

Seasonal Variations in the Surface Hydrology of Antarctica's Ice Shelves

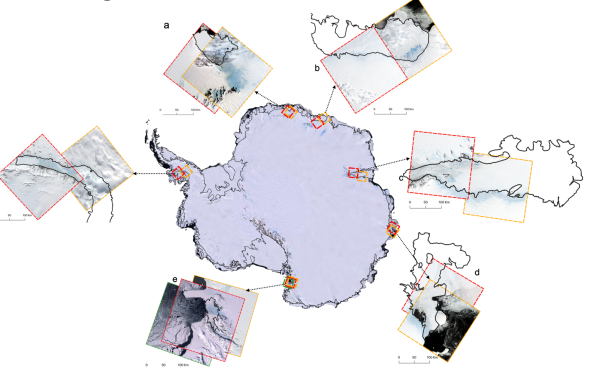
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The Problem

No method exists can automatically and accurately identifying both slush and ponded meltwater across all Antarctic ice shelves. Machine learning may offer a solution.

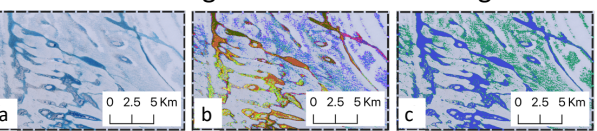
Step 1: Train

6 training and validation sites selected



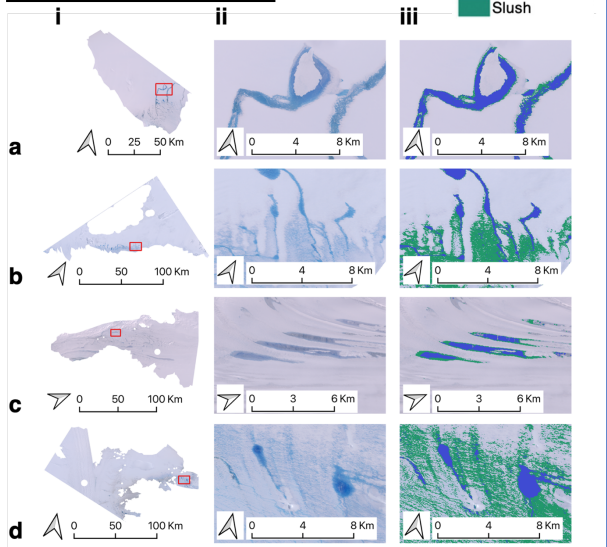
a) Nivlisen, b) Roi Baudouin, c) Amery, d) Shackleton, e) Nansen, f) George VI.

K-Means clustering used to create training classes



Example for Nivlisen Ice Shelf a) Base Landsat 8 image, b) output k-means clusters, c) interpreted classes.

Step 2: Validate



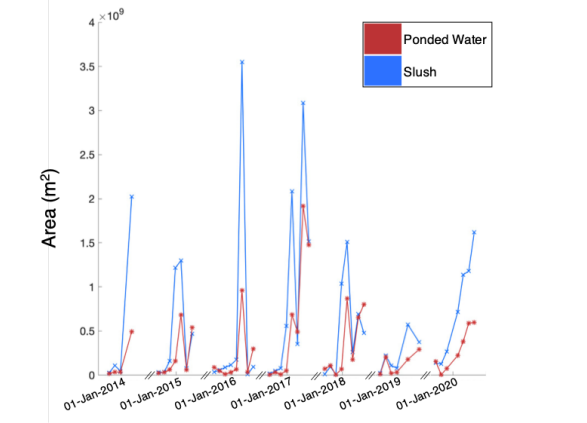
a) Nivlisen, b) Roi Baudouin, c) Amery, d) Shackleton. i) Landsat 8 RGB images, ii) close up of 'i', iii) 'ii' as classified by the supervised classifier.

	Pondered Water	Slush
Nivlisen	92%	92%
Roi Baudouin	86%	72%
Amery	65%	73%
Shackleton	96%	88%
Nansen	80%	74%
George VI	86%	91%
Average	84%	82%

Accuracy scores for the supervised classifier based on high-confidence pixels.

Step 3: Apply

Key Outputs = Time series data for each ice shelf. Available for the full Landsat 8 record.



Scaled areas for ponded water and slush over Roi Baudouin Ice Shelf. Data based on 15-day products that have over 20% AOI coverage.

Next: Investigate spatial & temporal trends across the Peninsula.

For more detail and to see the work presented here in full keep an eye out for: Dell, R., Banwell, A., Willis, I., Arnold, N., Halberstadt, A.R.W., Chudley, T., Pritchard, H. Supervised classification of slush and ponded water on Antarctic ice shelves using Landsat 8 imagery. *Earth and Space Science*. Submitted.