New Parameters on ATL09 for Data Release 003

Group: **/profile_x/high_rate**
asr_cloud_probability. This parameter contains the probability of the occurrence of cloud based on the magnitude of the apparent surface reflectivity (0 to 100)
bsnow_intensity. This parameter contains the blowing snow intensity defined as the average scattering ratio within the blowing snow layer times the 10 meter wind speed.

Group: **/profile_x/low_rate**
bsnow_intensity. This parameter contains the blowing snow intensity defined as the average scattering ratio within the blowing snow layer times the 10 meter wind speed.

ATL09 Issues in Release 002 that are fixed in Release 003

Profile_x/high_rate:

Cab_prof: this is the calibrated attenuated backscatter profile. In release 002 the slope of the average signal (of a minute or so in length) in a cloud and aerosol-free region is somewhat less than molecular. This is caused by folding of molecular signal from above 15 km and has been largely corrected in release 003. However, in areas of high solar background, this could still be a problem. The calibration in areas of twilight has also been improved.

Surface_h_dens: This is the height of the surface determined from the DDA (Density Dimension Algorithm). In release 002, the values tend to jump around the actual surface and may lead to an error in the surface height of about 100 m. This has been corrected in release 003.

Profile_x/low_rate:

Bsnow_h, bsnow_od, bsnow-con: In release 002, these parameters were not computed correctly. They are now fixed for release 003.

ATL09 Known Issues for ASAS V5.3

(Data Release 003)

The following lists the known issues with the ASAS version 5.3 (release 003) ATL09 atmospheric parameters. We are actively working to correct the problems for the next release.

Note: The normal operation of the ATLAS produces atmospheric profiles at the 25 Hz rate (400 shot sums). However, for a number of weeks shortly after launch, the instrument team conducted tests which produced 50 Hz (200 shot sums) atmospheric profiles. There are a total of 54 granules affected, all occurring in October or November of 2018. This does not cause noticeable problems in the data processing or product parameters but the user should be aware of this. These granules were released to the public for releases 001 and 002, but are being withheld for this release (003).

Profile_x/high_rate

Apparent_surf_reflec: This parameter can become negative when the ***surface_sig*** parameter is negative (see ***surface_sig*** entry below)

asr_cloud_probability: The range of this parameter should be 0 to 100. However a negative *apparent_surf_reflec* will cause this parameter to become > 100.

***Backg_theoret*:** This is the theoretical background based on the solar zenith angle and the estimates surface reflectivity. It needs to be multiplied by 400.

Bsnow_dens and ***bsnow_hdens*** are currently undefined.

Cab_prof: A new calibration method is used for release 003 which has improved the calibration but in areas of high background, the calibration can still be off by 10% or so. Also, in an area east of Africa westward to over South America, the South Atlantic Anomaly (SAA) causes added noise to the lidar signal. This is only noticeable at night and is evident as an increase in background. This also effects the calibration in this area.

Cloud_flag_asr: works well over Antarctica, Greenland and ocean, but is not as accurate over land. It tends to underestimate cloud cover over land.

Cloud_fold_flag: does not capture all instances of cloud folding (times when there are clouds above 15 km that are folded down to the -0.5 – 3 km height due to the 10 KHz laser repetition rate – see the atmosphere ATBD for a complete discussion of this).

Dem_h: This is the Digital Elevation Model surface height. It is generally very good but at some locations may jump up ~200 m. The most probable place for this to happen is in the Arctic.

Layer_attr: this is the cloud aerosol discrimination for each atmospheric layer detected. It is of poor quality and does not accurately differentiate cloud from aerosol. Based on comparisons with CALIPSO, it tends to identify too many layers as aerosol. We are working on improving this for future releases.

Layer_top and layer_bot: For very optically thin layers such as elevated aerosol, at times instead of having 1 top and bottom to define the layer, there can be multiple tops and bottoms within the layer. This is caused by the layer finding algorithm picking up on small gradients of backscatter within the layer. This can also happen in thin cirrus clouds. We have substantially mitigated this problem in release 003, but is at times still present. Note also that ICESat-2 cannot detect clouds above 14 km which affects cloud amount in the tropical regions.

Surface_h_dens: Very infrequently, very low clouds (< ~200 m) are misidentified as the surface.

Surface_sig**:** Very infrequently, this parameter (the magnitude of the surface signal in photons/bin) can be negative, which is an error.

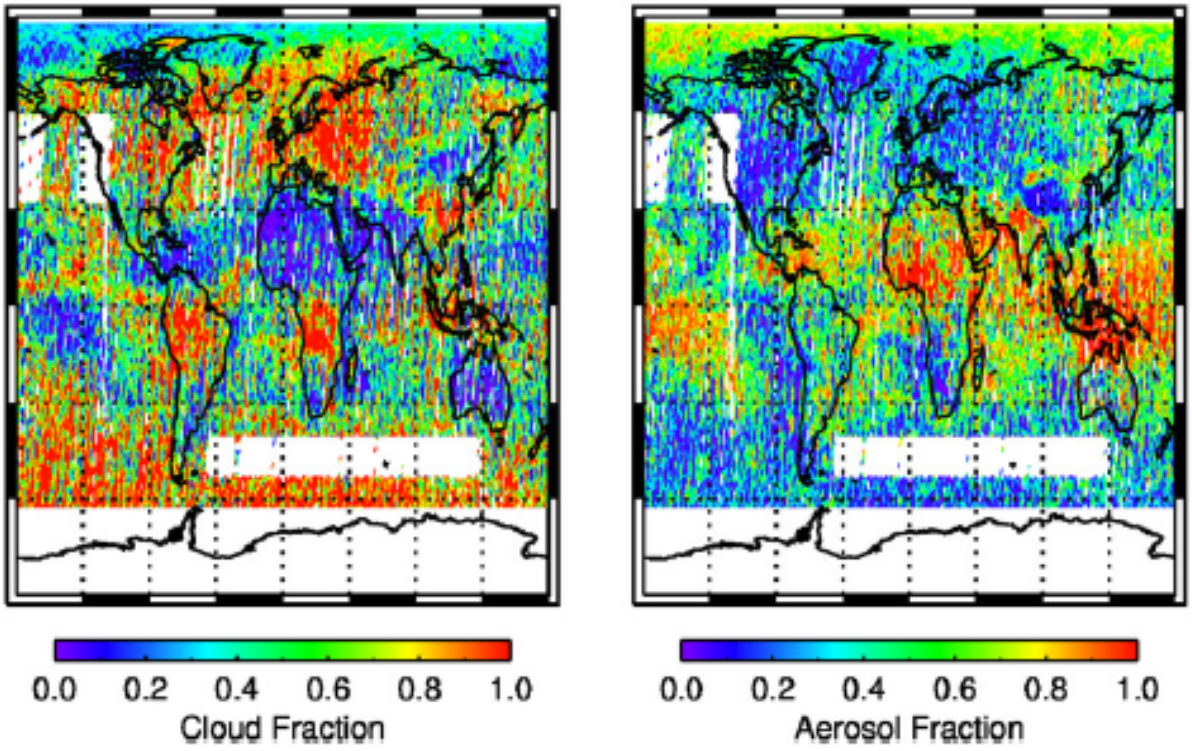
Profile_x/low_rate

Bsnow_h: This is the low rate (1 second) blowing snow height. There is a misalignment between this parameter and the wind speed data such that a blowing snow detection can be reported (parameter *bsnow_h* not invalid) but the corresponding wind speed is reported as less than the threshold wind speed for blowing snow (4 m/s).

Note for Nighttime data collection:

The ATLAS instrument performs calibrations that are used to optimize the altimetry retrievals during nighttime passes over parts of the oceans. During the calibration maneuvers, the atmospheric data are not collected. This results in areas where no data are collected as seen in the figure below (white areas). This affects data collected prior to March, 2019. After this date the calibration strategy was changed which greatly reduced this problem.

2018/12 – ZN


0.0 0.2 0.4 0.6 0.8 1.0
Cloud Fraction
0.0 0.2 0.4 0.6 0.8 1.0
Aerosol Fraction