

Comparisons of Brightness Temperatures and Atmospheric Temperature Retrievals between ATMS and COSMIC RO

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Abstract

The Advanced Technology Microwave Sounder (ATMS) on board the Suomi National Polar-orbiting Partnership (S-NPP) satellite provides brightness temperature observations at 22 channels for profiling atmospheric temperature and water vapor fields. There have been more than five years of ATMS antenna temperature record (TDR) since its launch on October 28, 2011. The five-year ATMS TDR data was consistently reprocessed with the latest calibration algorithm used in IDPS Block 2.0. The data quality was significantly improved by taking into account an antenna reflector emission correction, Lunar intrusion correction, a remapping to convert the ATMS 5.2° window channels 1-2 and the 2.2° temperature sounding channels 3-16 FOVs into AMSU-A's 3.3° FOVs, and striping noise mitigation. In this study, the consistency of SDR calibration algorithms for ATMS brightness temperatures during the five-year period from 2012 to 2016 is investigated by comparing with simulations from Global Positioning System (GPS) radio occultation (RO) observations. Using a recently developed temperature retrieval algorithm, the atmospheric temperature profiles during the five-year period are retrieved from the reprocessed ATMS observations and compared with the GPS RO atmospheric temperature profiles. The tropopause heights calculated from the ATMS-retrieved atmospheric temperatures compared surprisingly well to those from high vertical resolution RO data.