



EarthCARE 2026 Science and Validation workshop

8–12 June 2026 | Rhodes House | Oxford, UK

From MODIS to EarthCARE:

The role of precipitation on cloud break-up in marine cold air outbreaks

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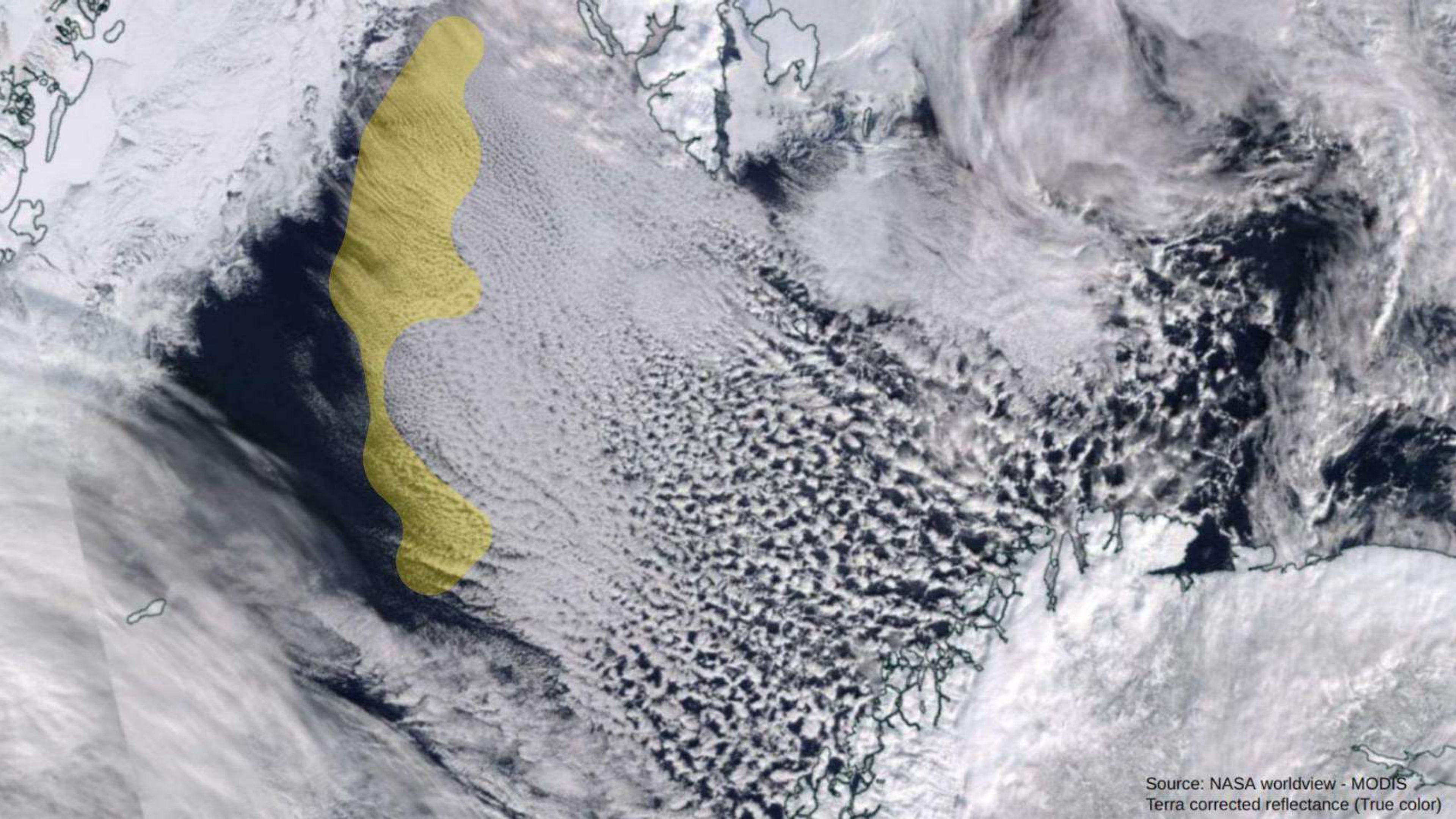
European Research Council
Established by the European Commission



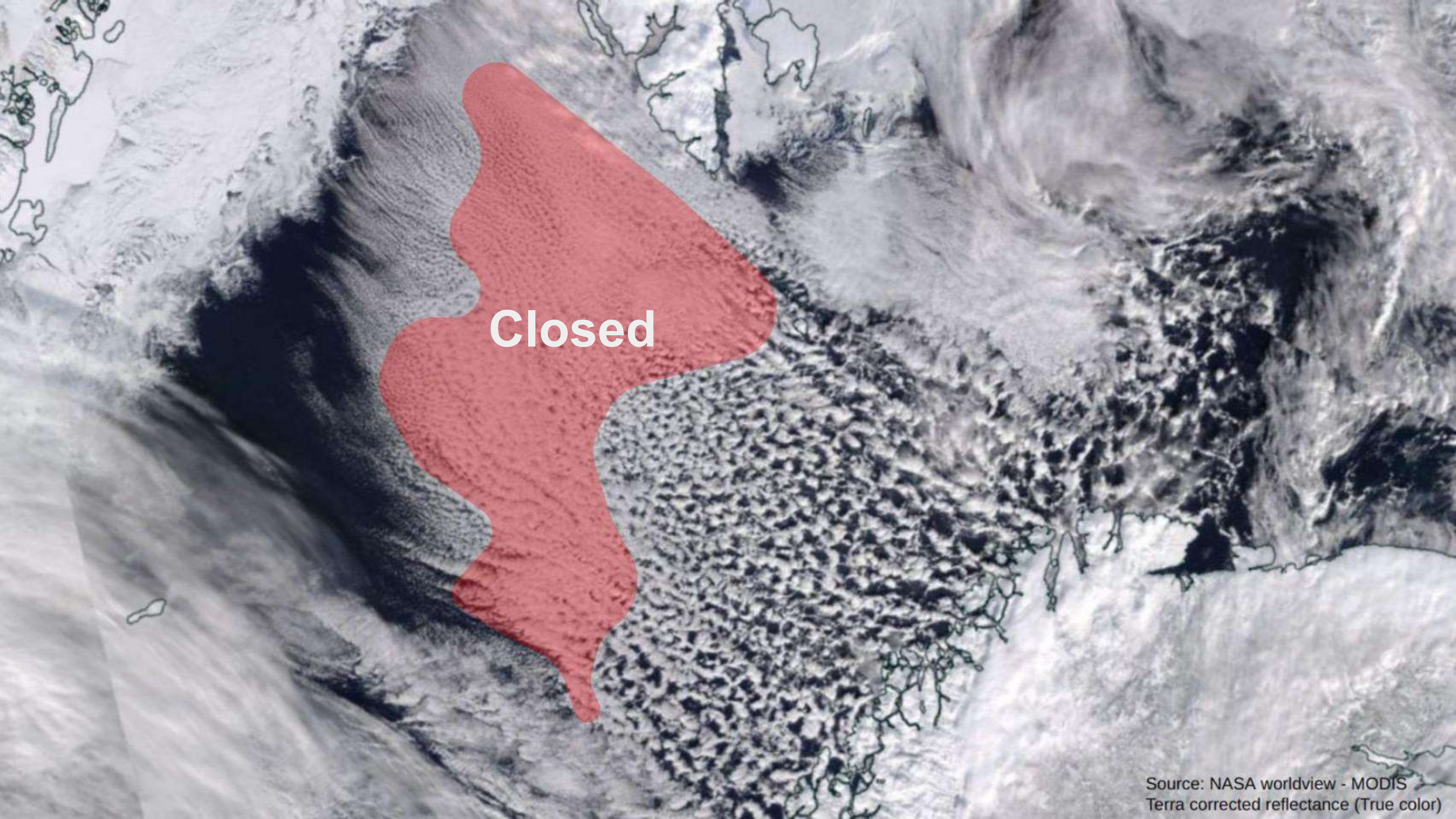
Sea ice



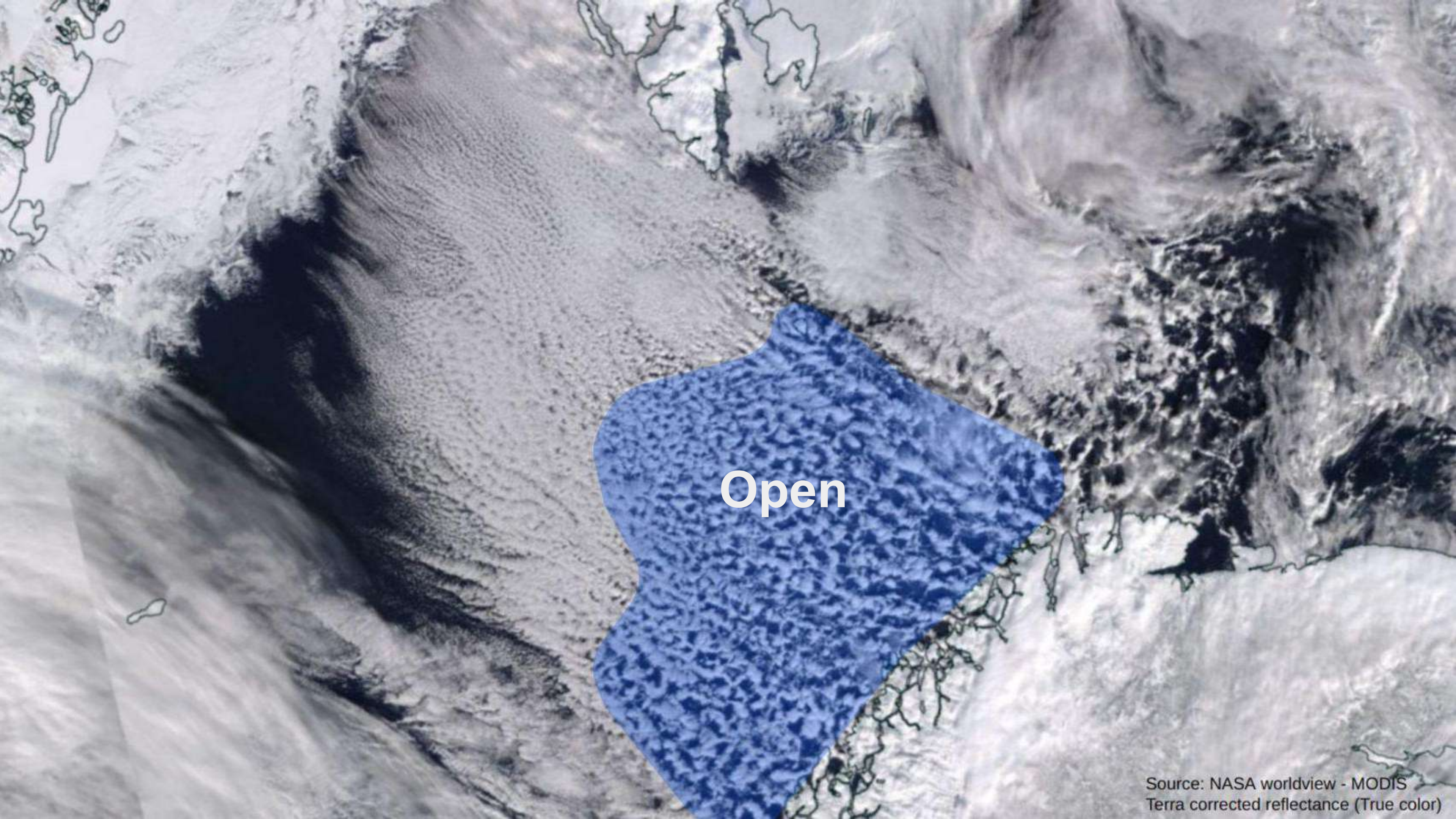
Norway



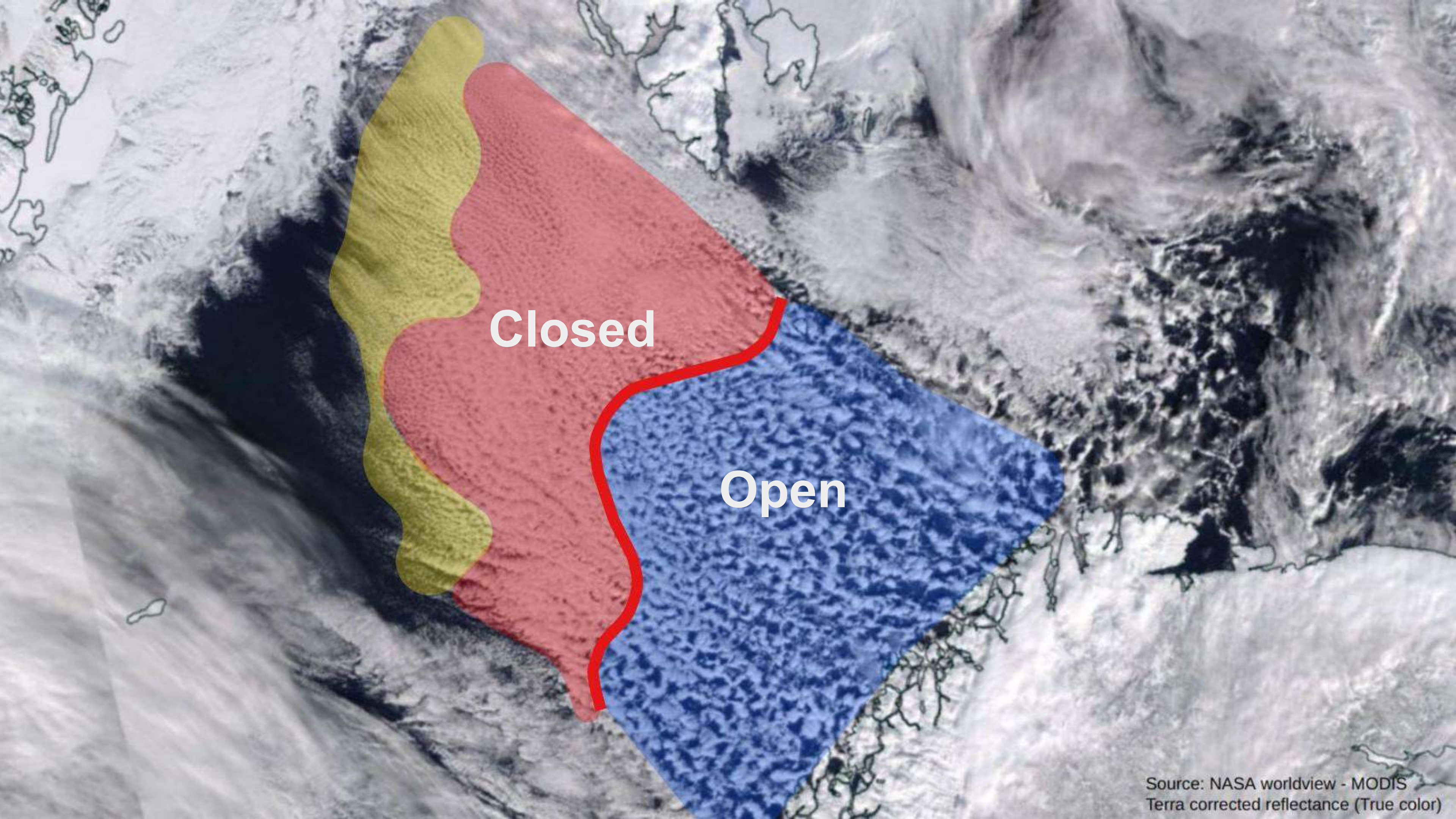
Source: NASA worldview - MODIS
Terra corrected reflectance (True color)



Closed

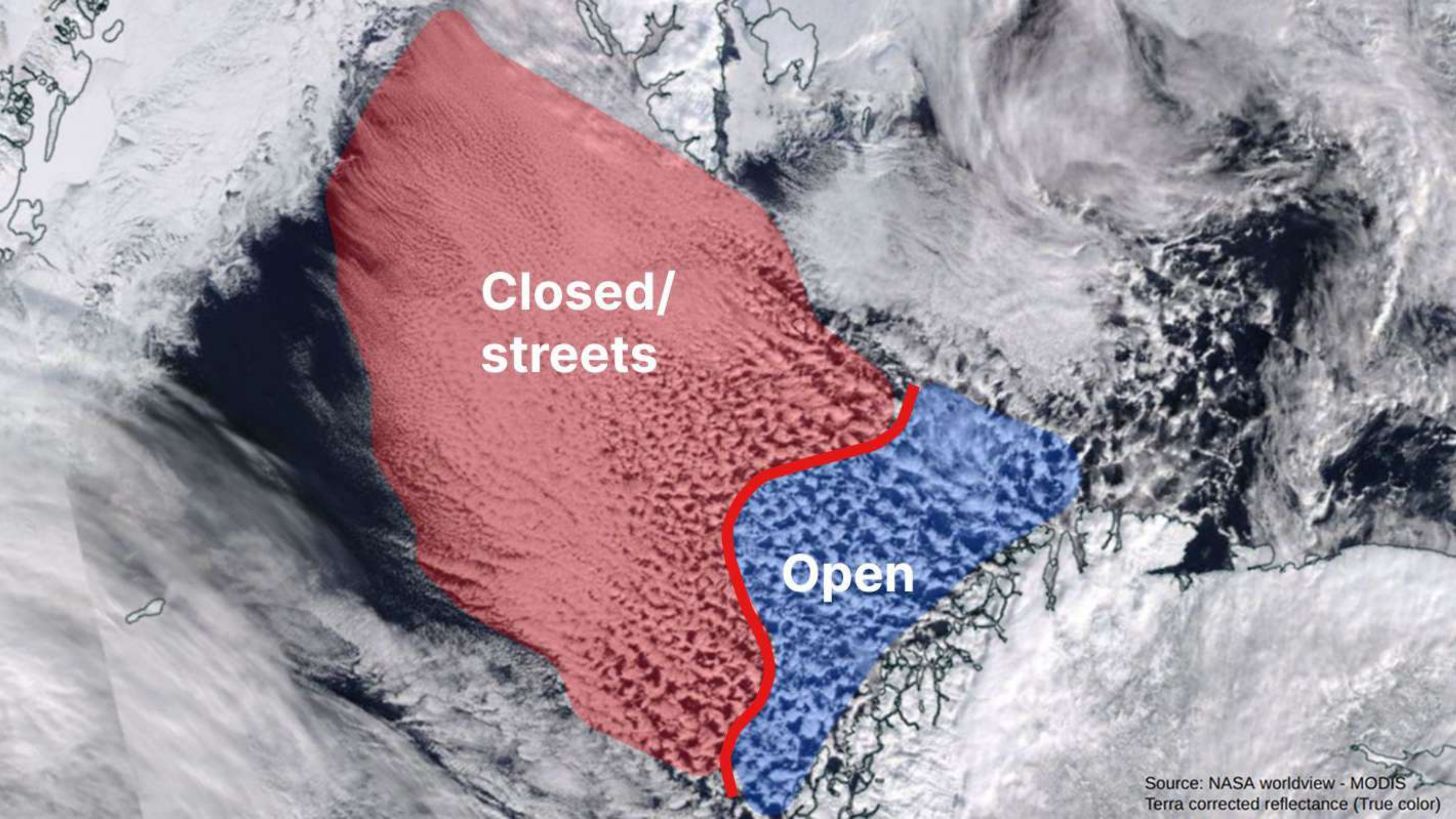


Open



Closed

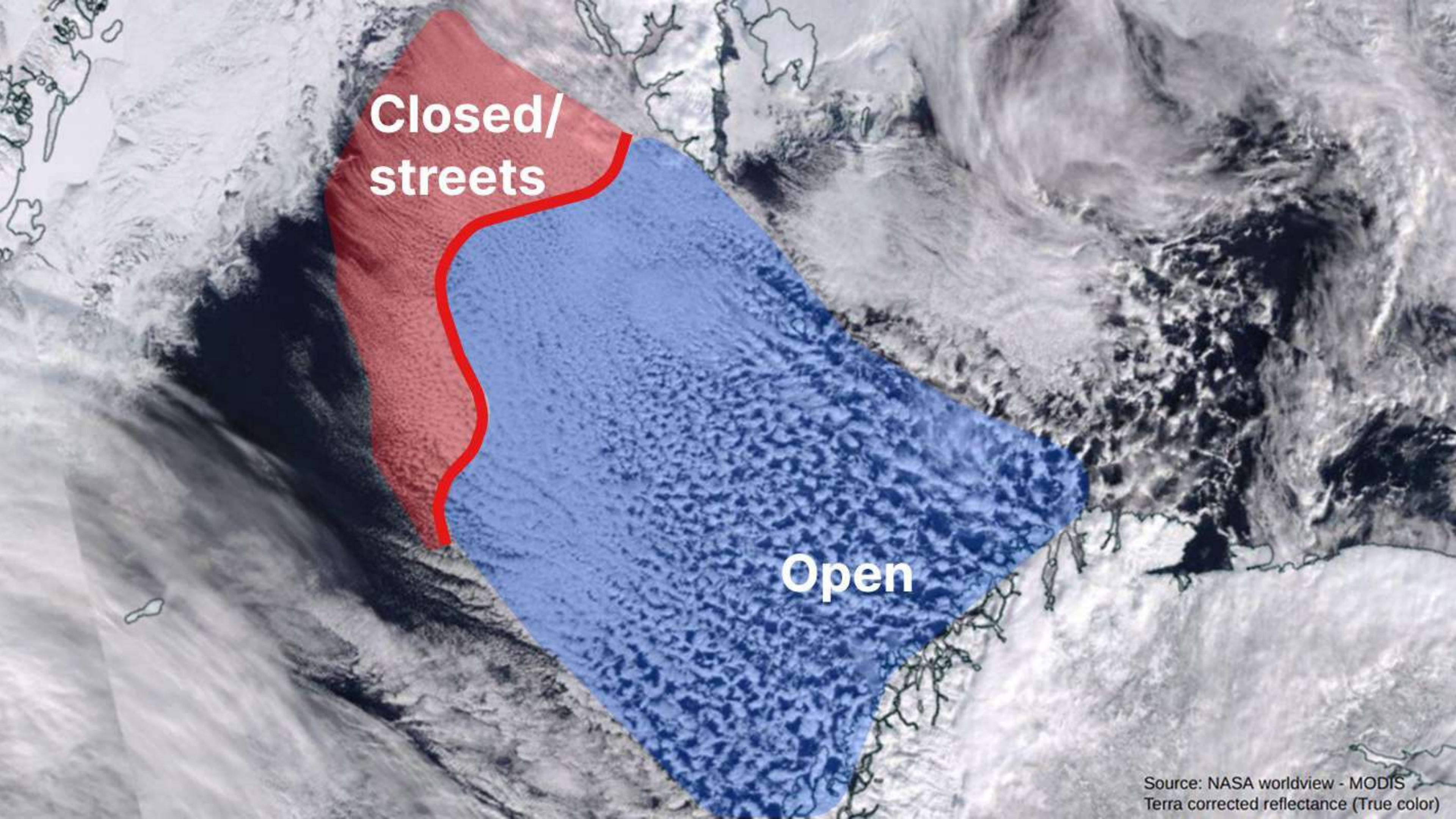
Open



**Closed/
streets**

This satellite image shows a coastal region with a large red-shaded area labeled 'Closed/streets' and a smaller blue-shaded area labeled 'Open'. The red area is irregularly shaped and covers a significant portion of the land. The blue area is also irregular and is located to the right of the red area. A red line separates the two shaded regions. The background is a grayscale satellite image showing land and water features. In the top left corner, there is a small inset map showing the location of the main image within a larger geographical context.

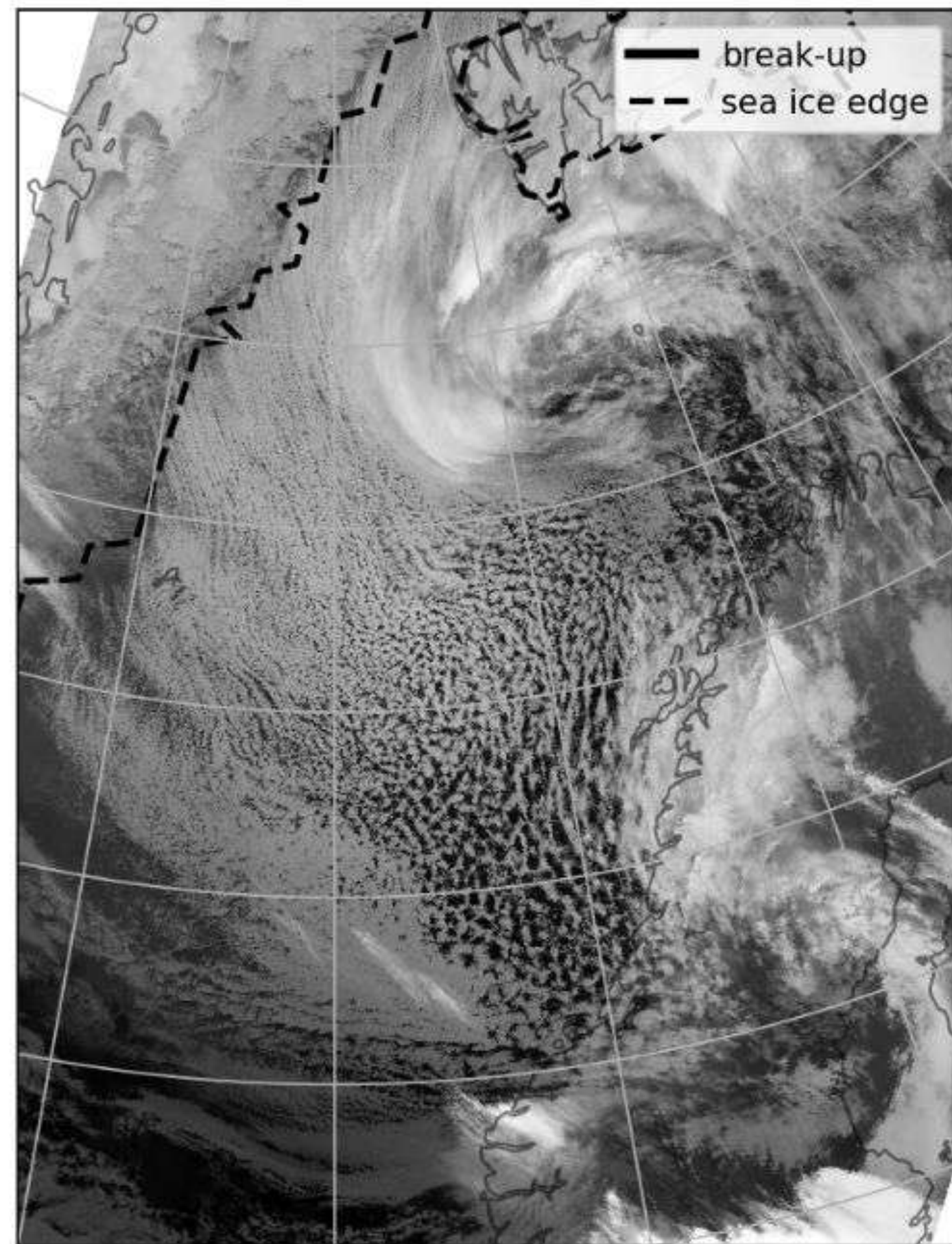
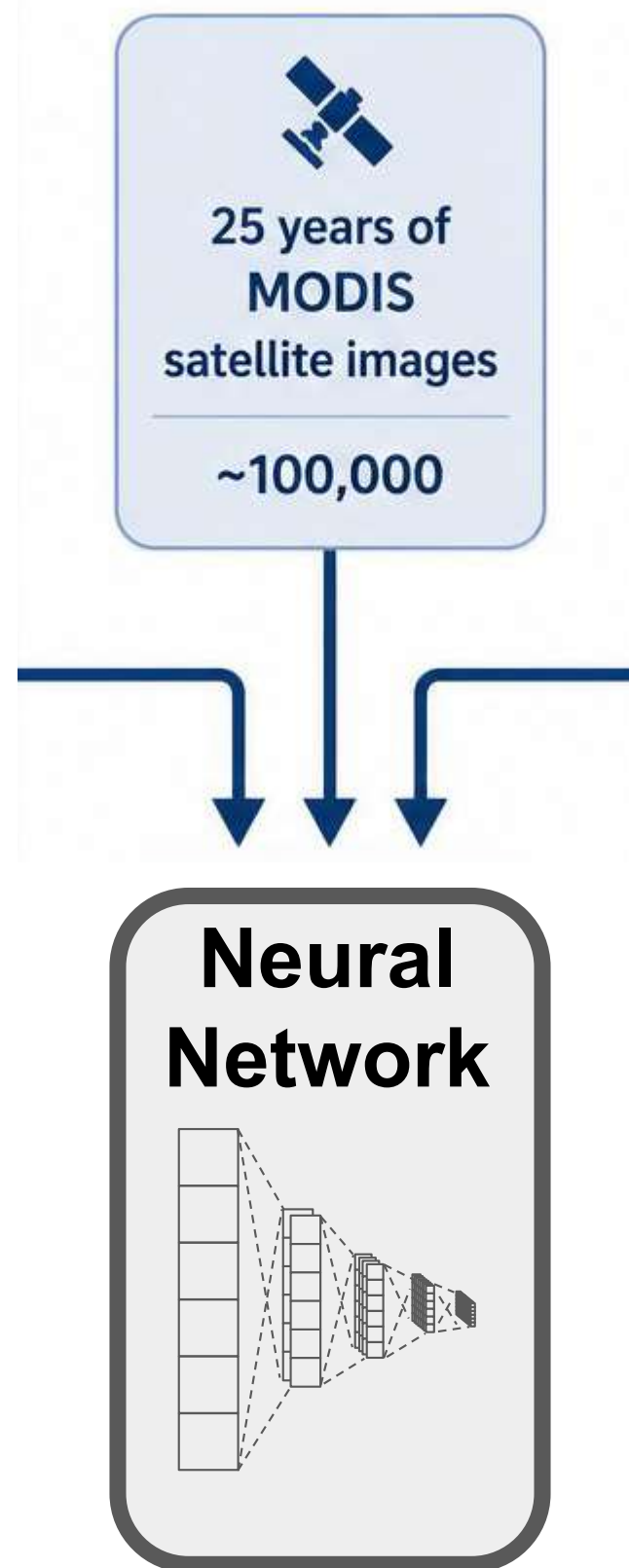
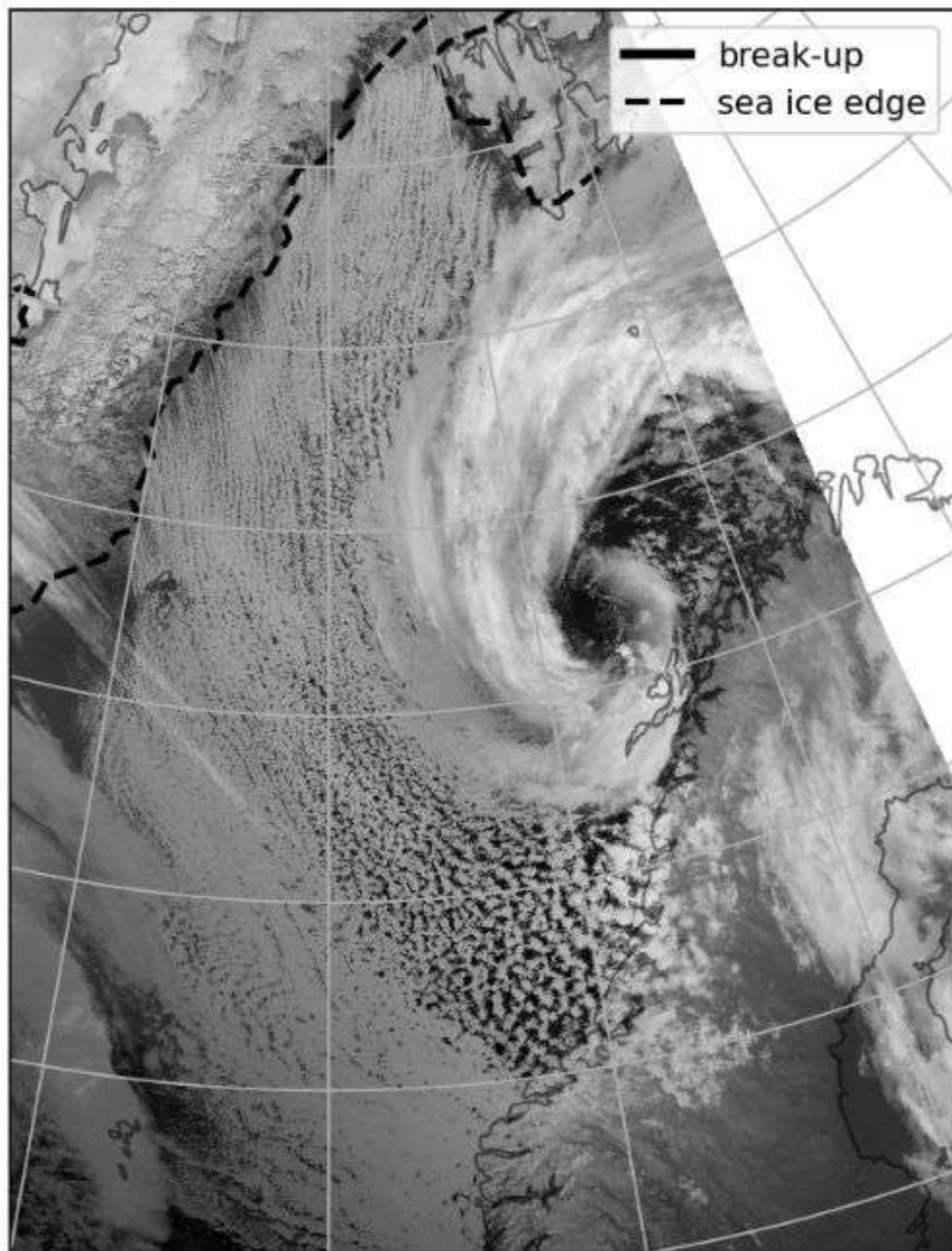
Open



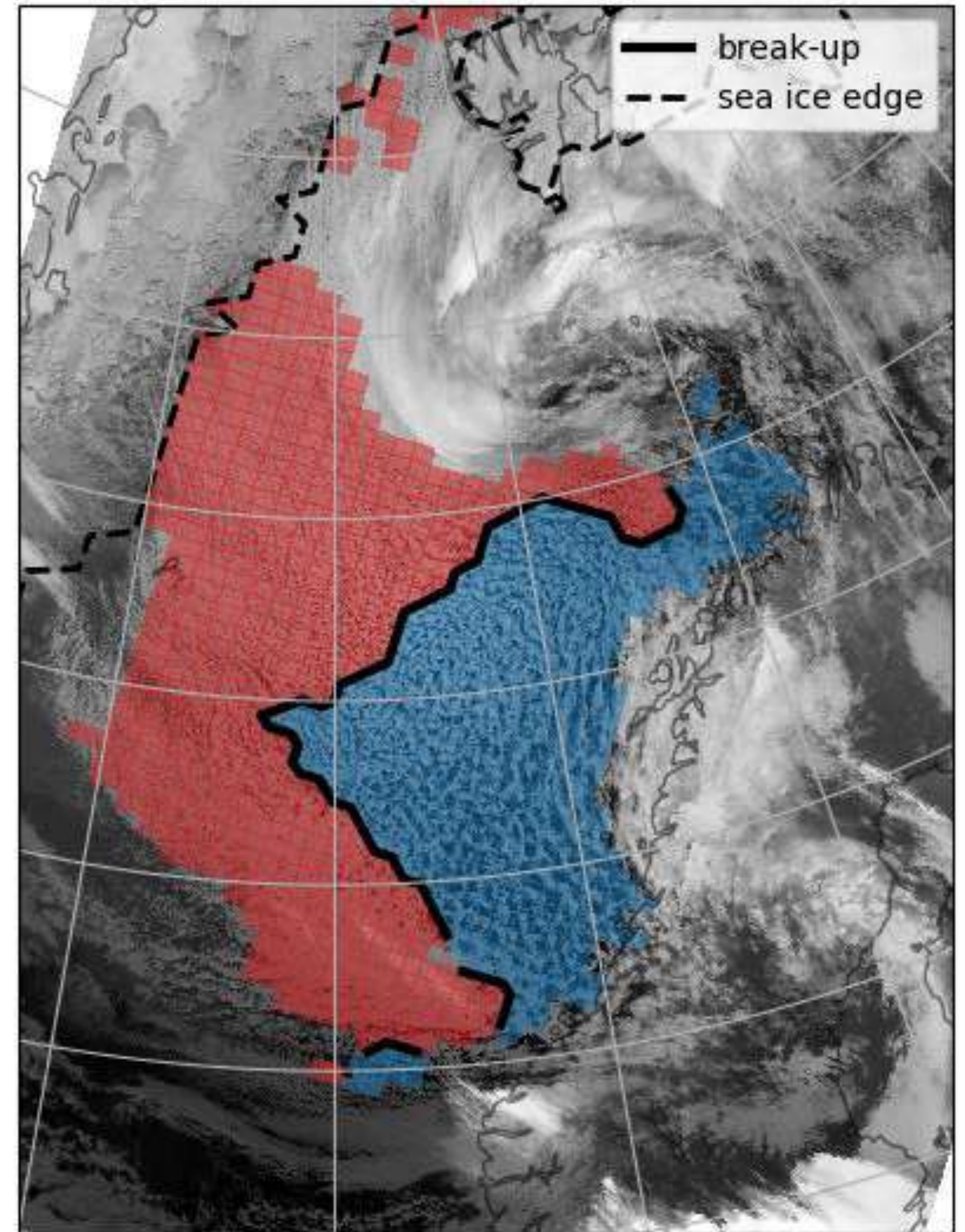
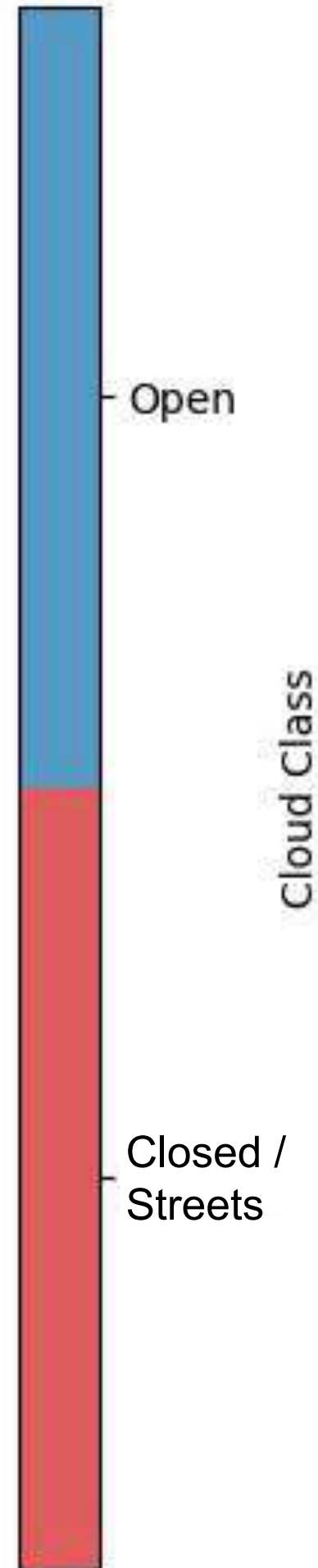
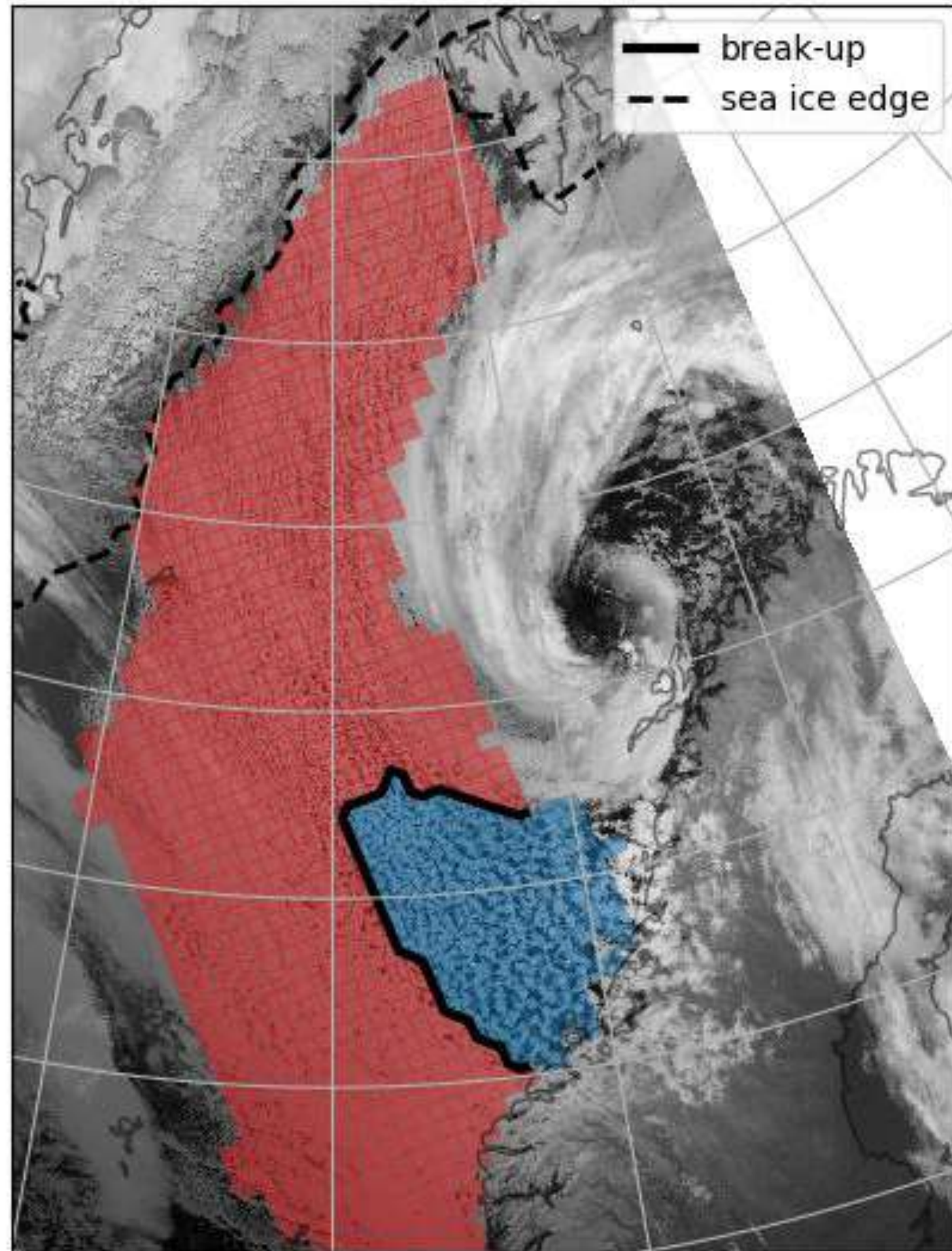
**Closed/
streets**

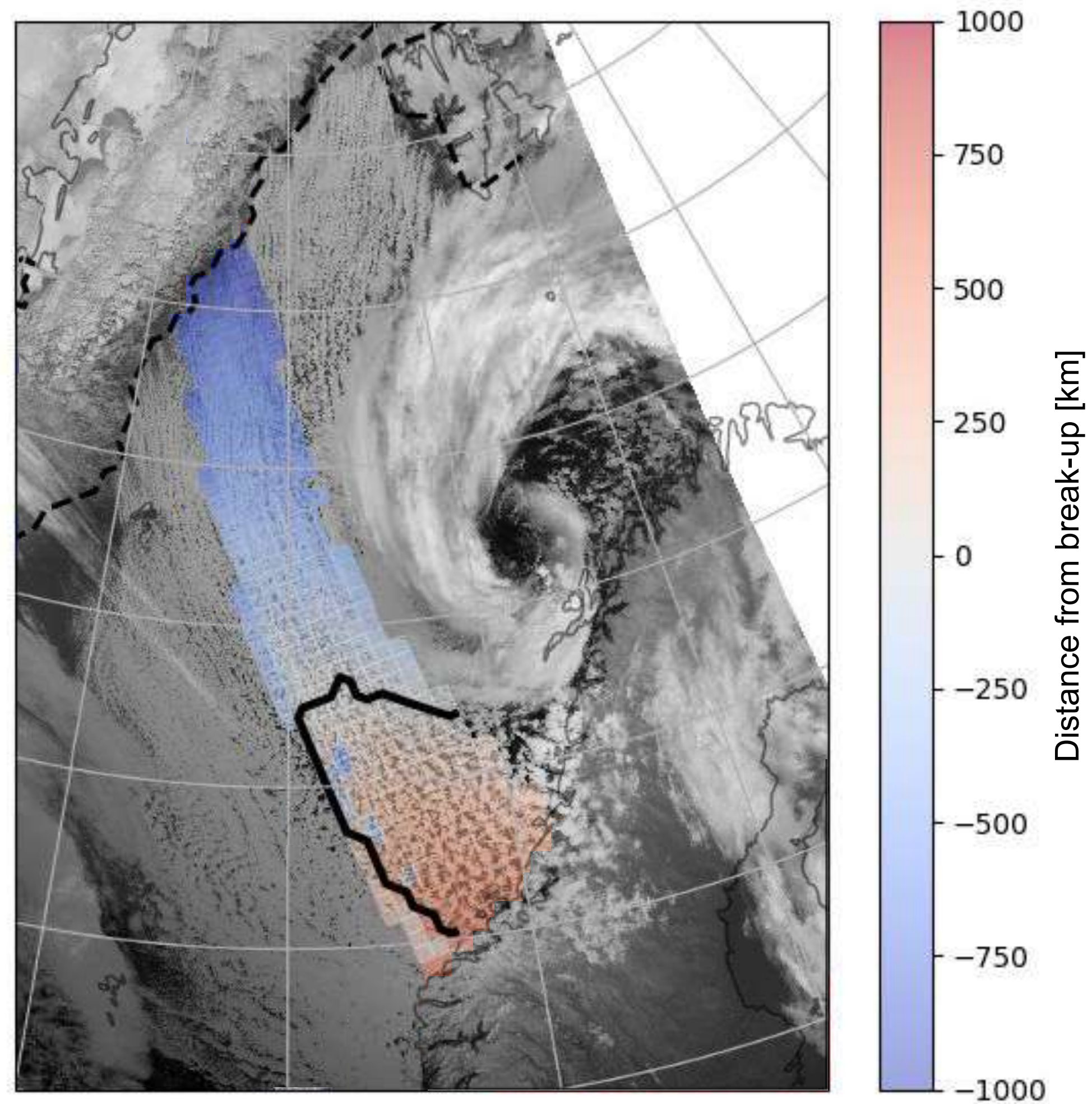
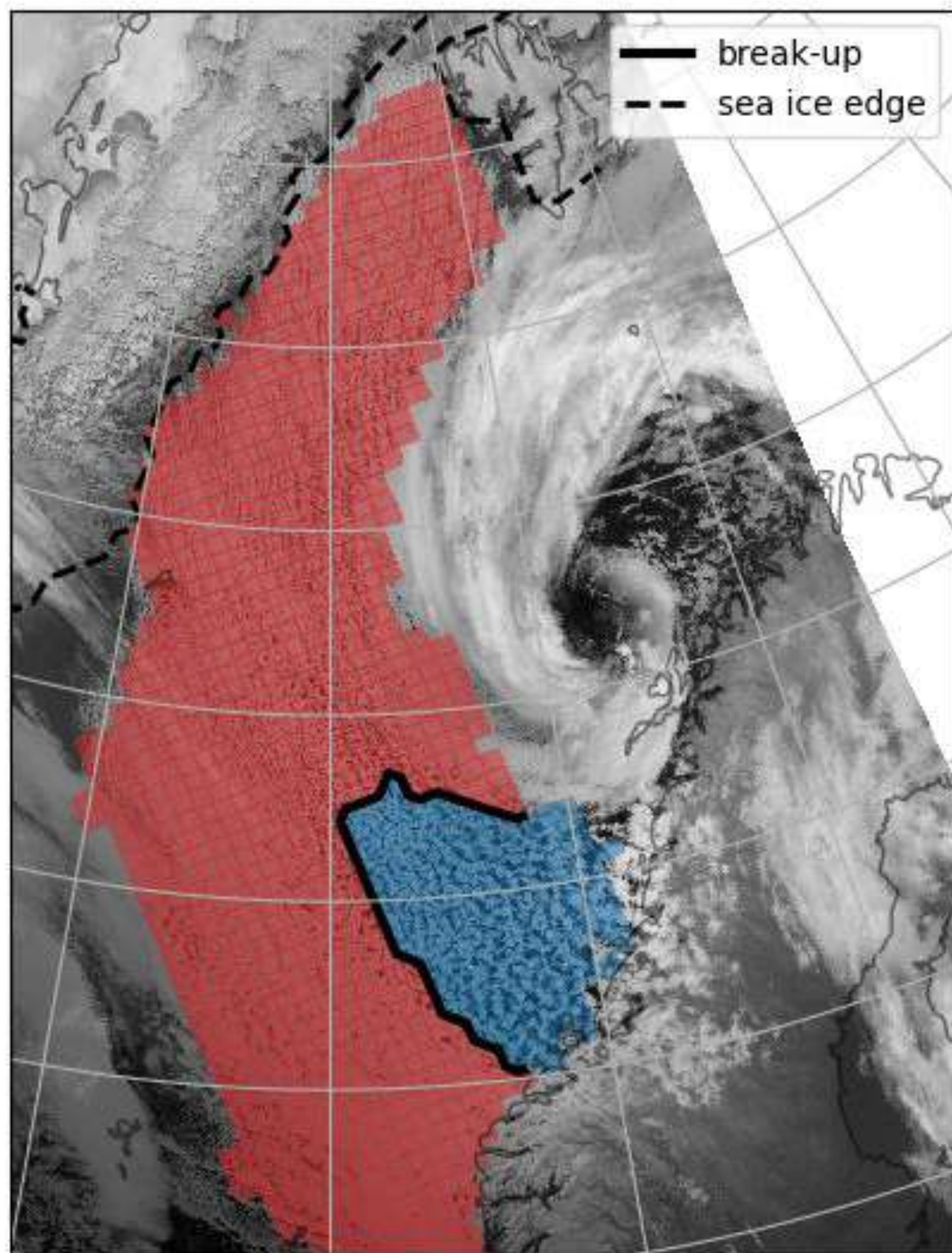
This satellite image shows a coastal region with a large body of water. A red-shaded area, labeled 'Closed/streets', is located in the upper left, adjacent to a coastline. The rest of the water area is shaded blue and labeled 'Open'. The surrounding land is shown in grayscale, with some coastal features and a small inset map in the top left corner.

Open

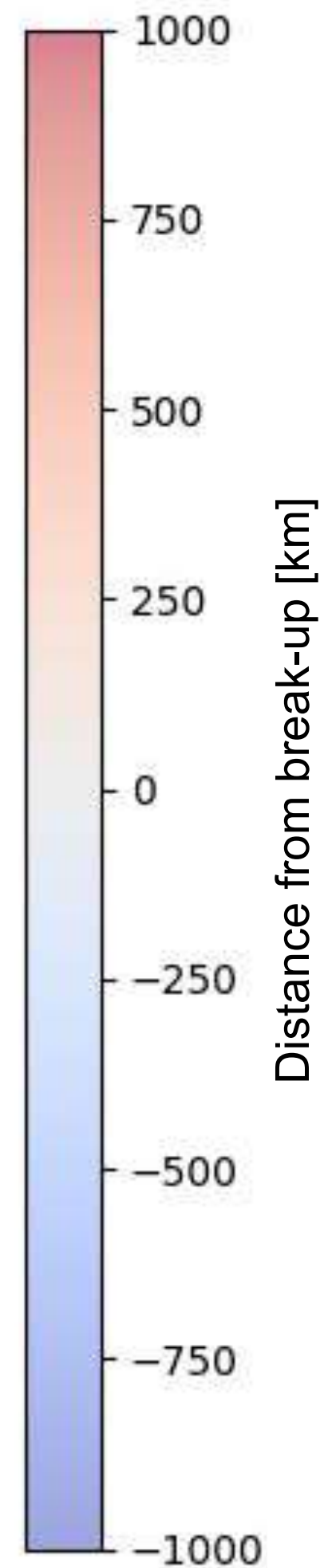
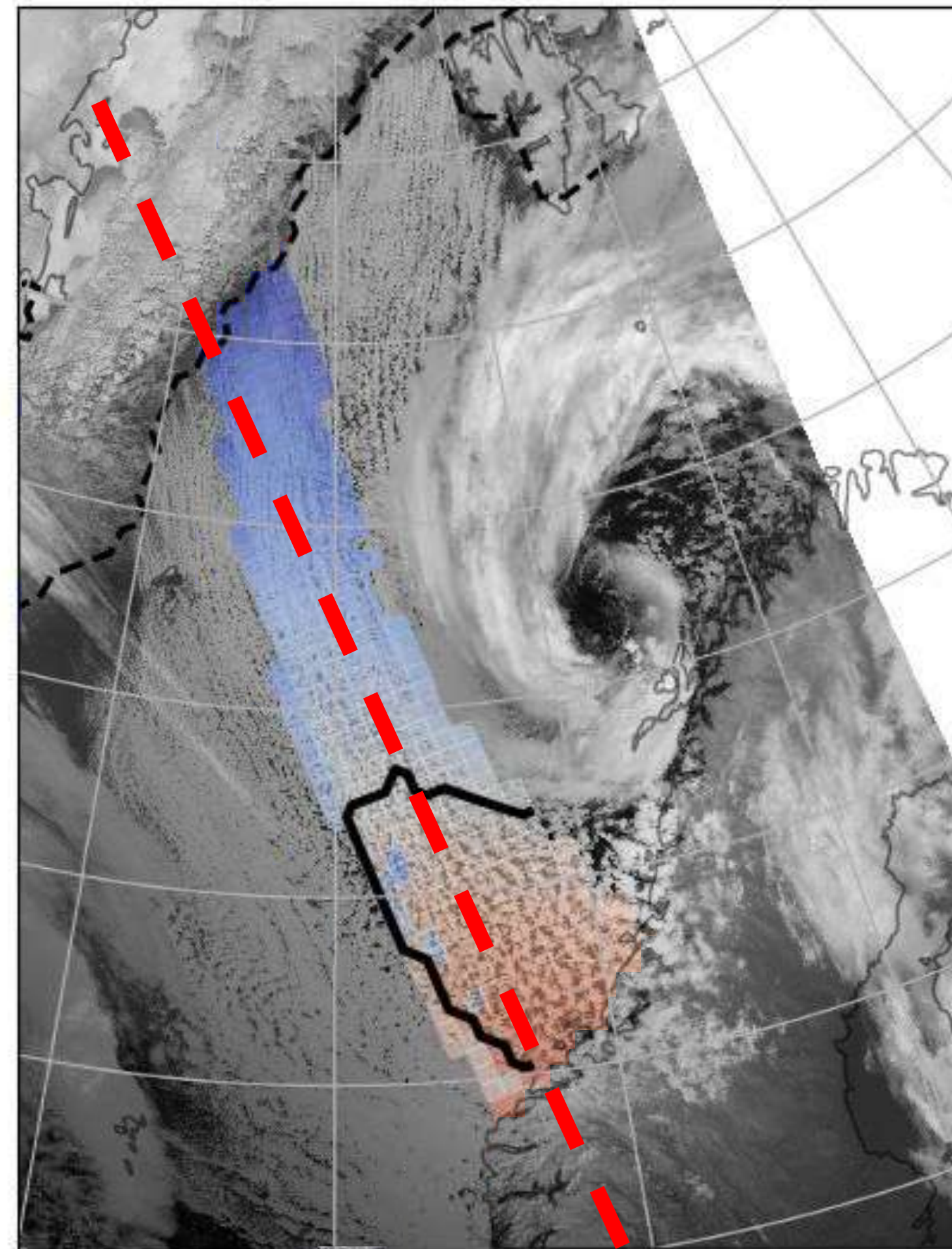
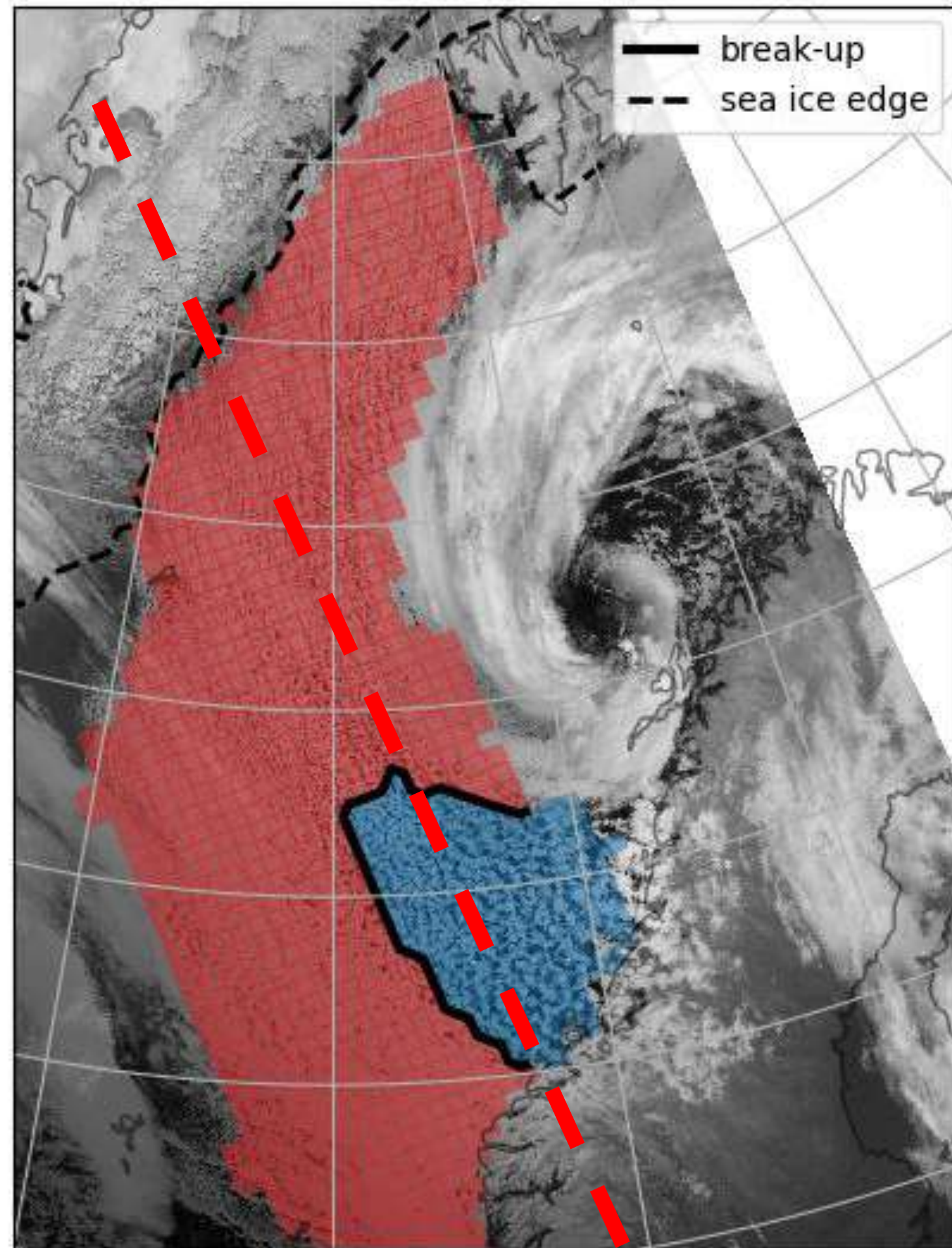


50,000+ classified cold air outbreaks

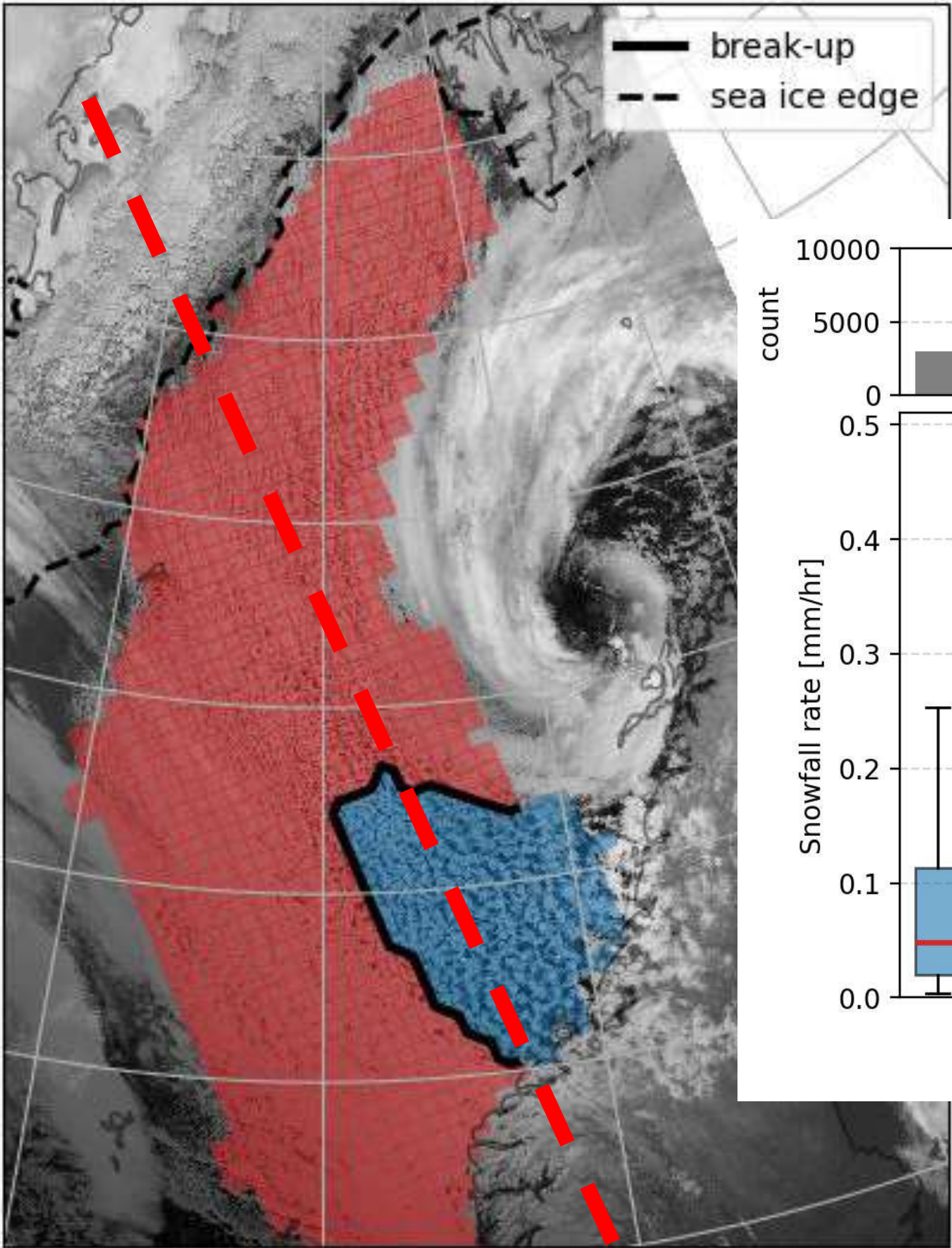




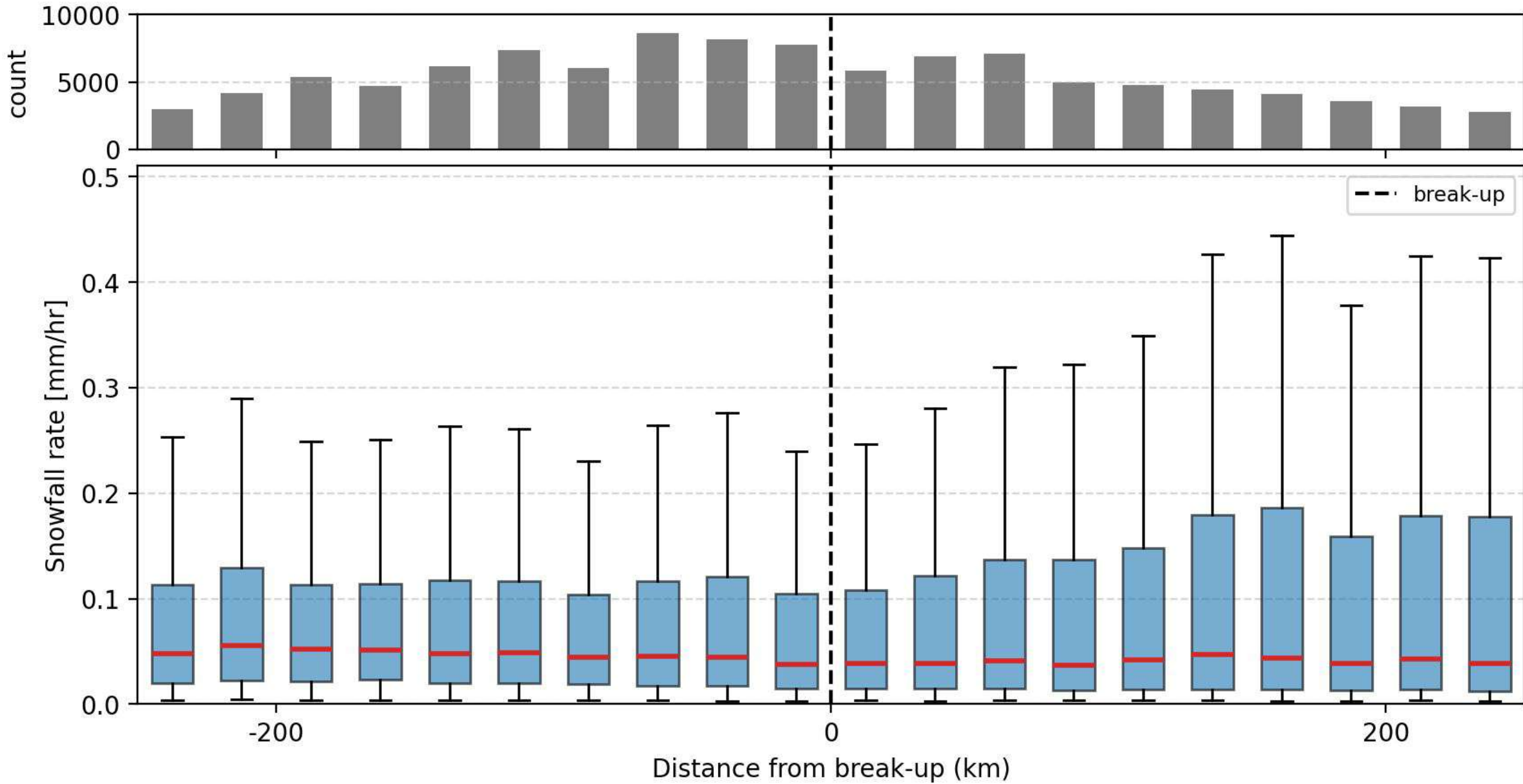
CloudSat / CALIPSO satellite track



CloudSat / CALIPSO satellite track



CloudSat (2C-SNOW)

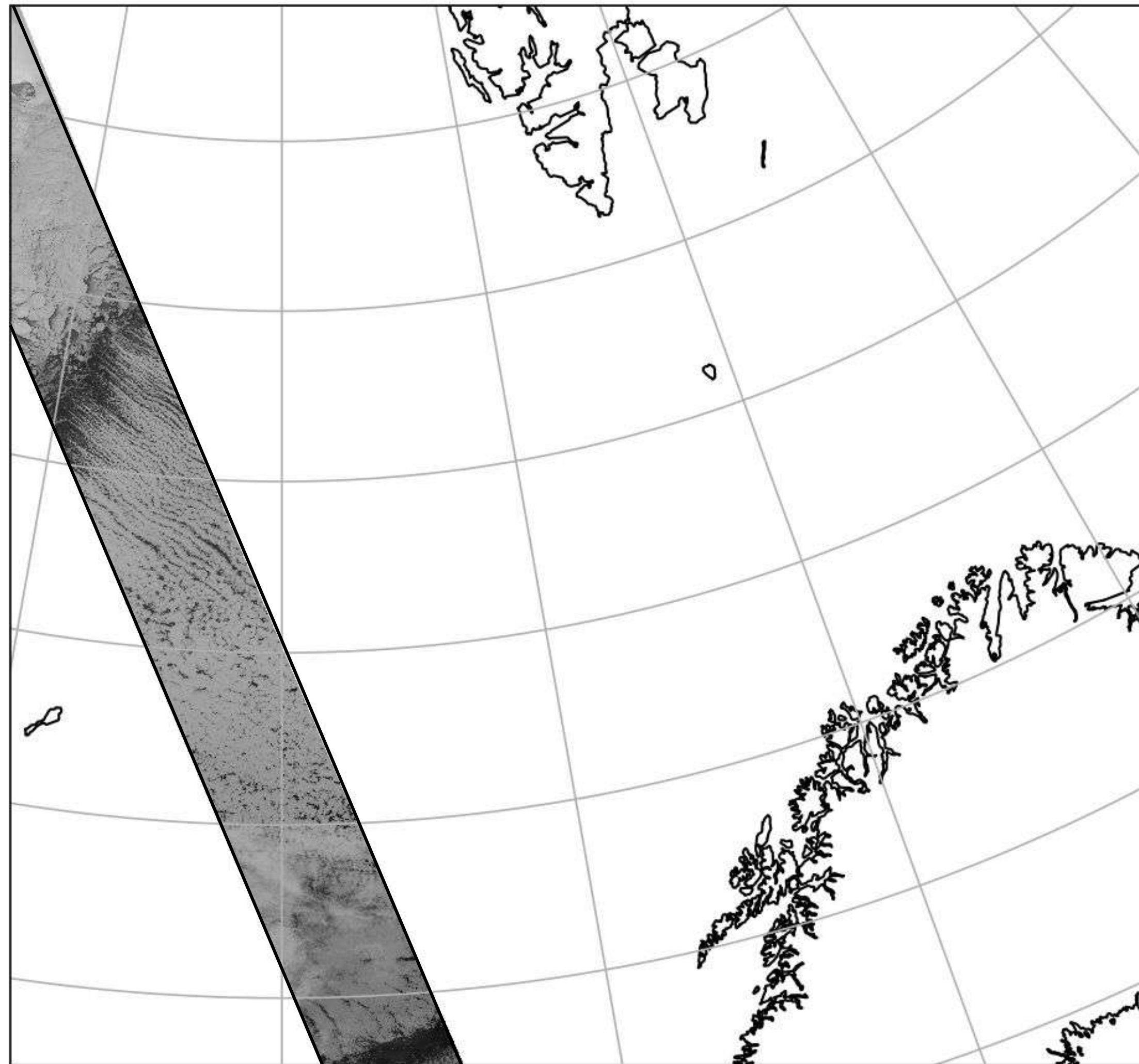
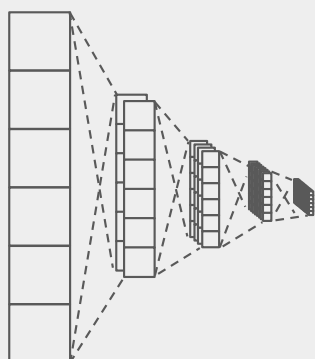


**2 years of
EarthCARE**

**MSI TIR2
~11 μ m**



**Neural
Network**

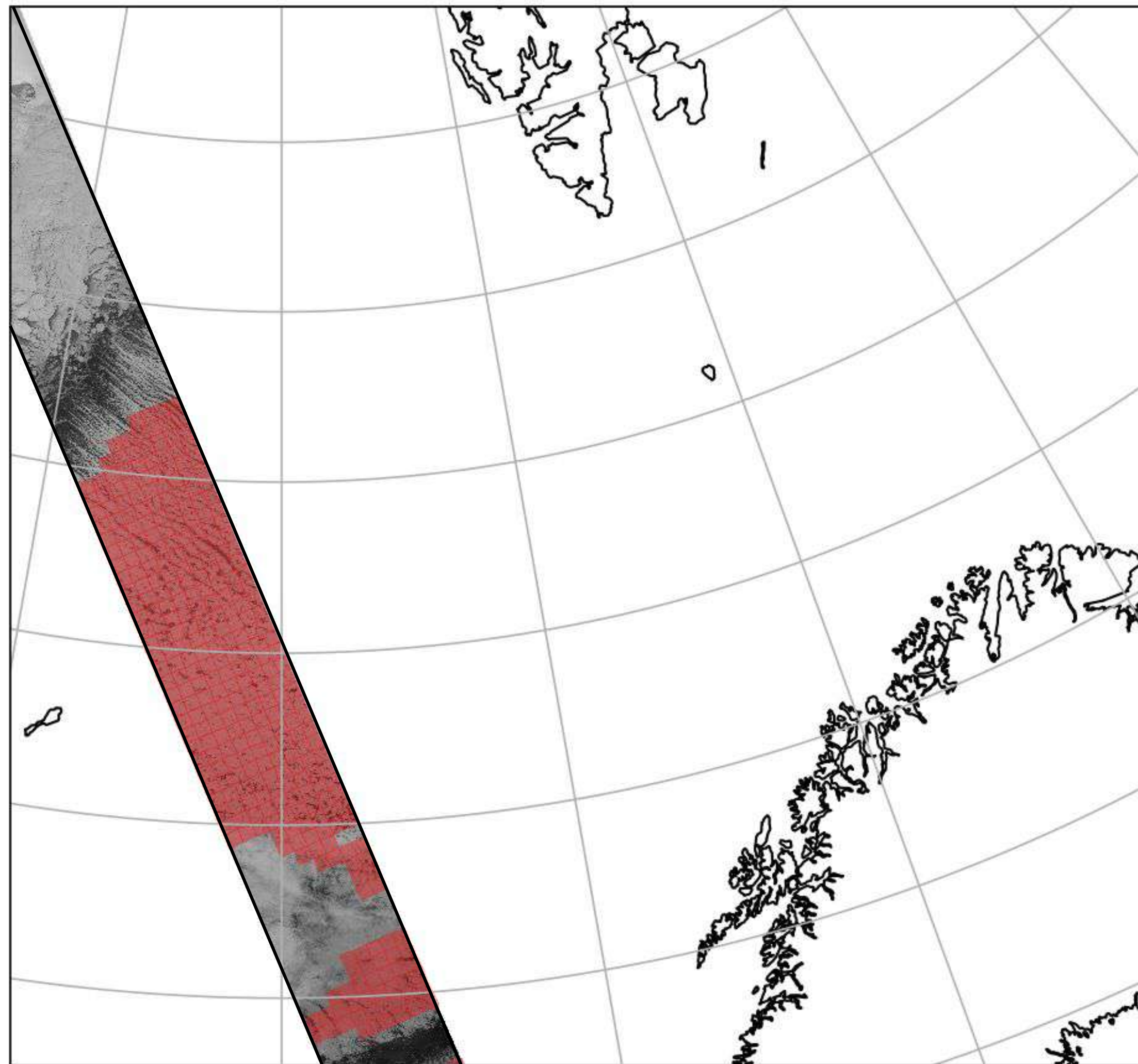
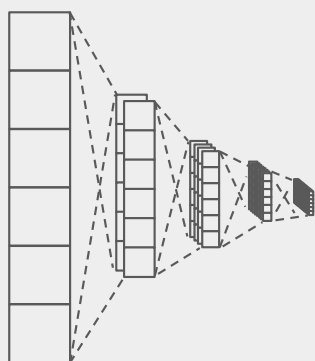


**2 years of
EarthCARE**

**MSI TIR2
~11 μ m**



**Neural
Network**



Open

Closed /
Streets

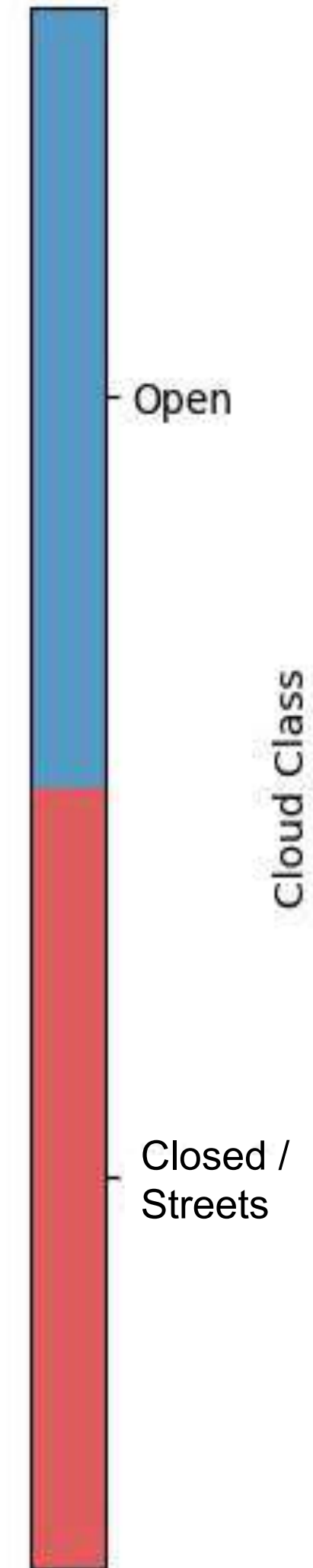
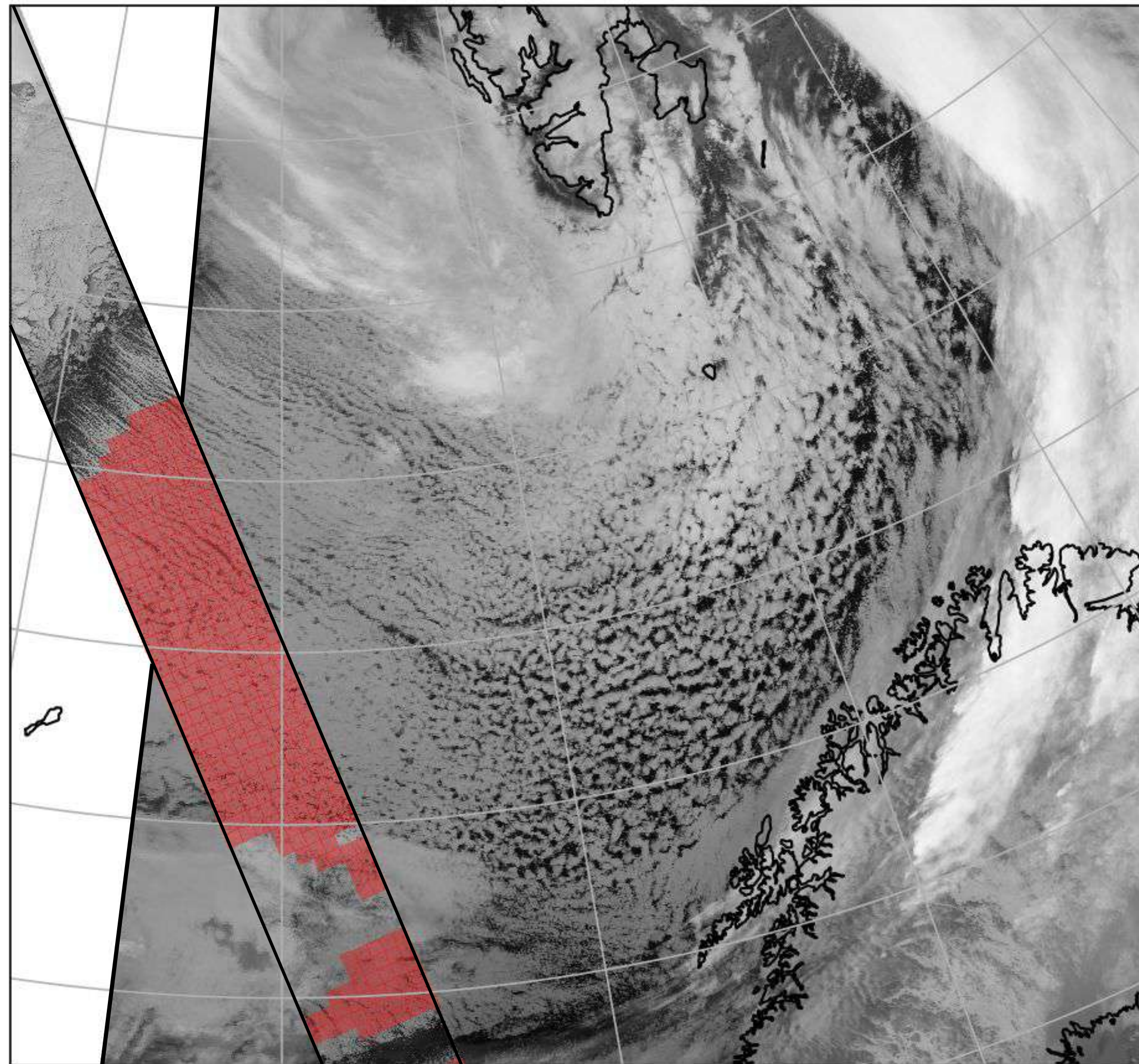
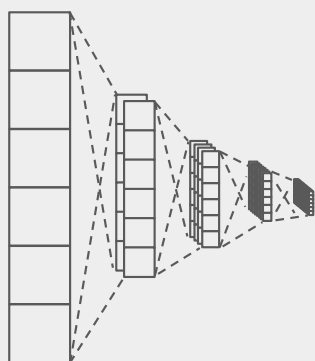
Cloud Class

**2 years of
EarthCARE**

**MSI TIR2
~11 μ m**

**2 years of
MODIS
Aqua and
Terra
~11 μ m**

**Neural
Network**

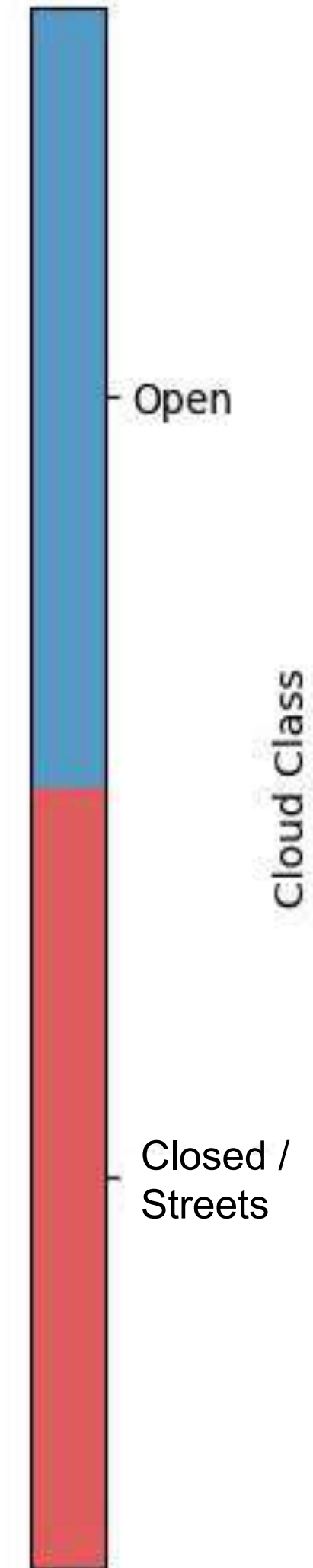
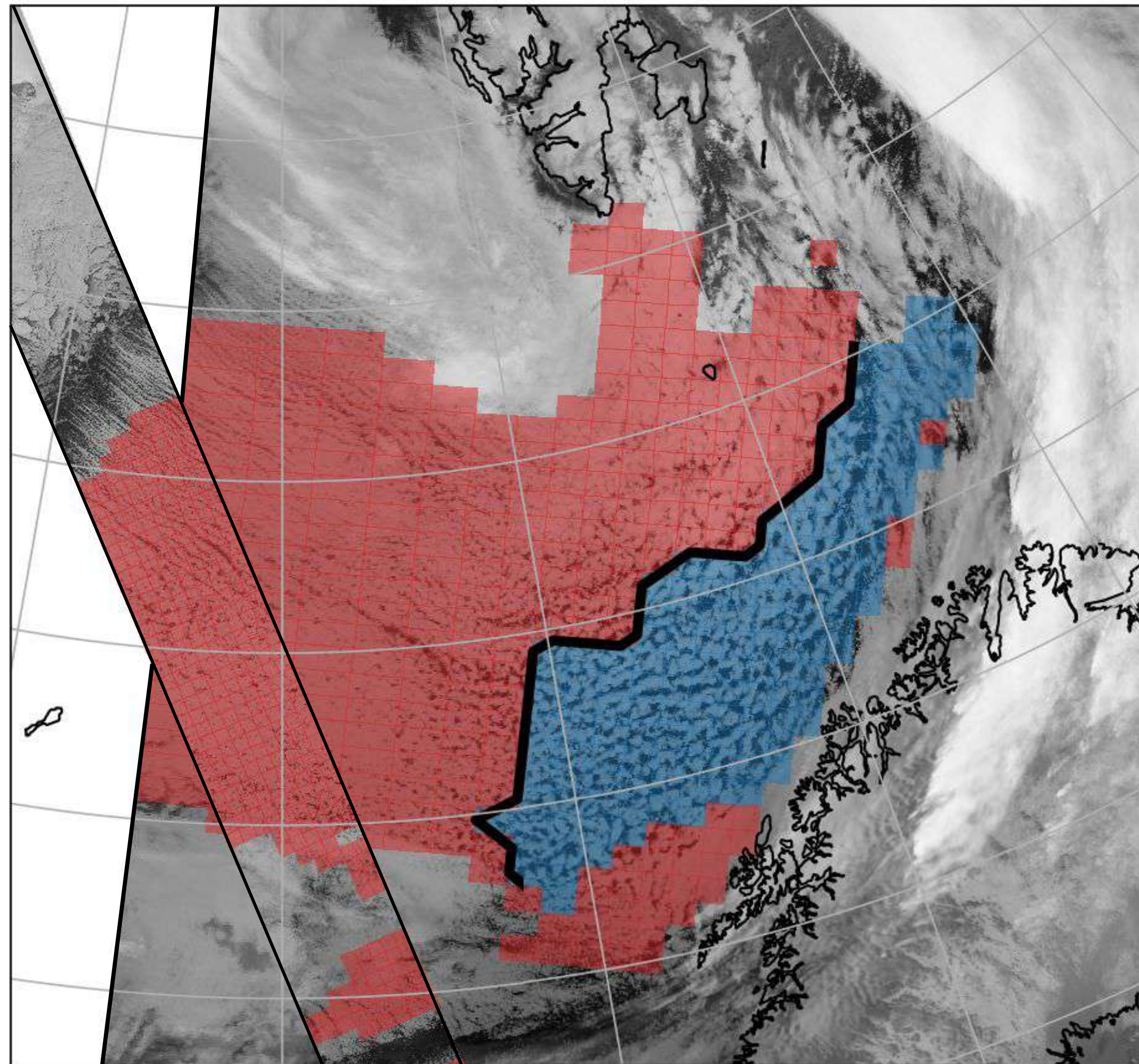
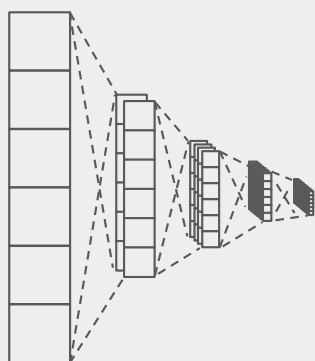


**2 years of
EarthCARE**

**MSI TIR2
~11 μ m**

**2 years of
MODIS
Aqua and
Terra
~11 μ m**

**Neural
Network**

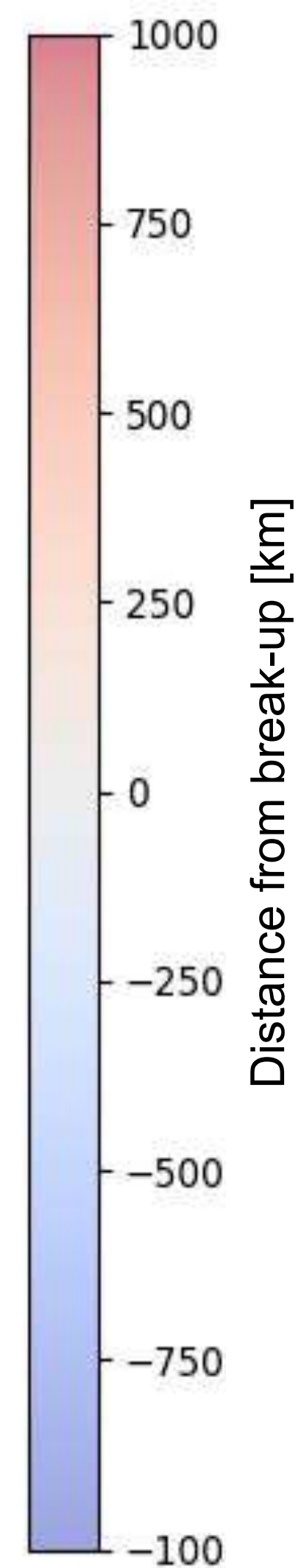
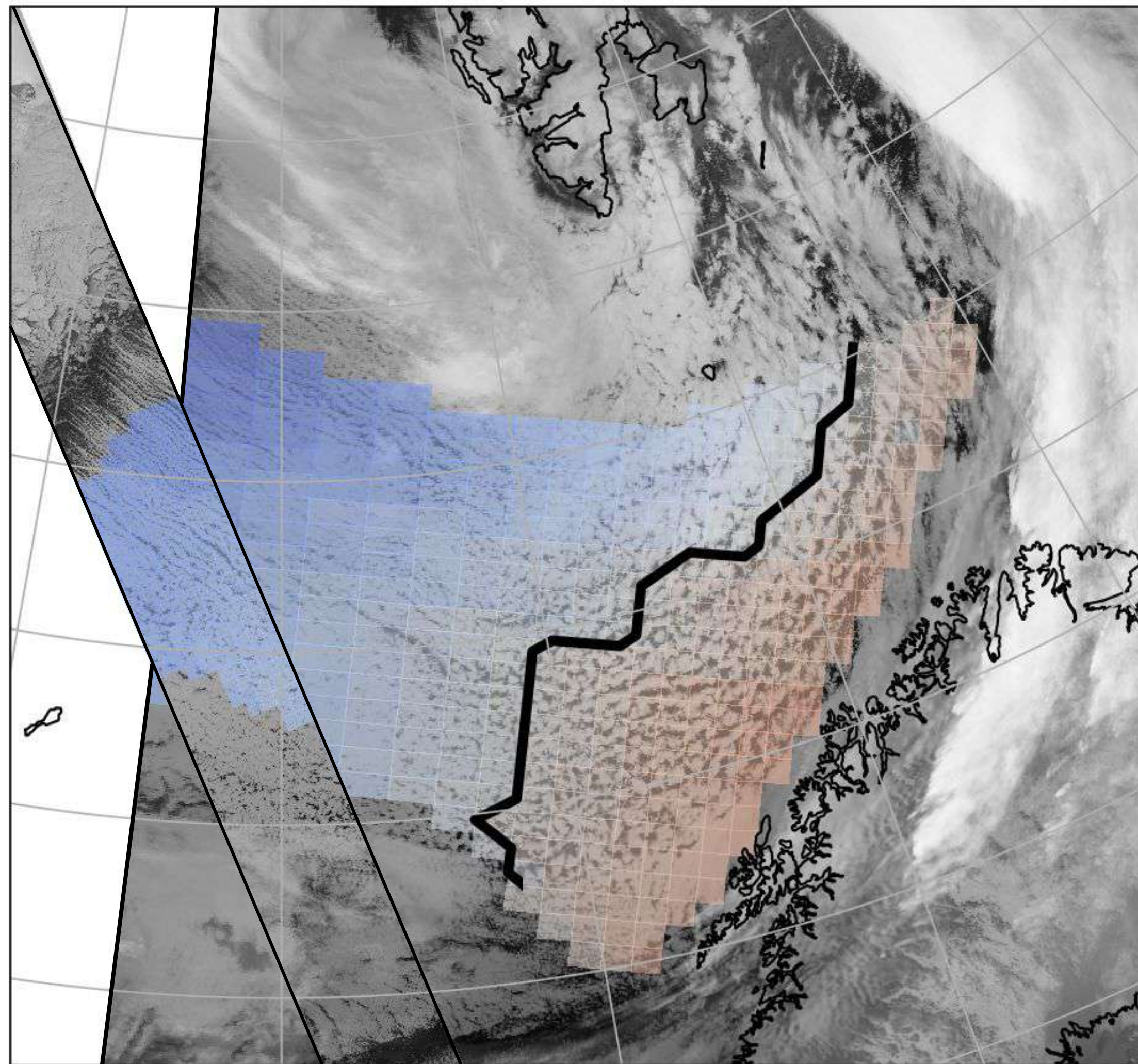
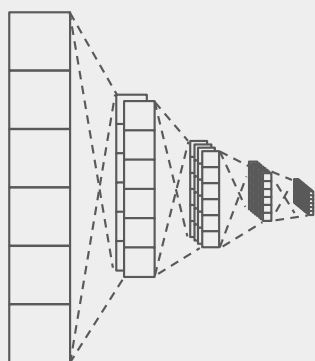


**2 years of
EarthCARE**

**MSI TIR2
~11 μ m**

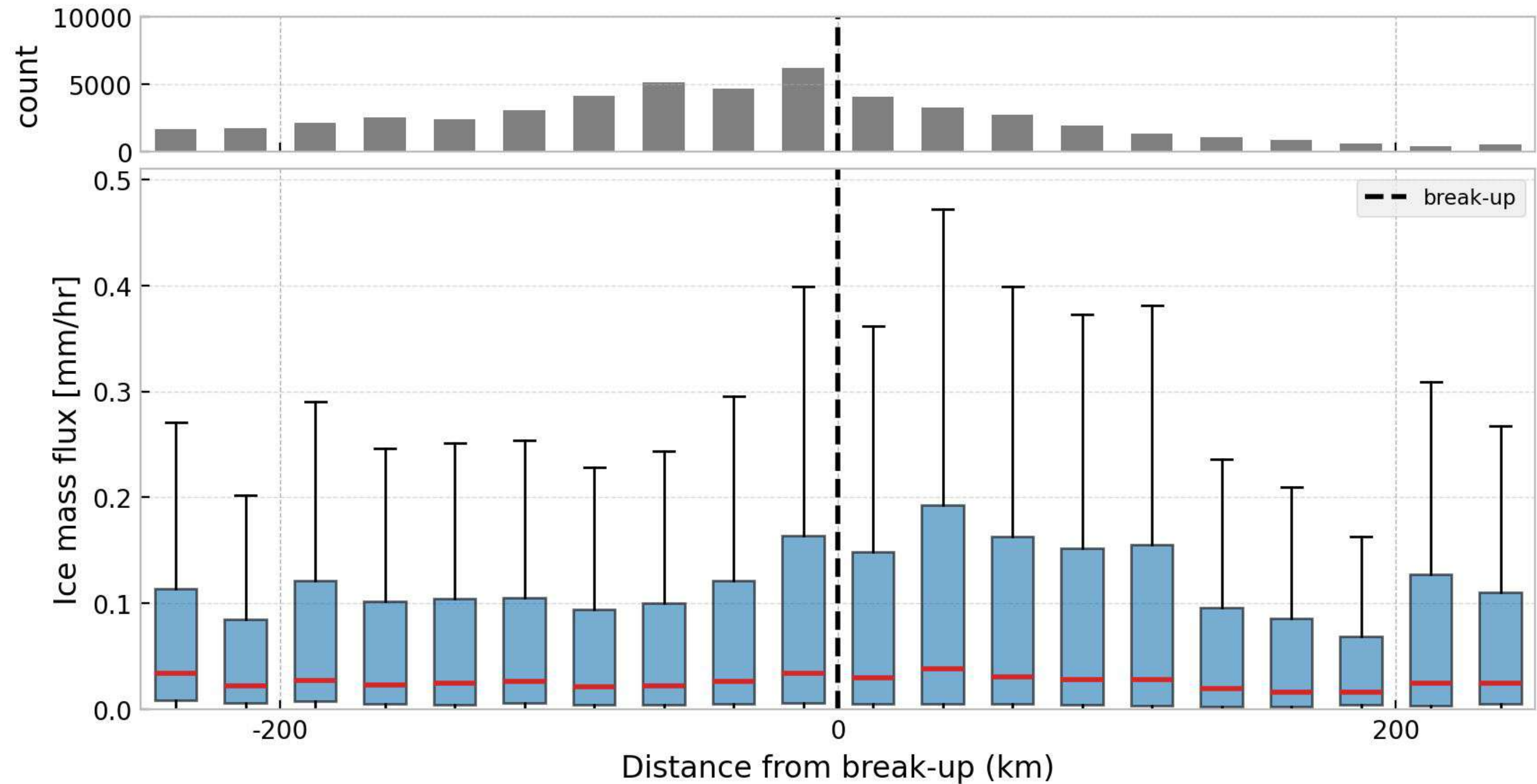
**2 years of
MODIS
Aqua and
Terra
~11 μ m**

**Neural
Network**

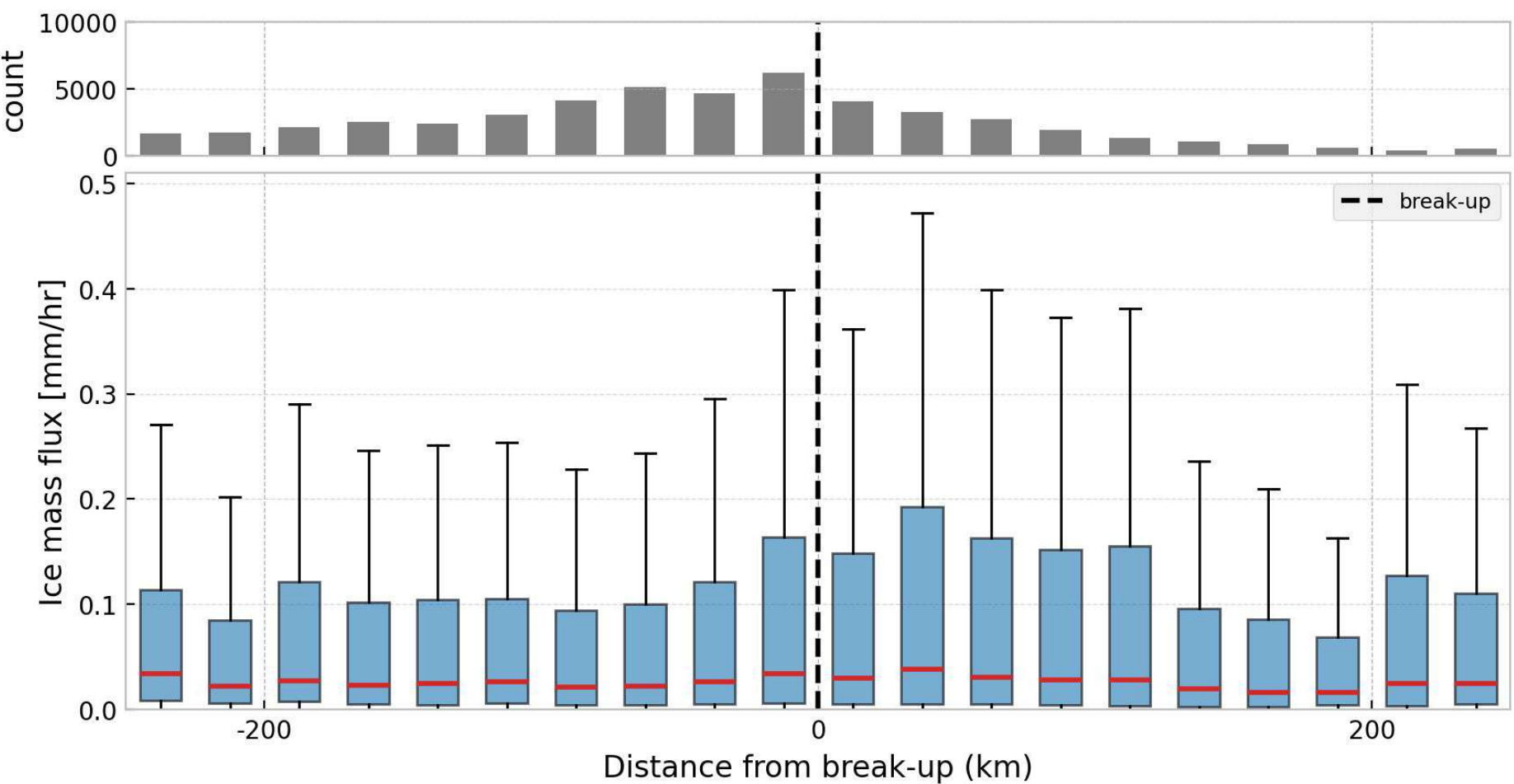


ACM-CAP: BA + MSI & MODIS Aqua / Terra classifications

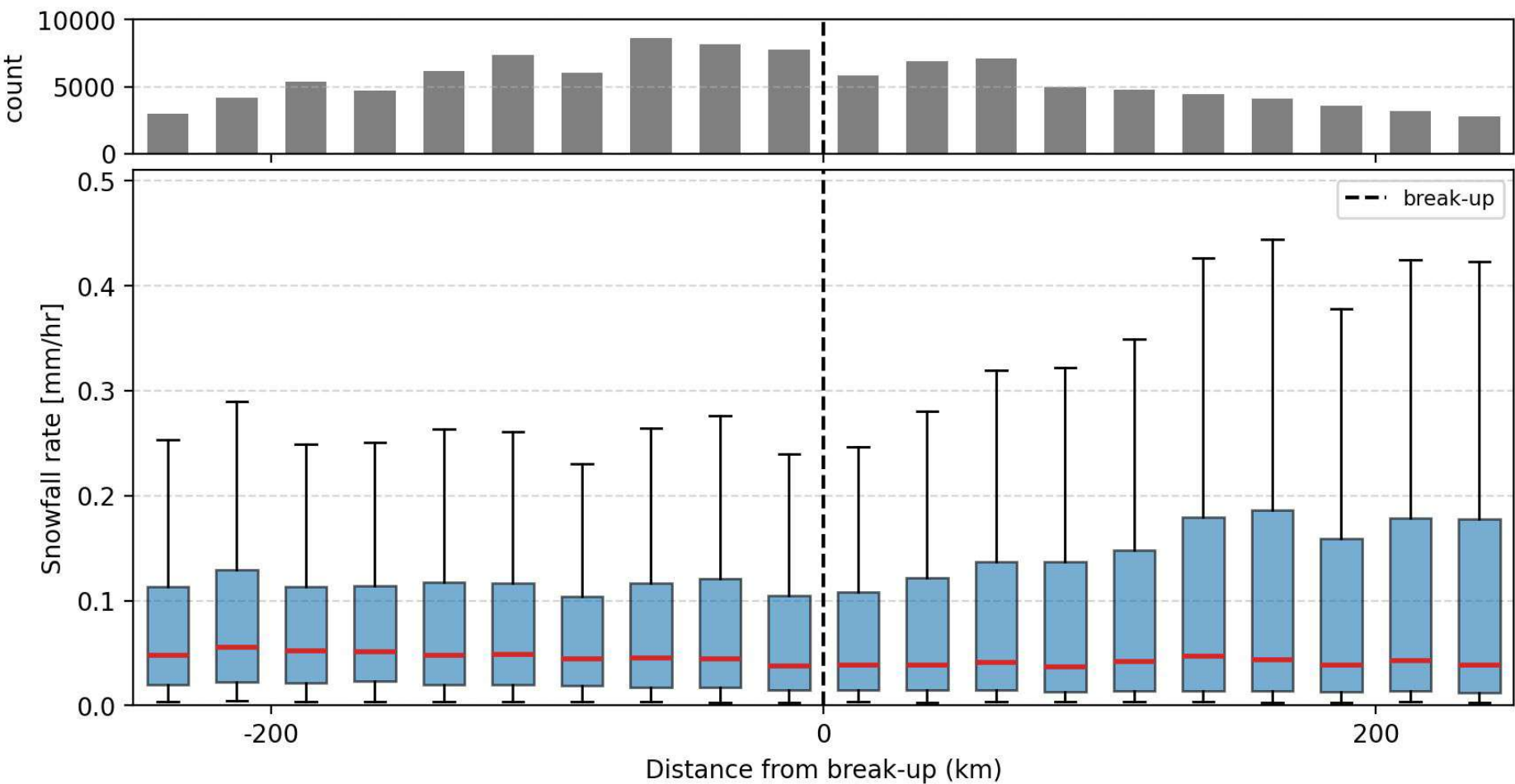
- Lowest bin ice mass flux



ACM-CAP: BA

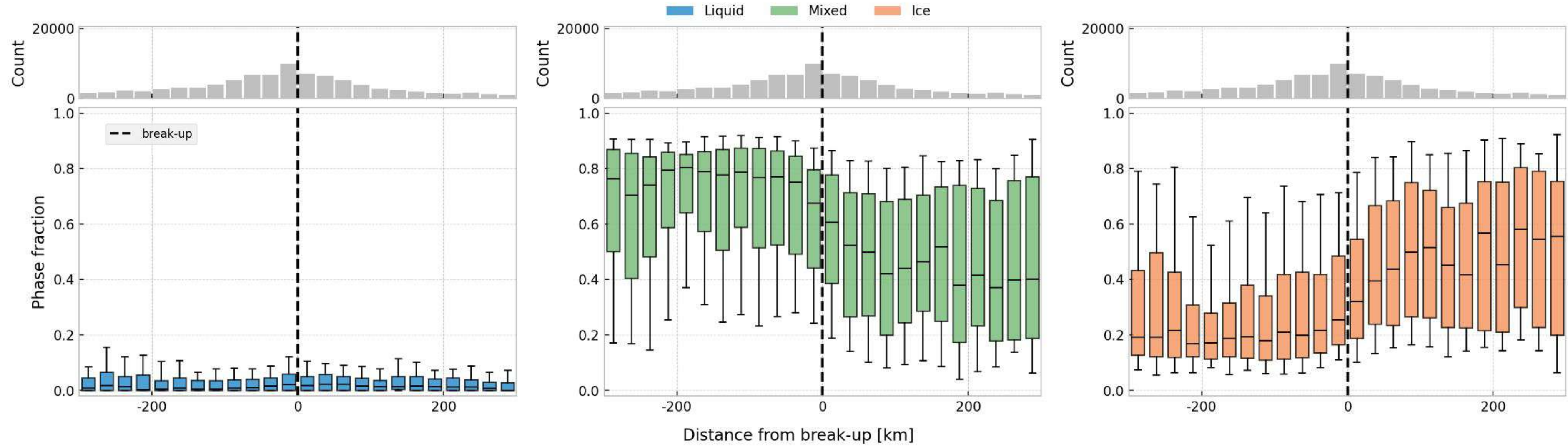


CloudSat (2C-SNOW)

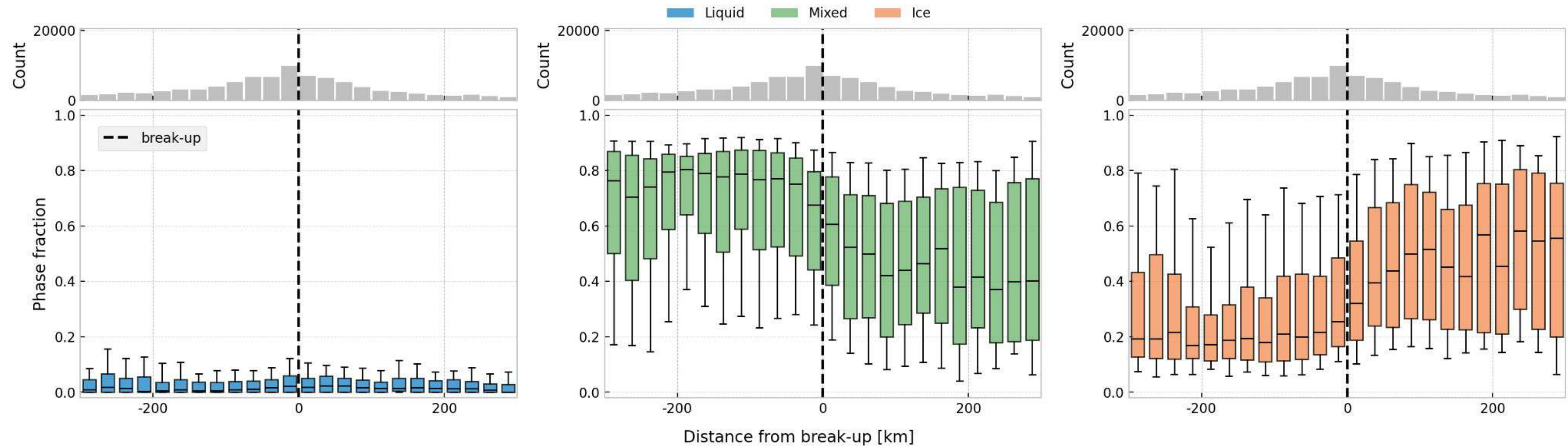


AC-TC: BA + MSI & MODIS Aqua / Terra classifications

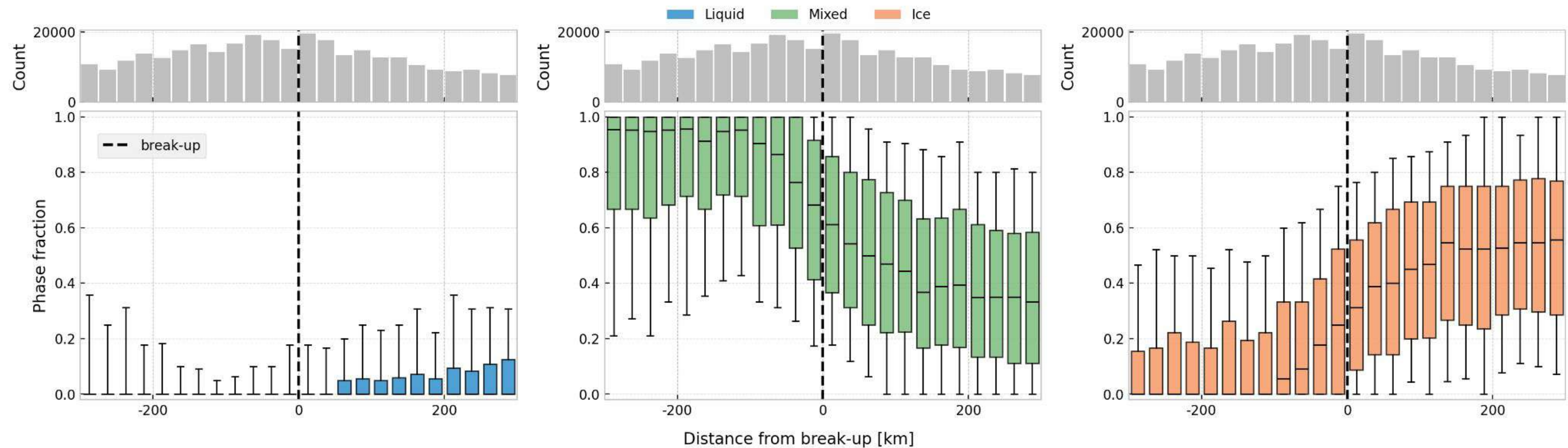
Synergetic cloud classification low resolution



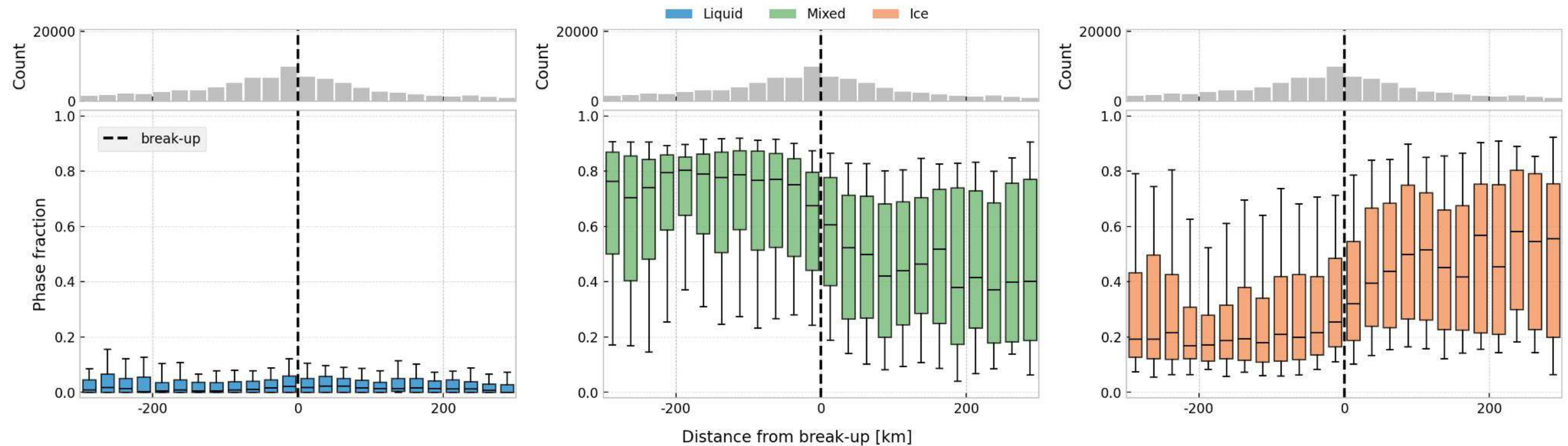
AC-TC: BA + MSI & MODIS Aqua / Terra classifications



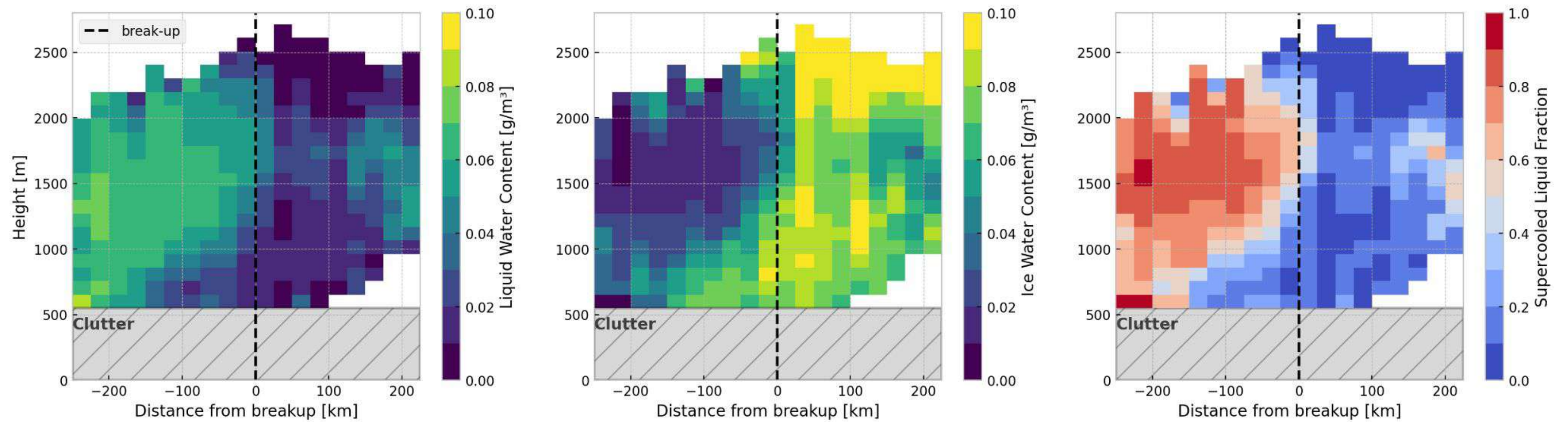
CloudSat / CALIPSO (2B-CLDCLASS-LIDAR) + MODIS Aqua classifications



AC-TC: BA + MSI & MODIS Aqua / Terra classifications



ACM-CAP: BA + MSI & MODIS Aqua / Terra classifications



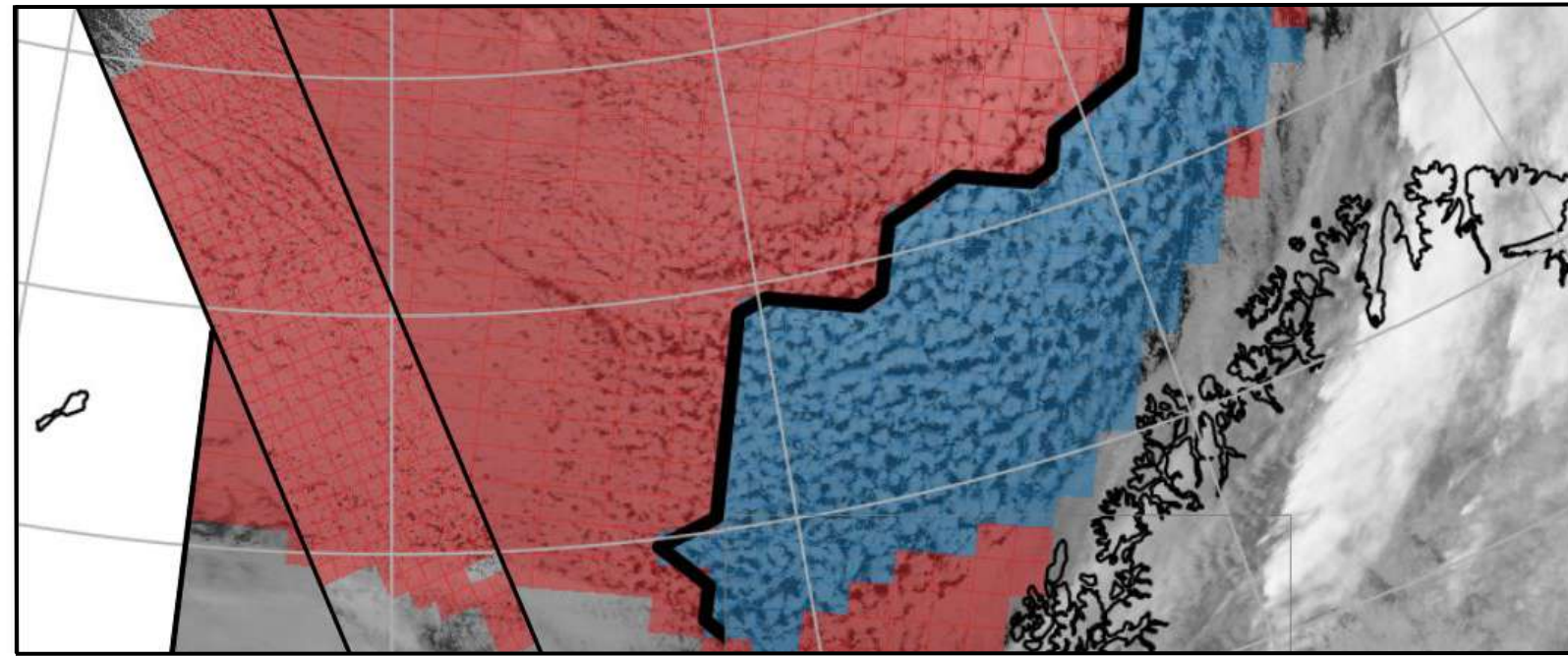
Summary



1

From MODIS to EarthCARE

Consistent neural network
classifications and colocation

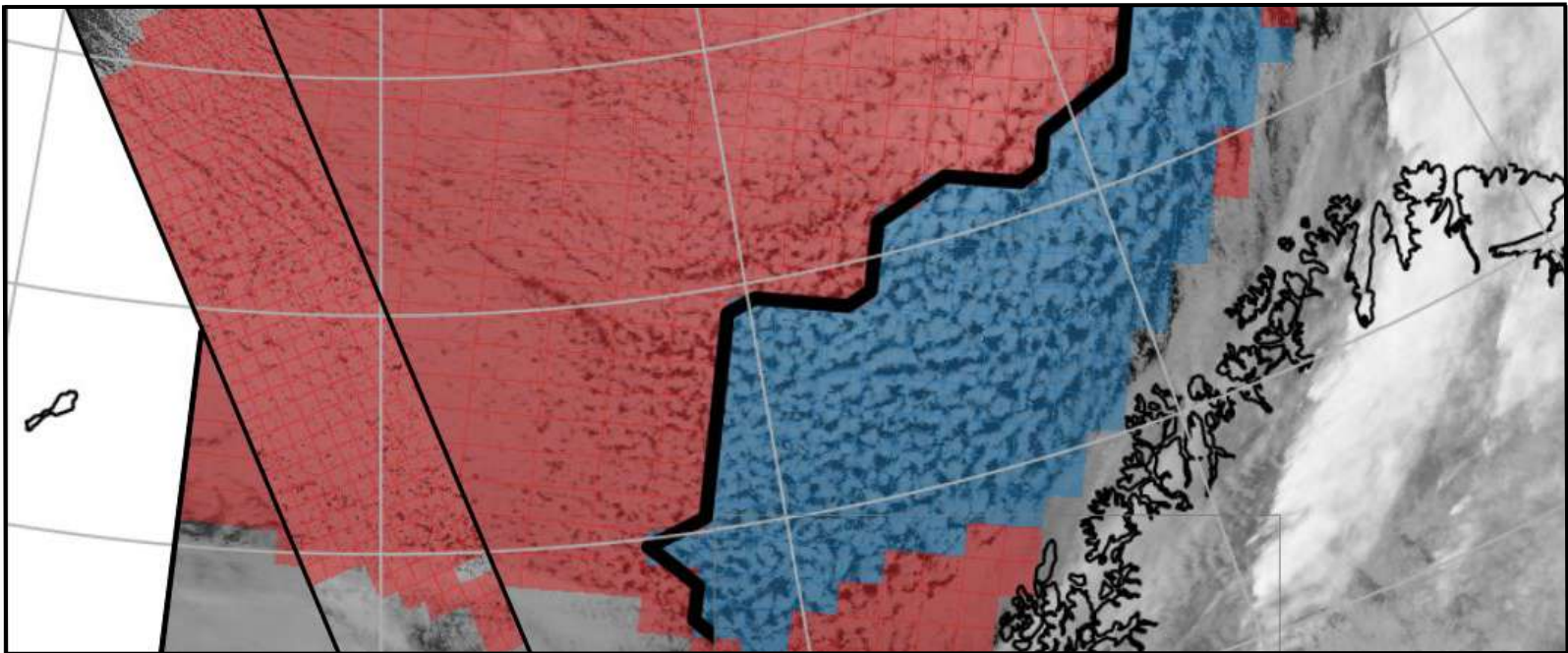


Summary



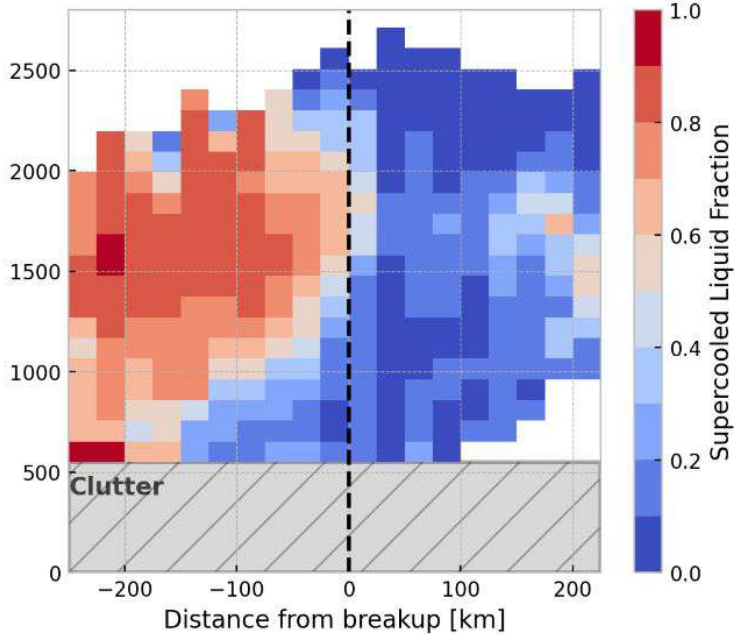
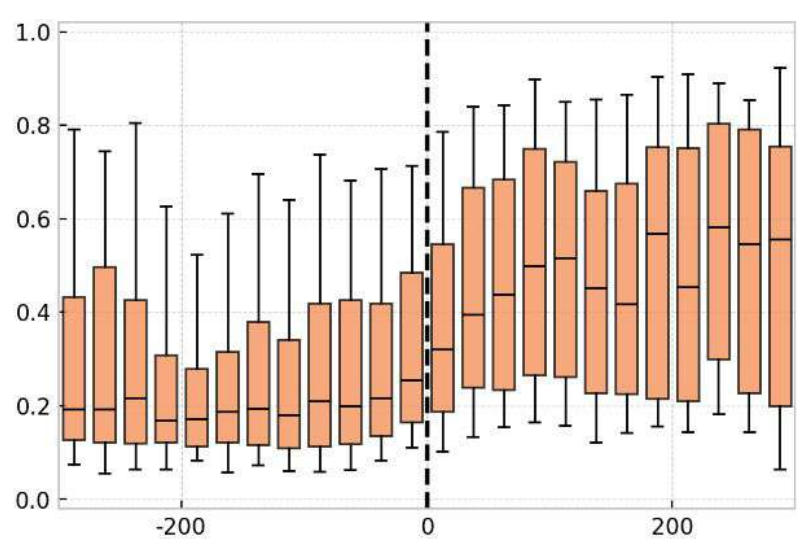
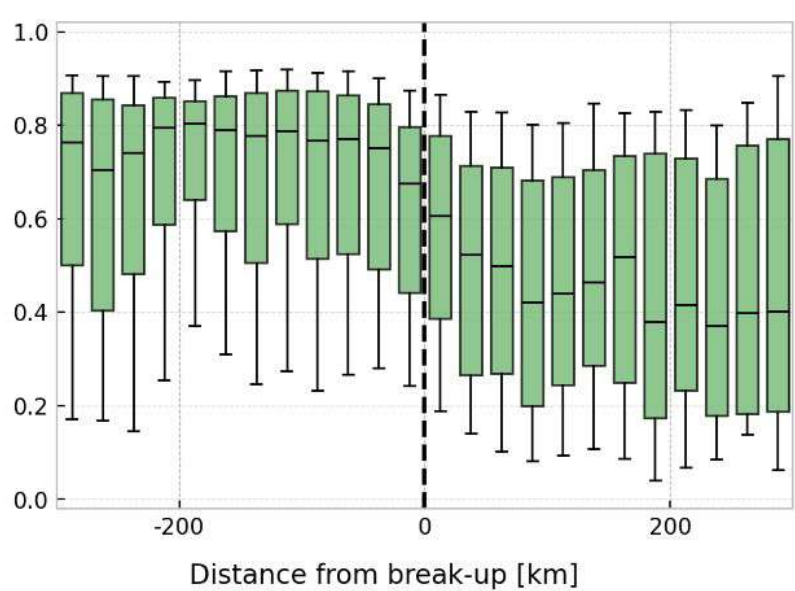
1 From MODIS to EarthCARE

Consistent neural network
classifications and colocation



2 Strong liquid–ice transition across break-up

Liquid dominates before break-up;
ice dominates after.

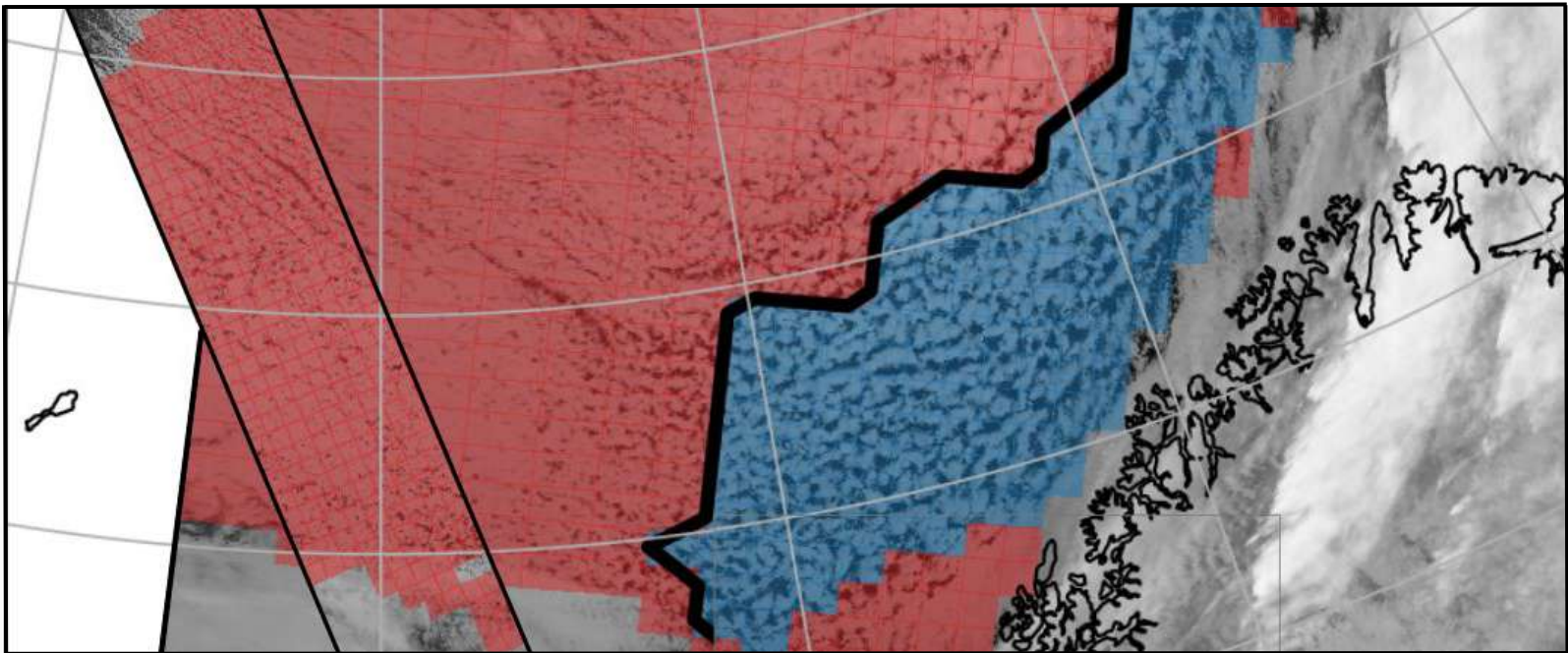


Summary



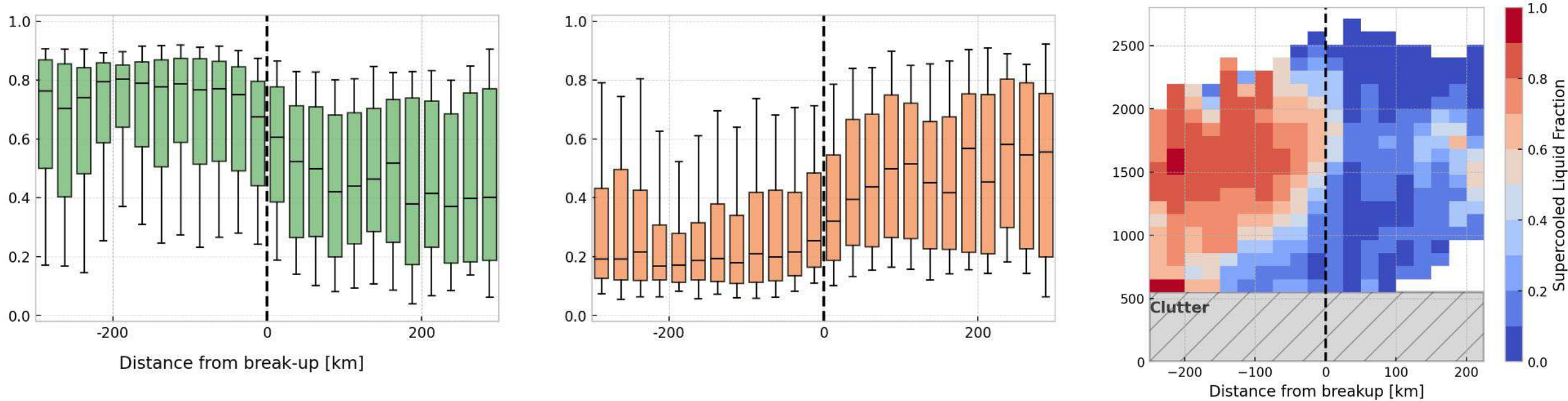
1 From MODIS to EarthCARE

Consistent neural network
classifications and colocation



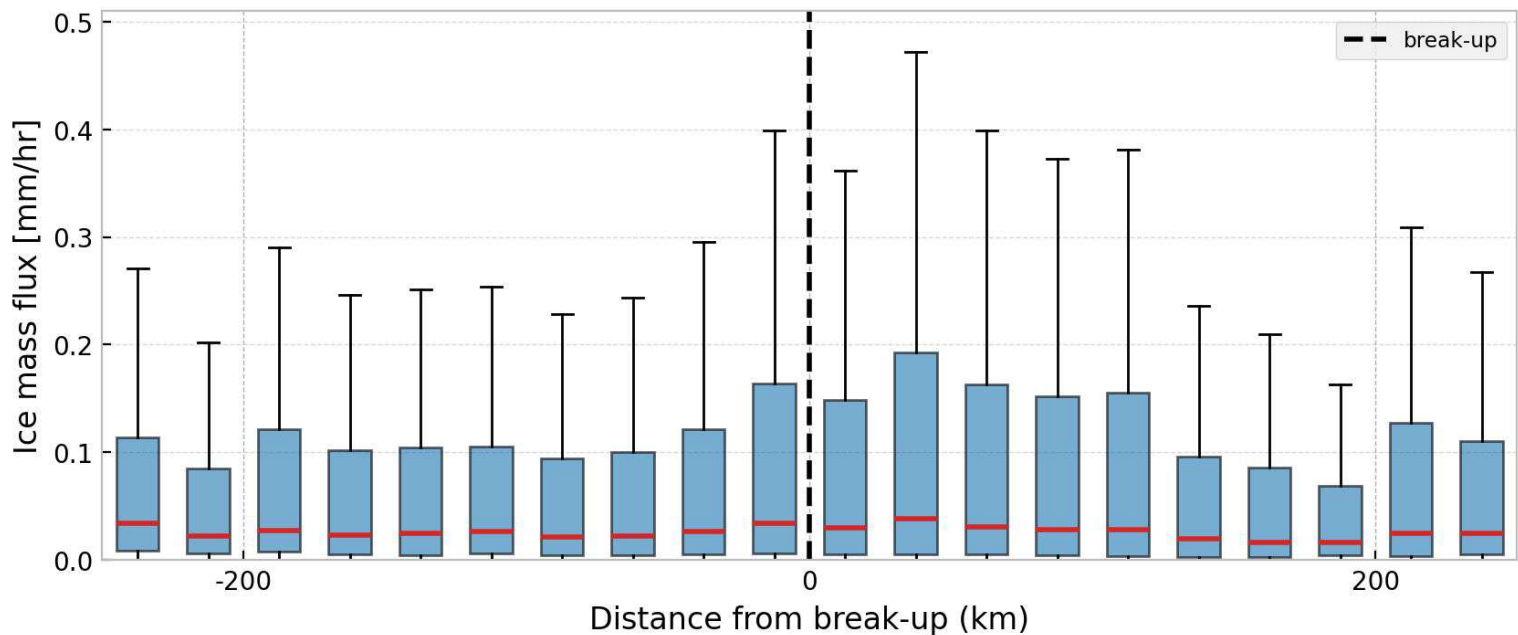
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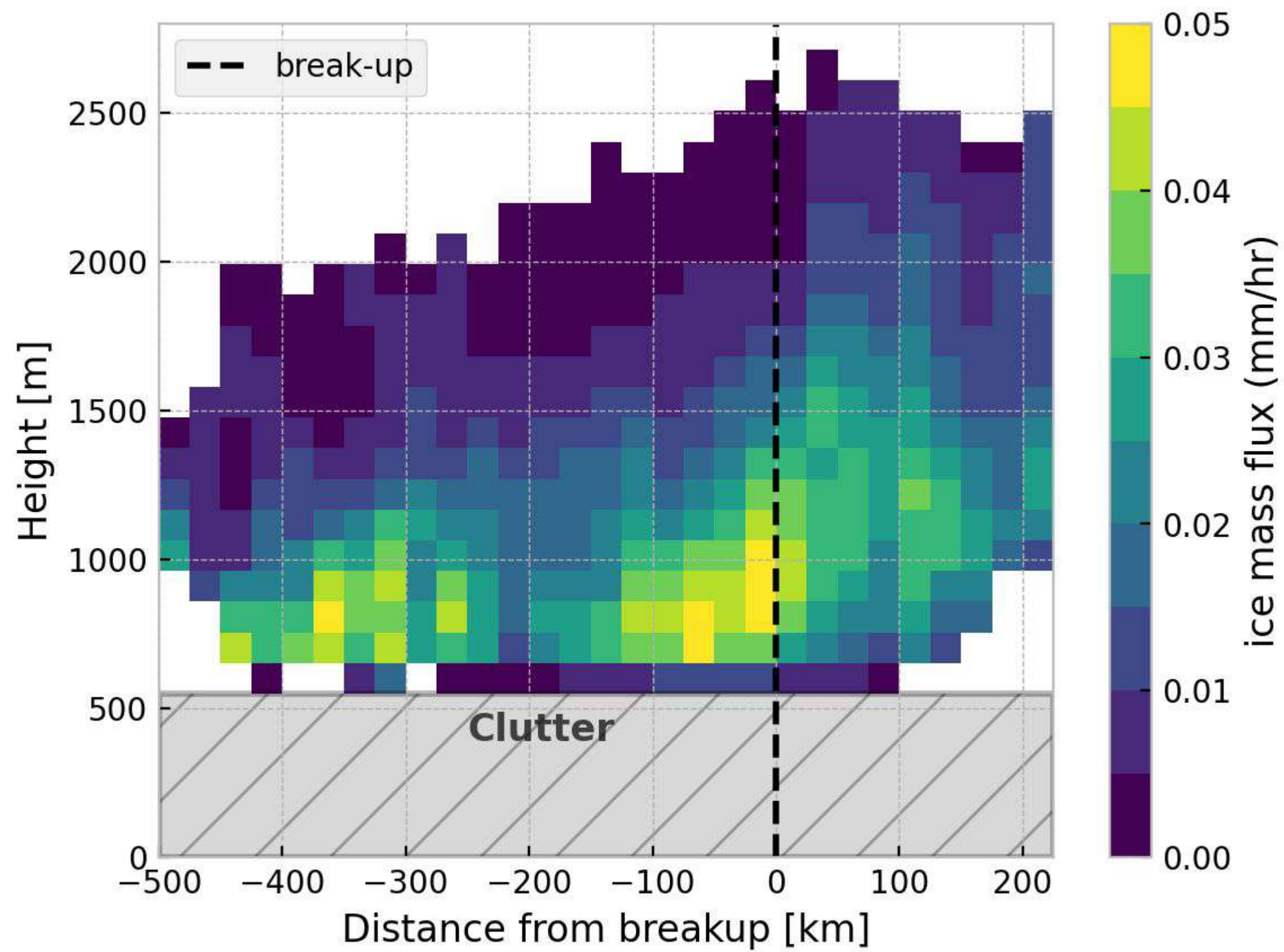
Liquid dominates before break-up;
ice dominates after.



3 No detectable precipitation enhancement

Ice mass flux shows no
systematic increase near break-up.





ACM-CAP: BA + MSI & MODIS Aqua / Terra classifications

- Lowest bin ice mass flux

