

***CrIMSS EDR Release, Beta Data Quality***  
***Last Updated: 9/7/2012***  
***Read-me for Data Users***

The JPSS Algorithm Engineering Review Board approved the release of the CrIMSS EDR to the public with a Beta level quality as of 19 April 2012. Beta quality is defined as:

- Early release product
- Initial calibration applied
- Minimally validated and may still contain significant errors (additional changes are expected)
- Available to allow users to gain familiarity with data formats and parameters
- Product is not appropriate as the basis for quantitative scientific publications, studies and applications

The Board recommends that users be informed of the following product information and characteristics when evaluating the CrIMSS EDR.

1. Together the CrIS and ATMS instruments provide data for the production of the Cross-Track Infrared Microwave Sounding Suite (CrIMSS) EDRs; the Atmospheric Vertical Temperature Profile (AVTP), the Atmospheric Vertical Moisture Profile (AVMP) and the Atmospheric Vertical Pressure Profile (AVPP). CrIS succeeds the heritage NASA AIRS and EUMETSAT IASI with 1305 spectral channels covering wavelengths from 4 to 15  $\mu\text{m}$ . ATMS succeeds the heritage NOAA AMSU-A and AMSU-B (or MHS) and provides 22 channels covering 20-183 GHz.
2. The CrIMSS algorithm utilizes all of the radiances from CrIS and ATMS within a CrIS field-of-regard (FOR) to produce a single sounding of the AVTP, AVMP. The FOR is derived from  $\sim 25$  ATMS fields-of-view (FOV) that are optimally averaged along with an optimal spatial combination of the 9 CrIS FOVs (called cloud clearing). AVPP is derived from geopotential height computed from AVTP and AVMP.
3. The CrIMSS EDRs are heavily dependent on the upstream SDRs as well as empirically derived bias corrections with respect to the CrIMSS forward model (called the Optimal Spectral Sampling or OSS model). As calibration of the CrIS or ATMS SDRs improves, so does the quality of the CrIMSS EDR. The ATMS and CrIS SDRs achieved beta status in February and April 2012, respectively.
4. The ATMS SDR does not have scan angle dependent (also known as side-lobe) bias corrections. When the ATMS SDR does provide these corrections there will always be a residual bias between observed radiances and those computed from a forward model. In the case of the CrIMSS EDR this forward model is the Optimal Spectral Sampling (OSS). Thus, at this time, there is a scan dependent bias ( $\sim 1\text{K}$ ) of the CrIMSS EDR products. This bias is particularly evident in AVTP at  $\sim 300$  hPa. A code and LUT installation has been requested for Mx6.3 (DR 4325, 474-CCR-12-472).
5. The CrIMSS EDR also requires a bias correction for the CrIS radiances with respect to OSS. This has been implemented in the CrIMSS EDR; however, the look-up-table (LUT) was derived from pre-launch proxy data. This contributes to the biases seen in AVTP and AVMP; however, it does

not appear to result in regional or scan dependent biases. A new LUT has been created and installation has been requested for Mx6.3 (DR 4334, 474-CCR-12-475).

6. The CrIMSS EDR has a pre-launch emissivity climatology that is sub-optimal. We have seen that this, coupled with the ATMS and CrIS bias correction, leads to a very low yield of accepted cases (most cases are rejected due to high values of  $\chi^2$ ) near coastlines and over land. A new LUT has been created and requested for installation in Mx6.3. (DR 4335, 474-CCR-12-495).
7. The CrIS and ATMS noise estimate files have not been updated from pre-launch values. In addition, the forward model error estimates are also based on pre-launch simulations and proxy data and they need to be updated. These files affect the convergence criteria in cloud clearing, stratification, and the retrieval steps. Optimization of these would increase the yield and improve the performance. This will be addressed in the provisional product.
8. An error was found in the stratification routine for warm ocean. The current test uses the retrieved value of surface temperature and emissivity (in microwave-only stage 1) to select covariance matrices for cold or warm ocean. The logic needs to be changed from (Tskin > threshold .or. emissivity > 0.1) to (Tskin > threshold .and. emissivity > 0.1). Changing this improves retrievals over warm ocean. This will be addressed in the provisional product.
9. Precipitation flag is using an out of date code and AMSU coefficients (DR 4068 and 4079). Preliminary analysis shows this flag is functioning but has a large number of false positives and false negatives. This will be addressed in the provisional product.
10. Daytime yield of the microwave-infrared CrIMSS retrieval has a significantly lower yield. This has been tracked to a software error in the indexing of non-LTE sensitive channels. This will be addressed in the provisional product.
11. Instrument and spacecraft maneuvers and tests: maneuvers and special tests are still being performed on-orbit to better characterize the SNPP instrument performance, including lunar roll maneuvers. During such events, the CrIMSS EDRs will not be optimal, and may not be useable.

Additional information on CrIS/ATMS and the algorithm theoretical basis documents (ATBDs) are available at

<http://www.star.nesdis.noaa.gov/jpss/ATBD.php>

The CrIS and ATMS SDR Read-mes for Beta Data Quality are also available at from CLASS Homepage.

Point of Contact  
Christopher Barnet  
CrIMSS EDR Validation and Algorithm Lead  
Chris.Barnet@noaa.gov  
301-683-3600