

Brief communication: Pancake ice floe size distribution during the winter expansion of the Antarctic marginal ice zone

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Copyright statement. TEXT

1 Pancake detection

The algorithm for the pancake detection is developed using the MatLab Image Processing Toolbox and built-in functions.

1. *Rectification*: projects the distorted camera image on an horizontal plane based on the camera internal parameters and
5 the angle of view;
2. *Contrast adjustment*: contrast in the greyscale image is enhanced based on a CLAHE algorithm (the limit for clipping and shape of the distribution are user selected) to better isolate the pancakes from the frazil ice;
3. *Masking*: removes the ship from the field of view;
4. *Binary conversion*: the greyscale image is converted into a binary image where 1 corresponds to white (i.e. ice) and 0 to
10 water or frazil (the threshold for conversion is user selected);
5. *Cleaning*: this morphological operation removes isolated white pixels (i.e. 1s completely surrounded by 0s);
6. *Erosion*: this morphological operation helps to separate the blobs corresponding to the pancakes (the erosion value is user selected);

7. *Filling*: this morphological operation substitute 0s with 1s in area completely enclosed by white pixels;
8. *Dilatation*: this morphological operation counterbalance the ice pixels lost by the erosion without merging two separate blobs;
9. *Clear border*: removes blobs intersecting the border of the field of view;
- 5 10. *Labelling and properties extraction*: geometrical properties of each individual floe are extracted.

All thresholds are user selected and the parameters have been subjected to testing to find the combination of operations that provided the best reconstruction as evaluated by the user visual inspection.