New Parameters on ATL09 for Data Release 005

Group: /profile_x/high_rate
Bnow_h_dens.
Bsnow_dens_flag
Ddust_htop_dens
Ddust_hbot_dens
Podppd_flag

The **bsnow_h_dens** parameter was on the prior release (004), but it was not defined. This new parameter complements bsnow_h and is a second independent retrieval (using the DDA layer detection algorithm) of the height of blowing snow layers. **Bsnow_dens_flag** is a 0-3 flag to indicate result of DDA blowing snow detection: invalid: not searched for; 0: no blowing snow or diamond dust found; 1: blowing snow only found; 2: blowing snow and diamond dust found; 3: diamond dust only found**. Ddust_htop_dens** and **ddust_hbot_dens** are the top and bottom of the diamond dust layer if found. **podppd_flag** provides identification of ATLAS data in nominal geolocation quality status or a degraded quality. **podppd_flag** =0 means geolocation is in reference ground track pointing with normal quality. **podppd_flag** =4 means geolocation is in around-the-world scan or ocean scan with normal quality. Other values are degraded quality.

ATL09 Issues in Release 004 that are fixed in Release 005

Profile_x/high_rate:

Surface_sig: In version 004 it was found that in some cases the dead time correction factor that is applied to the surface signal was incorrect. This caused **surface_sig** to be too low and has been corrected.

Apparent_surf_reflec: Because of the dead time correction error, the apparent surface reflectance (computed from the magnitude of the surface signal) was also affected. The problem was most noticeable over Antarctic, which showed an erroneous decrease in surface reflectance in winter. This has been corrected.

Cloud_flag_asr: This parameter is the cloud detection based on apparent surface reflectance. The cloud detection over land and snow surfaces has been improved.

ATL09 Known Issues for ASAS V5.5
(Data Release 005)

The following lists the known issues with the ASAS version 5.4 (release 004) 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 (005).

Profile_x/high_rate

Bsnow_dens is currently undefined.

Bsnow_h_dens**:** The height of retrieved blowing snow layers is roughly 90 m too high. Currently, the algorithm is unable to detect blowing snow layers less than 90 m thick.

Cab_prof: During twilight (solar elevation angles -7 to -1), the calibration can be very poor. 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. While calibration has been improved in this region, it can still have considerable error.

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).

Layer_attr: this is the cloud aerosol discrimination for each atmospheric layer detected. The cloud aerosol discrimination algorithm relies heavily on having well calibrated backscatter. When going from night to day (solar elevation 0 to 20), there is often a problem with the calibration (calibration constant too large). This causes the backscatter to be too small, which increases the frequency with which layers are classified as aerosol. When aerosol fraction is displayed on a map, this causes a noticeable step jump in aerosol fraction usually at the same latitude as is seen in Figure 1 below at roughly 50 degrees north.

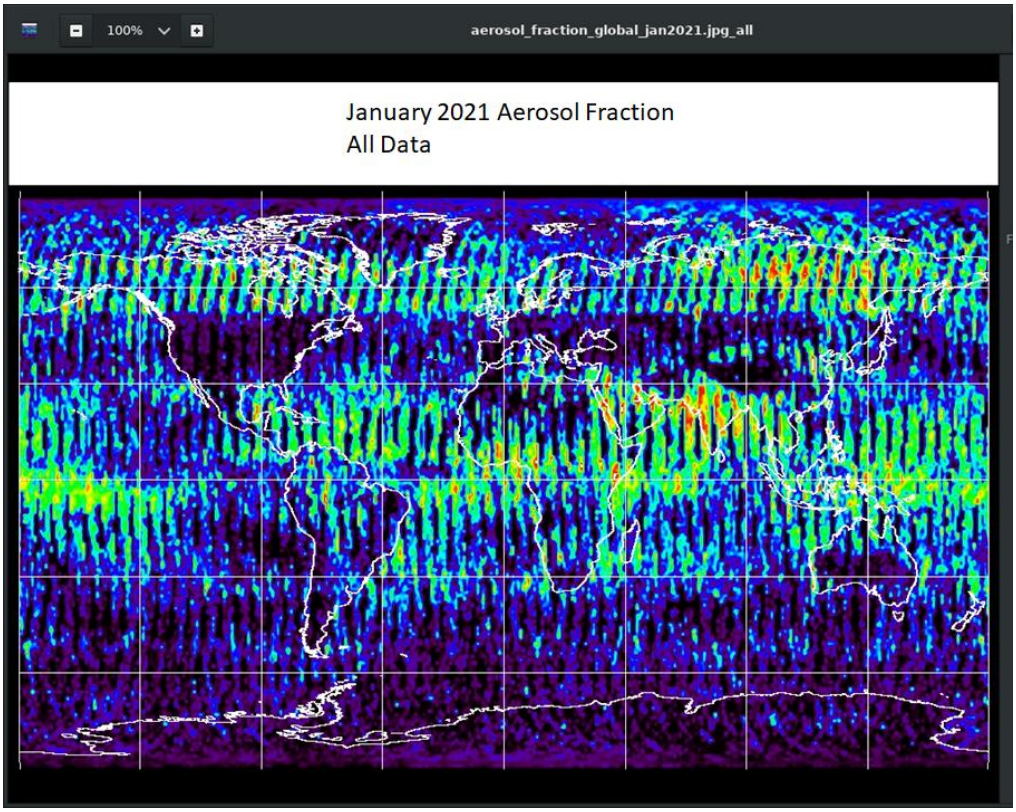

Figure 1.

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 and or the effects of noise. This can also happen in thin cirrus clouds but it is not as frequent there. Note also that ICESat-2 cannot detect clouds above 14 km which affects cloud amount in the tropical regions.

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 Figure 2 below (white areas). This affects data collected prior to March, 2019. After this date, the calibration strategy was changed, which greatly reduced this problem.

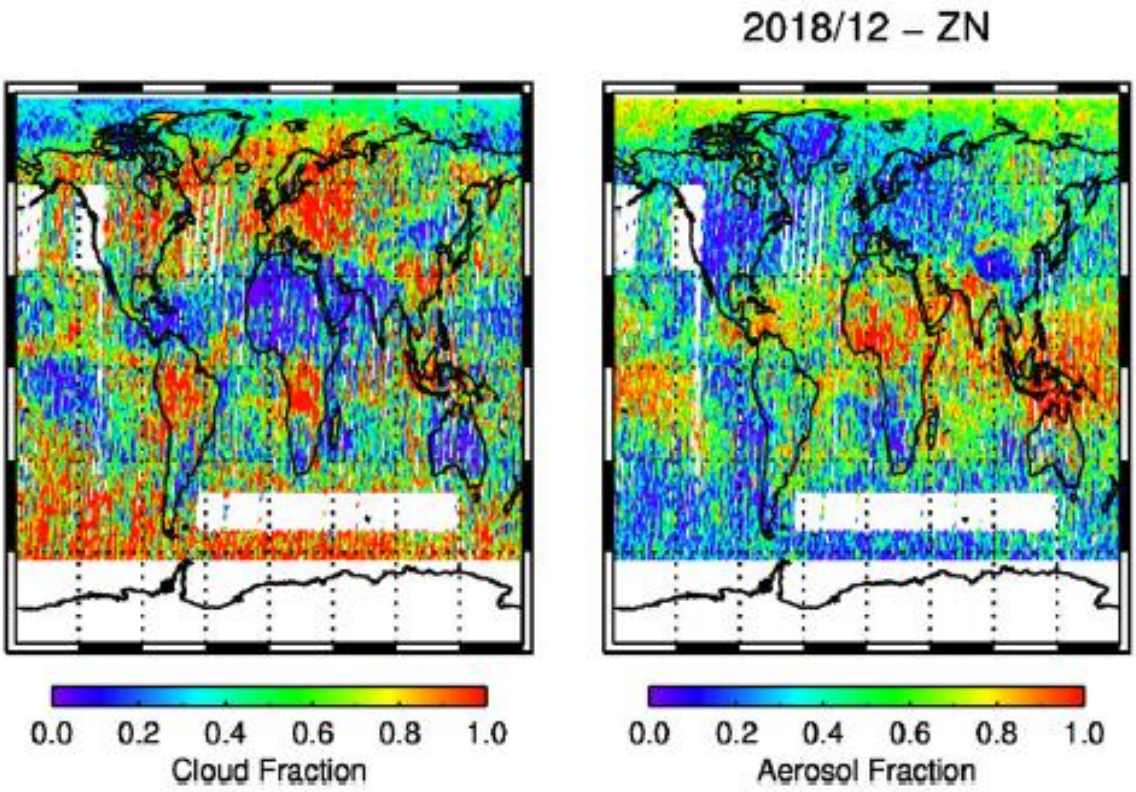
2018/12 – ZN
0.0 0.2 0.4 0.6 0.8 1.0
Cloud Fraction
0.0 0.2 0.4 0.6 0.8 1.0
Aerosol Fraction

Figure 2.