Supplement of

Automated mapping of the seasonal evolution of surface meltwater and its links to climate on the Amery Ice Shelf, Antarctica

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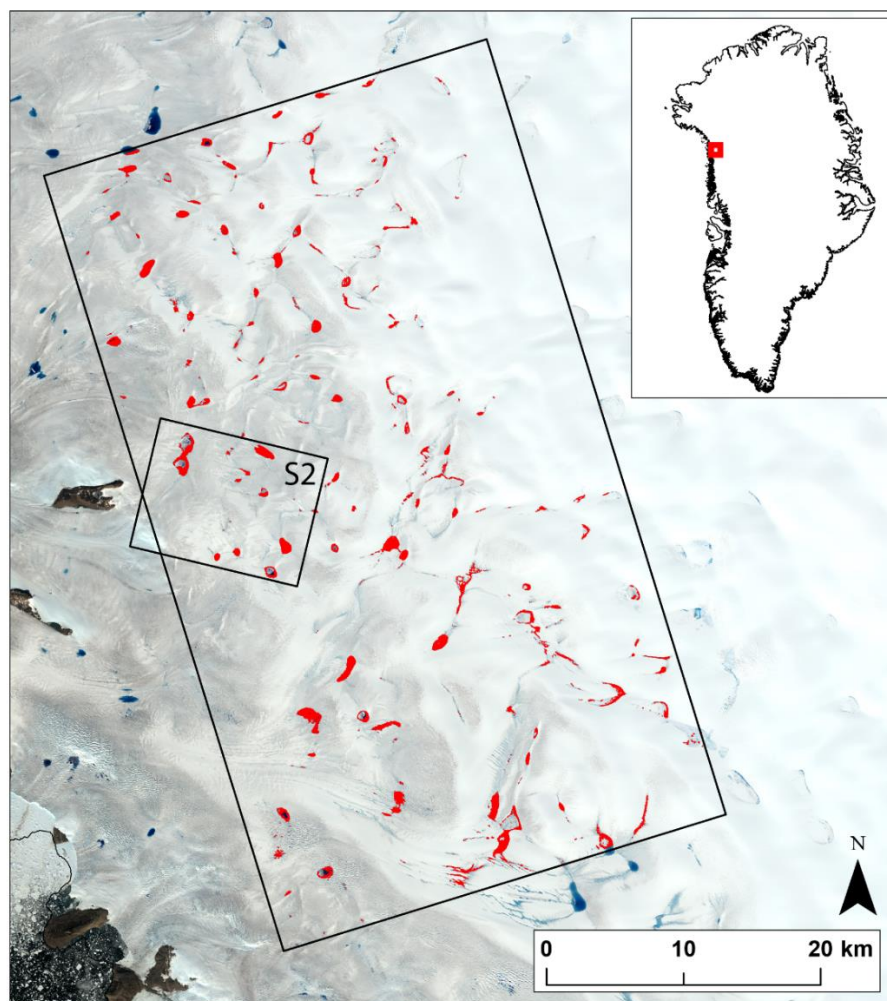
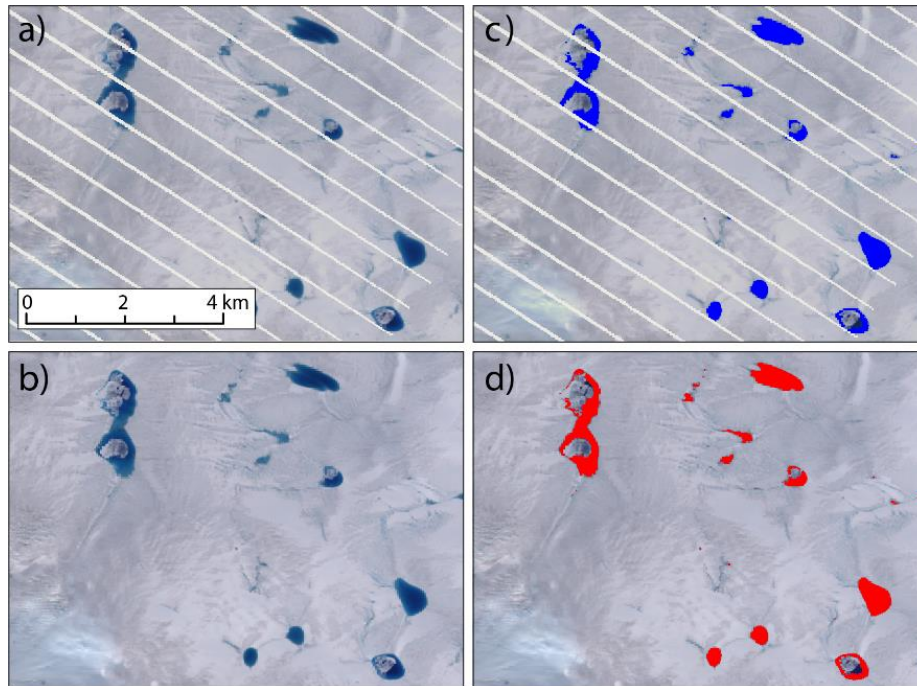
Comparison between Landsat 7 and Landsat 8 in north-west Greenland

In order to assess the quantitative difference between lake area results from Landsat 7 and Landsat 8 images, we compared results between two images (from the two different satellites) taken over the same region at approximately the same time. As no images taken close enough together were available in Antarctica, we conducted analysis over a 2000 km^2 region in north-west Greenland (Fig. S1). The closest temporal match we could find over a lake-covered region was 24 hours. Whilst this analysis has several limitations (including potential lake area changes in the 24 hour period between the two images), it enabled us to broadly assess the differences in surface meltwater identification between the two different satellites. We find that overall there is very good agreement between the two satellites, as shown in Fig. S2 and S3.

S1. Study region in north-west Greenland where Landsat 7 and Landsat 8 mapped lake results were compared. The larger box shows a 2000 km^2 region over which lake area results were compared between a Landsat 7 image (21st July 2013) and a Landsat 8 image (22nd July 2013, displayed), taken 24 hours apart. Automatically mapped lakes from the Landsat 8 image are shown in red. The smaller box labelled 'S2' indicates the region shown in Fig. S2.

S2. Automating masking of surface meltwater from Landsat 7 and 8 images. (a) Landsat 7 image from 21st July 2013, with automatically masked lakes shown in blue in (c). (b) Landsat 8 image from 22nd July 2013, with automatically masked lakes shown in red in (d). The area shown is displayed in Fig. S1. Note how the identification of surface water appears almost identical between the two satellites.

S3. Lake area comparison results between a Landsat 7 image and a Landsat 8 image from north-west Greenland (Fig. S1). Results are displayed from the region shown in Fig. S1.

Measure	Landsat 7	Landsat 8	Landsat 8 (with SLC stripes added)
Number of lakes	361	400	437
Minimum individual lake area	0.0027 km^2	0.0027 km^2	0.0027 km^2
Maximum lake area	1.39 km^2	1.54 km^2	1.54 km^2
Mean area	0.082 km^2	0.087 km^2	0.076 km^2
St dev. area	0.159	0.195	0.171
Lake visibility %	94.2 %	100	94.2 %
Minimum mapped total lake area	29.46 km^2	34.96 km^2	33.10 km^2
Estimated maximum total lake area	31.17 km^2	34.96 km^2	35.02 km^2