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Interactive comment on “Long-term coastal-polynya dynamics in the Southern Weddell Sea from MODIS thermal-infrared imagery” by S. Paul et al.

Anonymous Referee #1

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The importance of coastal polynyas in the southern Weddell Sea for sea ice production and bottom water formation has long been recognised and a large number of studies have attempted to quantify these contributions. Most previous studies have used satellite passive microwave (PMW) observations to measure polynya extent. While PMW data have the advantage that they are relatively unaffected by cloud, they have two major drawbacks for studying coastal polynya processes:

i) They are of comparatively coarse (10–25 km) spatial resolution, and ii) They do not allow one to discriminate easily between thin ice and open water.

The latter point is of great importance as a large fraction of a coastal polynya may be

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covered with thin ice that then has a significant effect on surface energy balance and ice production (e.g. doi:10.1029/2009JC005797). In this manuscript, the authors use high-resolution satellite thermal infrared data to map out polynya extent and thin ice thickness.

The paper thus represents an important step forward in our knowledge of atmosphere-ice-ocean exchange processes in the Weddell Sea. However, the description of the methodology used is not detailed enough and some key terms are not defined. In particular:

i) A more complete description of the thin ice thickness retrieval technique is required. The Adams et al paper cited is not easily available and it would only take a few sentences (and maybe one or two equations) to set out the basis of the technique more clearly.

ii) There is no clear definition of "polynya area", "thin ice" etc. anywhere in the paper. It is absolutely essential to make clear what you mean by these terms, particularly when you are comparing your results with other studies which may have used different definitions.

In my opinion, the manuscript requires major revision of the methodology section before it will be suitable for publication. I have made further comments on this, and on other aspects of the paper, in the attached annotated version of the manuscript.

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/9/C1449/2015/tcd-9-C1449-2015-supplement.pdf>

Interactive comment on The Cryosphere Discuss., 9, 3959, 2015.

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