# ATL20/21

## Notes to users and known issues

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**Notes to users and known issues**

This document contains notes, which are of use in the analysis of the gridded sea ice products, and issues that are known to the developers, which may be fixed in future releases of these products. Notes and Issues from the ATL07/10 Known Issues document relevant to these gridded products have been copied here also (in italics)

Feedback from the community will be added to future revisions of this document.

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**Note 1. Data coverage**

Currently ATL20 (and eventually ATL21) is configured to generate monthly freeboard composites across both hemispheres for all months since November 2018, regardless of the number of valid days of ATL10 data that exist in that month.

Data gaps in ATL10 do exist, due mainly to anomalous spacecraft issues. So far, the primary data gap was due to a safehold event on 26 June, 2019 that lasted until July 9, 2019. The monthly gridded June/July 2019 estimates are still produced but are thus based on incomplete monthly coverage. Due to the orbit cycle of ICESat-2, it is also very common for monthly grid-cells in ATL20 to be generated from just single day of ATL10 data (there is no minimum number of days needed to produce a monthly gridded freeboard estimate in a given grid-cell).

Following the safehold, the data through July 9 to 26 2019 were compromised (discussed below) but are included still in ATL10 and now ATL20:

*Copied from the ATL07/10 known issues - Data collected between 9-26 July 2019 have a small timing bias resulting from an erroneous Earth orientation parameter uploaded during the spacecraft's return to operations following a safehold event on 26 June 2019. This caused an error in spacecraft pointing, resulting in an extra approximately 1 degree of forward pitch, and shifted the onboard attitude control system interpretation of spacecraft time by roughly 19 seconds. The primary manifestation of this issue is telemetry band errors at steep coastal areas, at times resulting in loss of surface returns. We note that there may be some increased height errors from data collected during this time period, those errors are generally within the conservative estimates of geolocation and height uncertainty currently provided on the ATL03 product.*

**Note 2. High freeboard samples (near the ice margins) due to sea state***

We advise users to be cautious of erroneous freeboards in grid-cells near to the ice edge for the reasons provided in the ATL10 Known Issues (Issue #5): *Copied from the ATL07/10 Known Issues document: the reference sea surfaces used to calculate freeboards are based on sea surface heights identified in ATL07. Near the ice edge, the reference surfaces within the ice cover are affected by sea state, likely due to scattering from the troughs of waves propagating into the ice cover, resulting in surfaces that may be tens of centimeters below the local mean sea level. This results in higher freeboards and affect one or perhaps two 10-km freeboard segments. Most of these anomalous retrievals have been filtered out but they still occur.*

**Note 3. ATL21 development**

The gridded sea surface height product (ATL21) is still under development but is expected to be released in early 2021.

**Issue 1. Negative segment lengths**

As noted in the ATL07/10 Known Issues document (Issue #8), an error was found in r003 data whereby in rare cases, segments are listed as having an unphysical negative segment length. This

was caused by a software bug in how the ATL03 data was being ingested. This has been fixed for r004 data production.

Our testing (on January, June, October 2019 data) suggests this affects only ~0.002-0.003% of the freeboard segments in a given month and introduces errors that are only significant at the $5^{th}/6^{th}$ decimal level.