NPP OZONE MAPPING AND PROFLIER SUITE (OMPS) SENSOR CALIBRATION AND PREDICTED DATA PRODUCT PERFORMANCE

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The Ozone Mapping and Profiler Suite (OMPS) consists of three independent sensors designed to measure the vertical and horizontal distribution of ozone in the stratosphere and upper troposphere on a daily global basis. The two nadir-viewing sensors will measure both total column (TC) and nadir profile (NP) concentrations of O_3, while the third sensor utilizes an Earth limb-viewing geometry to improve the vertical resolution and coverage of the profile data product. All three sensors have undergone performance testing under both ambient and thermal-vacuum environments to assess the degree to which the instruments have met the specifications flow-down from Environmental Data Record (EDR) requirements. Both pre-launch calibration and post-launch calibration and validation programs rely on heritage techniques developed and refined over the past 30 years at NASA, NOAA, and within the ozone science community at large.

The focus of this paper will be on the development of the science data record (SDR) for each of the three sensors that comprise the suite. The process of performance verification of the various key parameters for the sensors will be discussed including radiometric sensitivity, spatial and spectral resolution and bandpass, wavelength registration stability, polarization response, and straylight rejection. The sensors were subject to a rigorous test program that included both solar and nadir viewing geometries using multiple stimuli and independent calibration techniques to improve the accuracy of the coefficients that are used to transform the raw instrument response into the measured physical quantities of solar irradiance and backscattered radiance. Results from this pre-launch calibration program will be shown emphasizing those parameters that will have the most impact on science product quality during the mission.

We will also discuss the calibration and validation activities and timeline that will be employed to perform sensor checkout, verification of calibration parameters, and tracking of sensor performance over the duration of the mission. These activities include special modes of operation to be used during an initial Intensive Cal/Val (ICV) period to measure various aspects of system performance not achievable through nominal operations. The results of the ICV will then be used to update the pre-launch calibration coefficients if required and provide a validated SDR product for the science community, and to further refine the predictions for long-term EDR performance. Critical measurements related to the ICV will be emphasized including on-orbit wavelength stability, straylight rejection, and diffuser goniometric performance.