

Suomi NPP Sounding EDR Validation and Evaluation

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1. Introduction

The Suomi National Polar-orbiting Partnership (S-NPP) was launched on Oct 28, 2011. The official Cross-track Infrared and Advanced Technology Microwave Sounder Suite (CrIMSS) sounding Environmental Data Record (EDR) products include the Atmospheric Vertical Temperature Profile (AVTP) and Atmospheric Vertical Moisture Profile (AVMP). These are very useful products for both nowcasting and data assimilation. Before the products are open for public use, extensive validations are necessary to provide needed quality flag information to users. The Cooperative Institute for Meteorological Satellite Studies (CIMSS) sounding team examines the impacts on the EDR products from 1) the cloud contamination, 2) satellite viewing angle, and 3) scene temperature.

The CrIMSS sounding EDR products are compared with ECMWF analysis. The focus day (05/15/2012) is presented using the official sounding EDR products (MX5.3) as well as the offline version (later MX6.1).

2. Impact of clouds on CrIMSS sounding

EDR

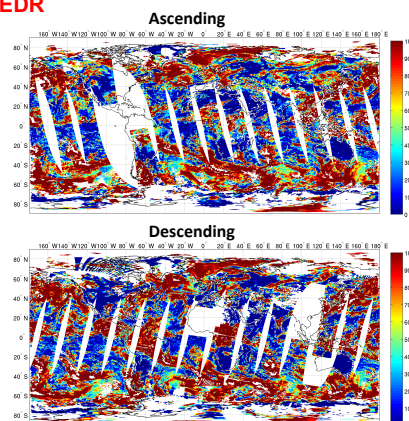


Figure 1. Example of CrIS cloud fraction from collocated VIIRS cloud mask (MX5.3)

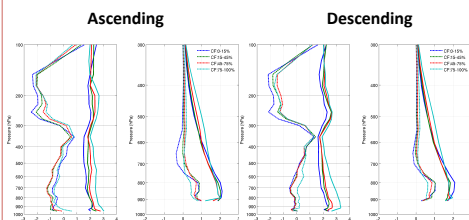


Figure 2. Cloud impacts on the CrIMSS sounding EDR (MX5.3).

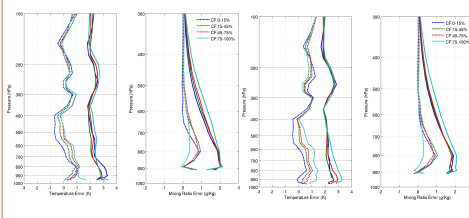


Figure 3. Same as Figure 2 except for offline EDR.

3. Viewing angle impacts on CrIMSS sounding EDR

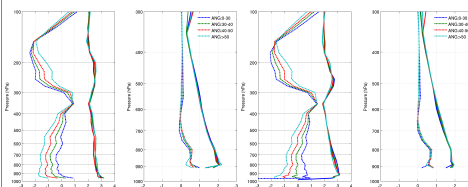


Figure 4. Viewing angle impacts on the CrIMSS sounding EDR (MX5.3).

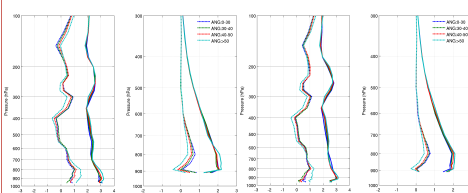


Figure 5. Same as Figure 4 except for offline EDR.

4. Scene temperature (Tb 11 um) impacts on CrIMSS sounding EDR

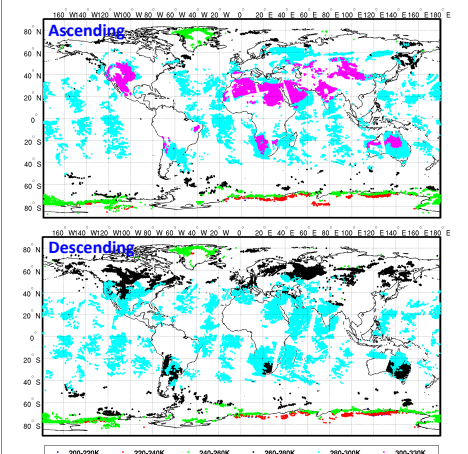


Figure 6. Scene temperature classification based on 11 um Tb

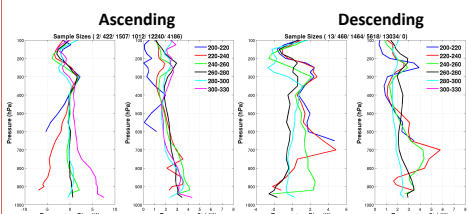


Figure 7. Scene temperature impacts on CrIMSS sounding EDR (MX5.3)

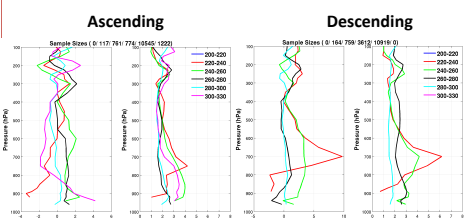


Figure 8. Same as Figure 7 except for offline EDR

5. Calculated CrIS Tb VS observations

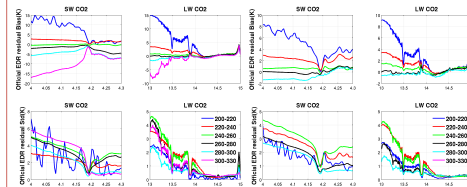


Figure 9. The statistics of CrIS Tb difference (MX5.3).

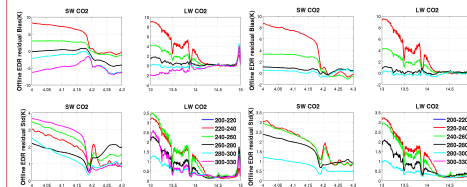


Figure 10. Same as Fig. 9 except for offline.

6. Radiative transfer model comparisons

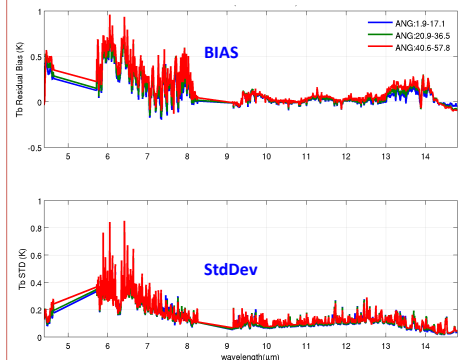


Figure 11. Clear sky CrIS: cRTM-RTTOV using SeeBor database

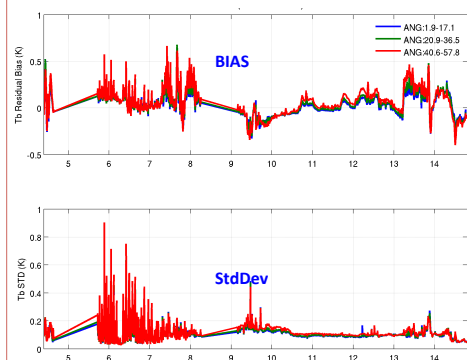


Figure 12. Same as figure 11 except for cRTM - SARTA

7. Summary

- Weak cloud impacts in both MX5.3 and the offline version (has been implemented as MX6.1);
- Angle dependency in MX5.3, but not in offline version;
- Scene temperature dependency in both MX5.3 and offline version;
- Calculated CrIS Tb shows substantial differences from the observations;
- Substantial differences among different RT models; could potentially affecting the retrieval.

8. Acknowledgement

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