The Cryosphere Discuss., 9, C1793–C1795, 2015
www.the-cryosphere-discuss.net/9/C1793/2015/

The Cryosphere
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Interactive comment on "Virtual radar ice buoys – a method for measuring fine-scale dynamic properties of sea ice" *by* J. Karvonen

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Received and published: 6 October 2015

This manuscript presents a methodology using features detection and tracking on coastal and ship radar data to analyze the fine scale drifting of so-called virtual ice buoys, and so, potentially, sea ice kinematics and deformation at small scales (below 10 km). The use of coastal and/or ship radar data for this purpose is interesting, either to improve our knowledge on sea ice kinematics at small scales, or for operational purposes. Consequently, I think that this work is worth publishing. However, as this work is essentially technical, and do not bring (so far) substantial new information on sea ice physics or mechanics, one may question the opportunity to publish such work in a more technical journal (such as IEEE) instead of The Cryosphere, but I'll leave the Editor judge on this point. Beyond this general comment, I think that this

manuscript should be improved in several places to precise the methodology, clarify different points, and to replace this work in the context of previous studies performed at larger scales on SAR imagery.

- Fig. 1 shows the very general structure of the algorithm, but many details are lacking, such as the detail of the filtering procedure

- I found the description of the filtering procedure rather obscure. In particular, please precise what you call homomorphic filtering. Please precise in details the filtering procedure, for example in an algorithm diagram.

- In relation to the previous comment, the section 4.1 needs a reformulation to improve its clarity

- The author argues that the proposed methodology is "novel". To what extent it differs from previous methodologies developed for the analysis of SAR imagery, such as in Kwok et al., IEEE Journal of Oceanic Engineering, 15, 44, 90 (this reference is actually not cited) ?

- I did not understood the Gaussian smoothing (relation 12): The Gaussian kernel is added to the pixel value I(r,c). I would have instead expected a convolution of the original signal by the Gaussian kernel to smooth the signal.

- the description of the results in section 5 is purely qualitative, and quite lengthy. I would instead extend section 4, which is the core of the paper, to give a more detailed and comprehensive description of the methodology.

- In the end, what is the uncertainty (error bar) on ice velocity (in m/s), direction (in °) , and acceleration (in m/s^2) obtained from these data and this methodology , and how can you estimate them ?

My general comment is to improve the paper such that it can be used by readers to construct their own code based on this promising methodology. This is not really the case yet.

Figures:

- Include scales on Fig. 3 to 6, as well as Fig. 11-12

- On the other figures, use real time scales (s) and not “time steps”

Interactive comment on The Cryosphere Discuss., 9, 4701, 2015.