

ATL06 release 006 known issues. September 29, 2022

Uncertainties in geolocation

Some components of the error propagation algorithms for ATL03 have not yet been implemented. To avoid providing incorrectly optimistic estimates of the horizontal geolocation uncertainty and the vertical uncertainty to which it is propagated, fixed, pessimistic values of 5 m (1-sigma) are reported for the horizontal geolocation uncertainty on release 006 (*sigma_geo_at* and *sigma_geo_xt*). Additionally, a parameter for radial component of the geolocation error (*sigma_geo_r*) is provided as a dynamically calculated value. This was previously provided as a fixed value but is now being dynamically calculated for ATL03 (see Section 3.3.2 in the ATL03 ATBD for the *sigma_h* calculation) and the value is passed through to ATL06 (*sigma_geo_r* in ATL06). Note that *sigma_geo_r* includes the uncorrelated photon errors, which are reduced when the ATL06 surface is fit to all surface photons in the segment, however this reduction is not reflected in *sigma_geo_r*.

We anticipate a refinement to the geolocation uncertainties for release 007, which will provide better estimates of all three components of geolocation uncertainty, including dynamically calculated values for *sigma_geo_at* and *sigma_geo_xt* and omission of the laser pulse width (uncertainty at the photon level) for *sigma_geo_r*.

Spurious trends in the data

Released data are calibrated to temporal trends smaller than 1 mm/day. As calibration exercises are completed, those data will be used to produce timing-bias models that will stabilize temporal trends in the beam to be on the order of a few mm/yr.

RGTs with significant off-pointing over the ice sheets

Before the middle of cycle 7 (~April 2020) calibration maneuvers known as Round-the-World scans (RTWs) were conducted that resulted in substantial off-nadir pointing for a subset of tracks in Antarctica and Greenland. Data collected while ATLAS was pointed away from the RGTs have substantially larger height errors than do data collected while pointing at nadir. These data may be identified by checking the ATL06 *y_atc* parameter. Any segment with *y_atc* larger than 10 km should be suspected of having height errors on the order of 0.2-0.5 m.

Data gaps due to Tx/Rx slips and degraded POD/PPD

Some ATL06 granules that were present in release 003 are missing in subsequent releases. This is due mostly to newly found instances where the components that make up photon times were misregistered, leading to incorrect heights. A second source of missing ATL06s in Rel004 are data that was culled due to degraded precision orbit determination (POD) and precision pointing determination (PPD) solutions. Users should refer to the ICESat-2 Major Activities table, available on NSIDC, for a complete list of missing data for all ICESat-2 products.

Surface window errors, July 6-26, 2019

In the period July 6-26, 2019, a timing error in the ICESat-2 flight software led to compromised tracking of the surface by the on-board software. Data from this period may have fewer detected ground returns and have somewhat larger (by a few cm) height errors in parts of Antarctica and Greenland. These data were first released in August 2020.

Data outside of the polar regions is experimental

With release 006, ATL06 data is now being processed for all global land regions. However, ATL06 data outside of the polar regions has not been thoroughly evaluated and may contain errors. The surface window width (*w_surface_window_final*) can be used as a coarse check on the data quality. If the surface window width is too large, the ATL06 algorithm has not converged on a surface in the ATL03 photon cloud due potentially to vegetation, indicating that the segment may contain large errors in the estimated height. Another coarse check that can be used is the difference between the ATL06 estimated surface height (*h_li*) and the surface height specified by the digital elevation model (*dem_h*). If this difference is large, that may be an indicator of large errors in the estimated ATL06 surface height.