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Yong Chen 2-3 S-NPP CrIS Full Resolution Sensor Data Record Processing and Evaluations Yong Han, Likun Wang, Denis Tremblay, Xin Jin, and Fuzhong Weng

The Cross-track Infrared Sounder (CrIS) on Suomi National Polar-orbiting Partnership Satellite (S-NPP) is a Fourier transform spectrometer. It provides a total of 1305 channels in the normal mode for sounding the atmosphere. CrIS can also be operated in the full spectral resolution (FSR) mode, in which the MWIR and SWIR band interferograms are recorded with the same maximum path difference as the LWIR band and with spectral resolution of 0.625 cm-1 for all three bands (total 2211 channels). NOAA will operate CrIS in FSR mode in November 2014 and the Joint Polar Satellite System (JPSS). Up to date, the FSR mode has been commanded three times in-orbit (02/23/2012, 03/12/2013, and 08/27/2013). Based on CrIS Algorithm Development Library (ADL), CrIS full resolution Processing System (CRPS) has developed to generate the FSR Sensor Data Record (SDR). This code can also be run for normal mode and truncation mode SDRs with recompiling. Different calibration approaches are implemented in the code in order to study the ringing effect observed in CrIS normal mode SDR and to support to select the best calibration algorithm for J1.

We develop the CrIS FSR SDR Validation System to quantify the CrIS radiometric and spectral accuracy, since they are crucial for improving its data assimilation in the numerical weather prediction, and for retrieving atmospheric trace gases. In this study, CrIS full resolution SDRs are generated from CRPS using the data collected from FSR mode of S-NPP, and the radiometric and spectral accuracy are assessed by using the Community Radiative Transfer Model (CRTM) and European Centre for Medium-Range Weather Forecasts (ECMWF) forecast fields. The biases between observation and simulations are evaluated to estimate the FOV-2-FOV variability and bias under clear sky over ocean. Double difference method and Simultaneous Nadir Overpass (SNO) method are also used to assess the CrIS radiance consistency with well-validated IASI. Two basic frequency validation methods (absolute and relative spectral validations) are used to assess the CrIS spectral accuracy. Results show that CrIS SDRs from FSR have similar radiometric and spectral accuracy as those from normal mode.