB is the best option for feature tracking of sea ice on Sentinel-1 SAR imagery. . .".

I find the descriptions of the algorithm to be insufficient for understanding the merit of the procedure. While most readers are not experts in motion tracking, the authors

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should provide at least enough details for a general appreciation of the merits of ORB. Not enough was provided in the approaches of SIFT and SURF, and it was not clear whether these algorithms were tuned to obtain the best results. Also, this is a small data set to be used for quality assessment of these algorithms. Thus. the conclusion seems to be somewhat unjustified given the restricted data set used in the assessment. A proper evaluation of these algorithms, seems to me, requires a larger data set with better-defined metrics for objective analyses.

Detailed Comments:

Page: line 6940:20 Perhaps it would be useful to describe why the selected images are sufficient for evaluation process – i.e., the range of ice conditions and what seasons do they cover? It seems that the data covers only winter conditions.

6941:5 What specific geometric coordinate system are the images projected onto prior to motion tracking? Are these ground range images? If so, what are residual planimetric distortions that could contribute to the assessment of data quality?

6941:15 The resampling algorithms listed do not necessarily reduce speckle noise, e.g., nearest neighbor, bilinear, etc. It is not surprising that simple averaging was the best.

6942:1 Define grid cell.

6943:1- It would be useful if the authors provided remarks along the way to help the reader follow the construction of features based on image intensity. How important is the absolute/relative calibration of the image values to ORB? So, the binary keypoints are no sensitive but the score R is?

6944: 10 What does the feature vector actually look like? How many features are there? It's not clear in the text. How are these features normalized for distance calculations?

6945:10 Is it really per hour?

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6945:12 I don't know how this could be justified: "...Using this assumption, it can be concluded that more matches equals better algorithm performance..."

6946: 1-10 Should the reader be familiar with these parameters?

6946: 4 2.5 km is not a velocity. Do you mean 2.5 km per day?

6947:3 What does the scale factor do?

6947: How are the SIFT and SURF algorithms tuned?

6948:19 In general, how far are the vectors from the manually identified vectors? Should the quality be dependent on distance from manual observation?? What is the RMSD for the other two algorithm,?

Interactive comment on The Cryosphere Discuss., 9, 6937, 2015.