Antarctica: Cracks in the ice

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Enormous curved crevasses near the Pine Island Glacier shear margin. Credit: Brooke Medley/NASA

In recent years, the Pine Island Glacier and the Thwaites Glacier in west Antarctica has been undergoing rapid changes, with potentially major consequences for rising sea levels. However, the processes that underlie these changes and their precise impact on the weakening of these ice

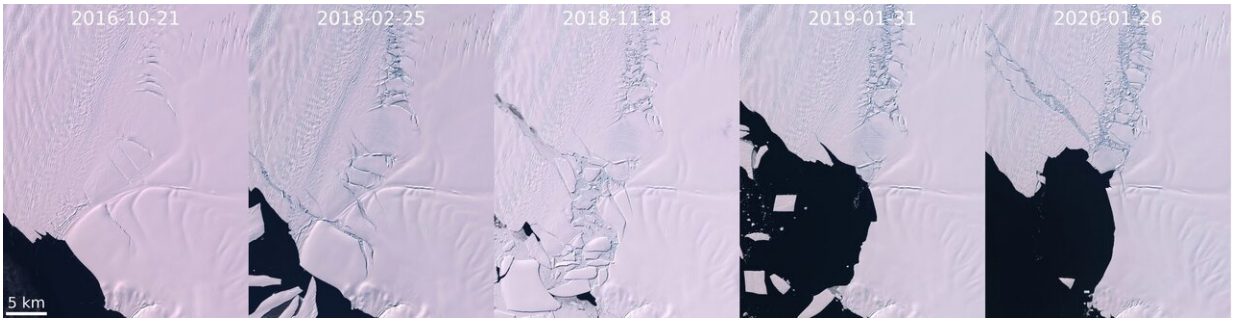
sheets have not yet been fully charted. A team of researchers including some from TU Delft have now investigated one of these processes in detail: the emergence and development of damage/cracks in part of the glaciers and how this process of cracking reinforces itself. They are publishing about this in *PNAS*.

Satellite imagery

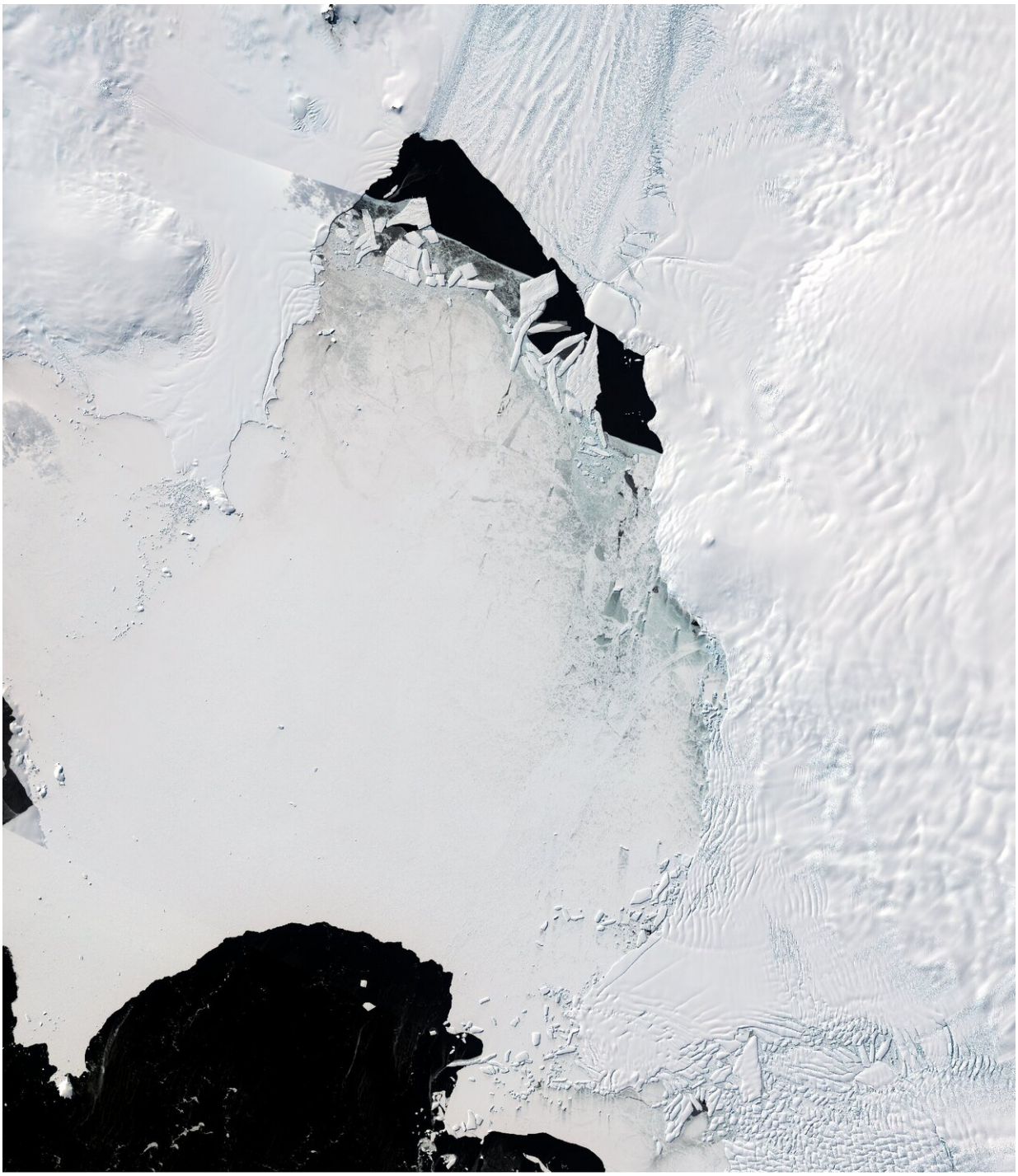
The researchers have combined satellite imagery from various sources to gain a more accurate picture of the rapid development of damage in the shear zones on the ice shelves of Pine Island and Thwaites. This damage consists of crevasses and fractures in the glaciers, the first signs that the shear zones are in the process of weakening. Modeling has revealed that the emergence of this kind of damage initiates a feedback process that accelerates the formation of fractures and weakening.

Unstable

According to the researchers, this process is one of the key factors that determines the stability—or instability—of the ice sheets, and thus the possible contribution of this part of Antarctica to rising sea levels. They are calling for this information to be taken into account in climate modeling, in order to improve predictions of the contribution these glaciers are making to rising sea levels.



Damage evolution in the shear zone of Pine Island Glacier viewed from the Copernicus Sentinel-2 satellite. Credit: Stef Lhermitte



Amundsen Embayment viewed from the Copernicus Sentinel-2 satellite. Credit: Stef Lhermitte

More information: Stef Lhermitte el al., "Damage accelerates ice shelf instability and mass loss in Amundsen Sea Embayment," *PNAS* (2020). www.pnas.org/cgi/doi/10.1073/pnas.1912890117

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