AMSU-A Channel 4 NeDT Update: 20 December 2007

AMSU-A Channel 4 NeDT continues to degrade, reaching 3K by the beginning of December 2007 (Figure 1). This condition is now significantly impacting the yield of the operational Version 5 AMSU+AIRS retrieval products, especially near the surface. Daily global yields, which are a good indicator of this situation, have dropped steadily since the beginning October 2007 (Figure 2). The most striking effect can be seen in the 850 mb line, which exhibited an average yield of about 50% at the beginning of October now shows a daily yield below 30%. Similar decreases in yield can be seen at 500 mb, 200 mb and 1000 mb levels. Retrieval quality near the surface has also degraded somewhat. Perhaps the best way to visualize the impact of Channel 4 degradation on retrievals is to compare two daily Level 3 Surface Air Temperature products, one from December 12, 2007 and one produced on the same date in 2006 (Figure 3 – following page). While the global temperature patterns on both images depict typical December distributions, the 2007 image exhibits pronounced masking along the perimeter of cloud features, and dropouts are more common over land and ocean. The prognosis is for continued degradation in retrieval quality as the Channel 4 NeDT worsens.

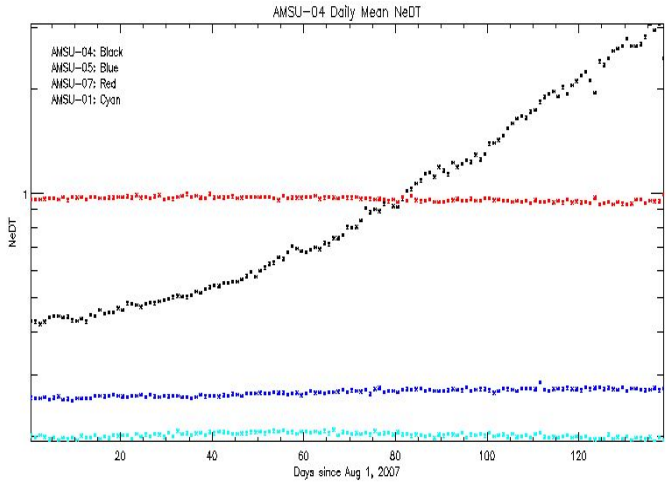

Figure 1. Daily Mean NeDT for selected AMSU-A Channels. Channel 4 (black) exhibits a pronounced rise since August 1. Also depicted are Channels 1 (cyan), 5 (blue) and 7 (red).

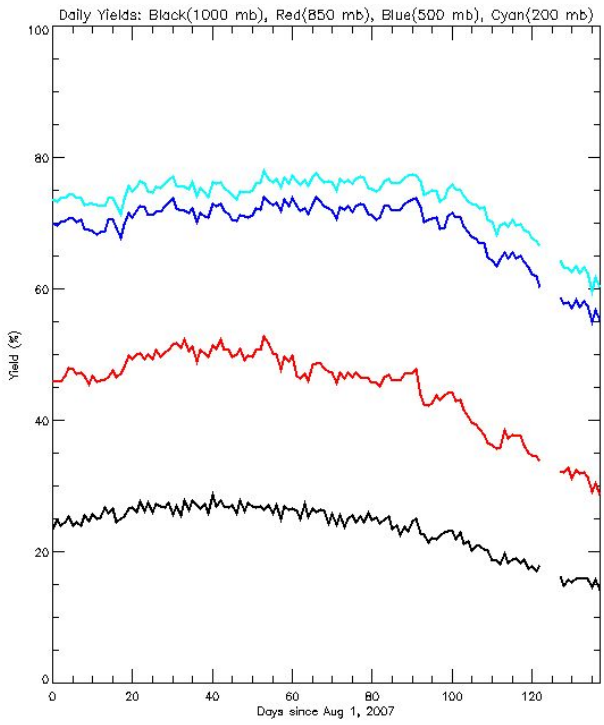

Figure 2. Daily yields have dropped continuously since early October for all near-surface levels.

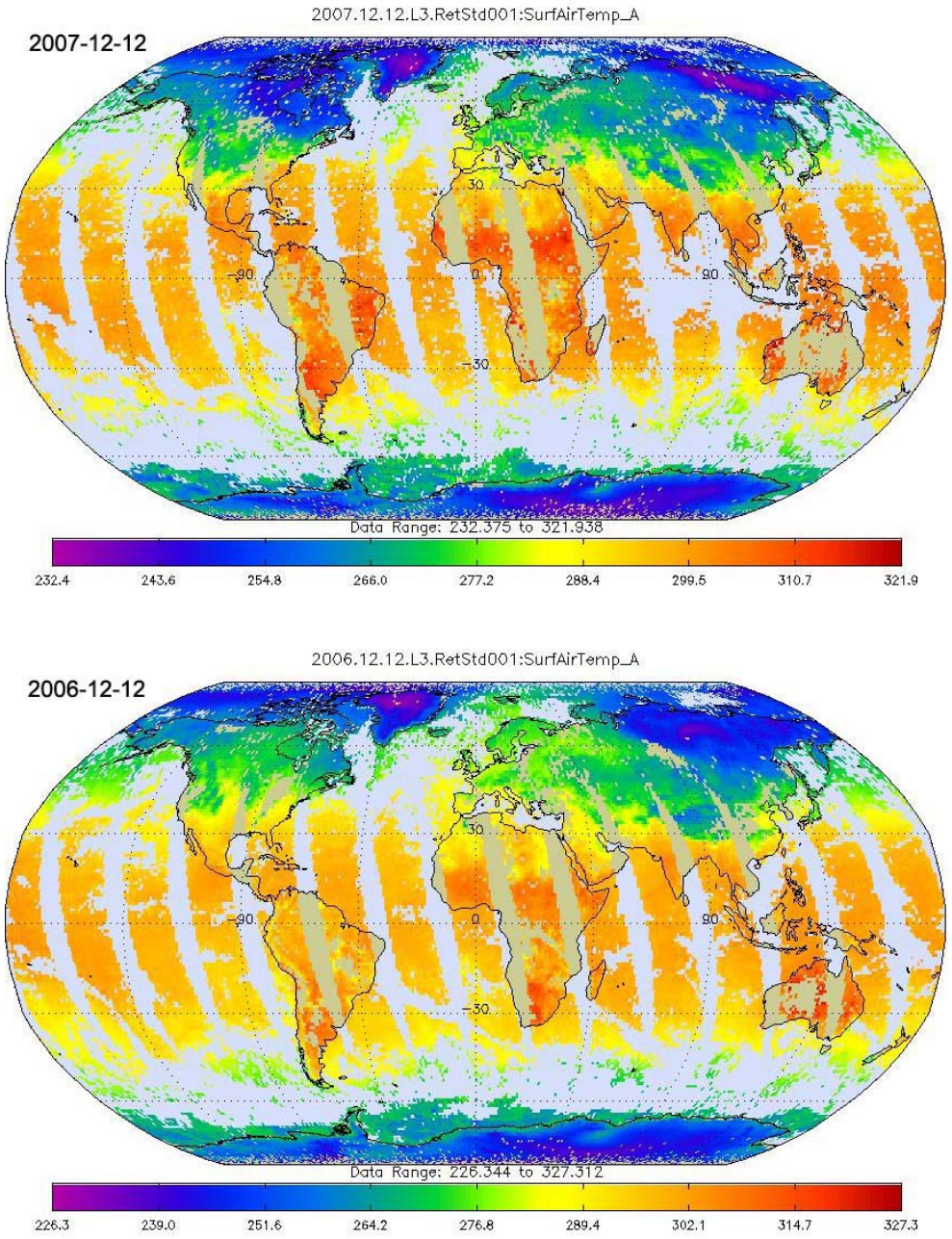

Figure 3. Daily Level 3 Surface Air Temperature maps for December 12, 2007 (top) and December 12, 2006 (bottom) depict a relative decrease in retrieval yield in 2007 as a result of the AMSU-A Channel 4 degradation.

In response to this condition, the AIRS Project and the GES DISC began producing IR-Only products on November 8, 2007 and they are now available for access via WHOM and Mirador data ordering tools (http://disc.sci.gsfc.nasa.gov/AIRS/data_products.shtml). The IR-Only algorithm has not been exhaustively validated, but initial comparison of its products with those of the AIRS+AMSU algorithm are in the Version 5 Test Report which is part of the Version 5 Data Release Documentation.The document may be downloaded at the link: http://disc.gsfc.nasa.gov/AIRS/documentation/v5_docs/AIRS_V5_Release_User_Docs/V5_Test_Report.pdf. Users of AIRS data will notice a lower yield for the IR-Only algorithm, due to its reduced capability to handle the more cloudy fields.

Currently, the AIRS Project is investigating options for modifying the AMSU+AIRS retrieval algorithm to identify an effective method for dealing with a degraded AMSU channel 4. We expect that an upgrade to the AIRS Level 2 retrieval will be delivered early in 2008. Please note that any modification of the AIRS retrieval algorithm must undergo rigorous testing before being implemented at the GES DISC. Users must therefore expect some months to elapse before any modified AMSU+AIRS retrieval algorithm becomes operational.

To recap, the GES DISC will now produce and archive AIRS products produced from both the IR-Only and the AMSU+AIRS retrieval versions. You can discriminate these products from each other by their product names. All AIRS+AMSU product names begin with "AIRX" while all IR-Only product names begin with "AIRS." For example, the AIRS Level 2 standard product produced by the AIRS+AMSU algorithm will be with a data product ID of "AIRX2RET," and the IR-Only algorithm will produce a product named "AIRS2RET." AIRS near-real-time (NRT) products continue to be produced with the AIRS+AMSU algorithm (AIRX product names), as it is impossible to maintain two NRT streams at the same time.

For additional information about the degradation of AMSU-A Channel 4, please see the following link: http://daac.gsfc.nasa.gov/AIRS/amsu_ch4_noise_increase.shtml