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2-4 Inter-Comparison of Suomi NPP CrIS Radiances with AIRS and
IASI toward Infrared Hyperspectral Benchmark Radiance
Measurements

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The Cross-track Infrared Sounder (CrIS) on the newly-launched Suomi National Polar-orbiting Partnership (SNPP) and future Joint Polar Satellite System (JPSS) is a Fourier transform spectrometer that provides soundings of the atmosphere with 1305 spectral channels, over 3 wavelength ranges: LWIR (9.14 - 15.38 μm); MWIR (5.71 - 8.26 μm); and SWIR (3.92 - 4.64 μm). The SNPP CrIS, combined with the existed Atmospheric Infrared Sounder (AIRS) on NASA Aqua and Infrared Atmospheric Sounding Interferometer (IASI) on Metop-A and -B, will accumulate decades of hyperspectral spectral infrared measurements with high accuracy. These hyperspectral infrared (IR) measurements have been used as references to inter-calibrate other narrow or broad band IR instruments in the Global Space-based Inter-Calibration System (GSICS) community. Therefore, the radiometric and spectral consistency of AIRS, IASI, and CrIS is fundamental for creation of long-term infrared (IR) hyperspectral radiance benchmark datasets for both inter-calibration and climate-related studies.

In this presentation, we will 1) evaluate radiance consistency among AIRS, IASI, and CrIS, and 2) thus further demonstrate that the CrIS Sensor Data Records (SDR) can serve as a long-term reference benchmark for inter-calibration and climate-related study just like AIRS and IASI. In the first part of presentation, we will brief major postlaunch calibration and validation activities for SNPP CrIS performed by the NOAA STAR CrIS sensor data record (SDR) team, including the calibration parameter updates, instrument stability monitoring, and data processing quality assurance. Comprehensive assessments of the radiometric, spectral, geometric calibration of CrIS SDR will be presented. In addition, the preparation of CrIS SDR re-processing toward consistent Climate Data Records (CDRs) will be discussed. The brief of future CrIS on JPSS-1 will be also discussed. The purpose of this part is to provide a comprehensive overview of CrIS SDR data quality to user community.

Second, the CrIS radiance measurements on Suomi National Polar-orbiting Partnership (SNPP) satellite are directly compared with the AIRS on Aqua and IASI on Metop-A and -B at the finest spectral scale through one year of simultaneous nadir overpass (SNO) observations to evaluate spectral and radiometric consistency of these four hyperspectral IR sounders. The spectra from different sounders are paired together through strict spatial collocation. The uniform scenes are selected by examining the collocated Visible Infrared Imaging Radiometer Suite (VIIRS) pixels. Their spectral differences are then calculated by converting the spectra onto common spectral grids.