

Observation of a giant tabular iceberg calved from Amery Ice shelf based on multiple remote sensing data

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Introduction

- Iceberg calving has been assumed to be the dominant cause of mass loss for the Antarctic ice sheet.
- Iceberg D28 is a newly generated iceberg from Amery Ice Shelf, East Antarctica.
- We use multiple remote sensing data to observe the evolution of iceberg D28 from October 2019 to October 2020.



Figure 1. Trajectory of D28 (2019.09 – 2020.02)

Table 1. Cross validation of different satellite altimeter profiles of Amery Ice Shelf Front From 2018.09 to 2019.09

	Number of Points	Mean Value of Differences (m)	Standard Deviation of Differences (m)
ICESat-2 – Cryosat-2	2025	-0.33	0.82
ICESat-2 – Sentinel-3	524	-0.09	1.12
Sentinel-3 – Cryosat-2	151	-0.33	1.83

Methods

- Area:** Estimated using Sentinel-1 SAR images
- Freeboard:**
 - Cryosat-2 Baseline-D product
 - Sentinel-3 SRAL Level-2 Product
 - Downscaled ICESat-2 ATL03
- Freeboard Change:**
 - Compare freeboard of iceberg D28 with its initial surface height (Interpolated from altimeter profiles of AIS front)

Findings

- Continuous stretching (strain thinning) and random fragmentation lead to area change.
- Freeboard increased during the study period.
- Considering snow accumulation estimated from ERA5, which caused about 0.12m increment of freeboard from 2019.09 to 2020.09. Fragmentation may contribute to the increase of freeboard.

Results

Area Change:

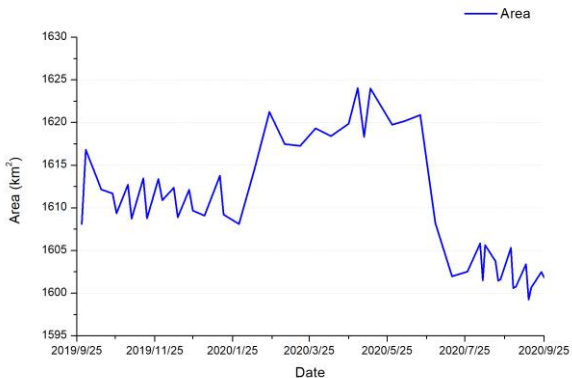
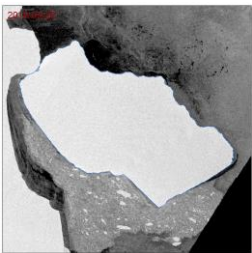
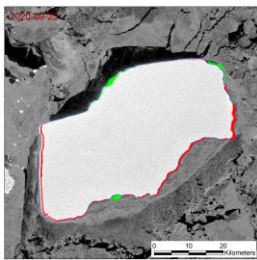


Figure 2. Area Change of D28



(a). 2019-09-29



(b). 2020-09-25

Area Gain:
7.219 km²
Area Loss:
13.449 km²

Figure 3. D28 on Sentinel-1 images

Freeboard Change:

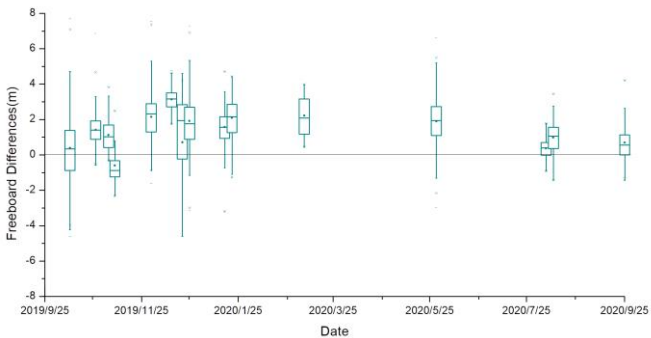


Figure 5. Freeboard Change of D28

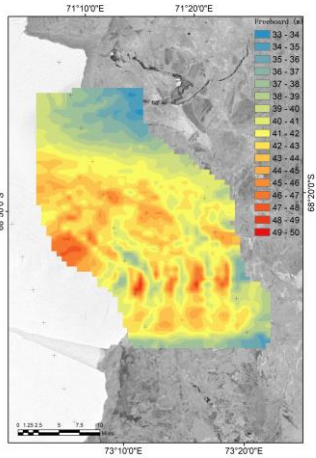


Figure 4. Initial surface height of D28