

ATL11 release 007 known issues. September 24, 2025

Poorly constrained reference surfaces: The primary problem observed with ATL11 data is that when the surface topography is complex, and when the number of repeat measurements for an along-track point is small, the reference-surface fitting solution can produce unreliable results, resulting in unrealistic corrected-height values. The /ptx/ref_surf/fit_quality flag is provided to help users identify points affected by this problem. This variable has one element for each reference point, and nonzero values (1, 2, or 3) indicate a problem. The subset of data with /ptx/ref_surf/fit_quality==0 will contain significantly fewer, and smaller, outlying values.

Inherited problems from lower-level products: The ATL06 dataset contains a few tracks that have significant errors not accounted for in the standard error model. These include signal-finding blunders, and systematic errors associated with activities that point the spacecraft away from the reference ground tracks. These errors in some cases produce missing data or outlying values in ATL11.

1. ATL06 outliers. Signal-finding blunders have the largest effect in the crossing-track data values and may be eliminated (in part) by filtering based on the /ptx/crossing_track_data/along_track_rss values (smaller values are better), and on /ptx/crossing_track_data/ATL06_quality_summary values (zero indicates no problems identified).

2. Systematic off-pointing relative to the reference track also has its most significant effects on the crossing_track_data group, because data from cycles with significant off pointing are usually excluded from the along-track fit. Some of these events are identified in the ICESat-2 Technical Reference Table, which is available on request from the NSIDC.

3. The dac (dynamic atmosphere correction) is computed based on atmospheric pressure globally, and is thus nonzero even over grounded ice, where there should be no dependence of surface height on surface pressure. Note that dac is not applied to any data in ATL11, and users who wish to apply it may make the rough approximation that the dac correction is valid anywhere the ocean_tide is nonzero.

Jumps in delta_time variable: The ATL11 delta_time variable is calculated based on all of the ATL06 data available from each cycle at each reference point. In some cases, data are available from only one beam in a pair at a reference point, and because the two beams are separated by ~2.5 km in the along-track direction, the delta_time values between the beams differ by around .36 s. In some cases, for subsequent reference points at which data from different beams are available, the delta_time value for a cycle will jump forwards

or backwards by ~ 18 s. This is expected behavior for the algorithm and does not indicate a problem.

Gaps in /ptx/ref_surf/dem_h: There are some places in both Antarctica and Greenland where the input reference DEM has incorrect values. If these translate into values in ATL11 that are greater than 8000 m, or less than -400 m, the output /ptx/ref_surf/dem_h will be set to the output _fillValue, indicating that they are invalid.

Incorrect _FillValues in cycle_stats variables. Some of the variables in /ptx/cycle_stats are of type byte, but the _FillValues are set to long-integer types. This means that when most software reads invalid values from these variables, they will appear as valid data with a value of 127. Integer values of 127 from cycle_stats should be viewed with suspicion.