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Pre-Launch Characterization of the Advanced Technology Microwave Sounder (ATMS) on the Joint Polar Satellite System-1 Satellite (JPSS-1)

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The Advanced Technology Microwave Sounder (ATMS) is the newest generation of microwave sounder in the international fleet of polar-orbiting weather satellites, replacing the Advanced Microwave Sounding Unit (AMSU) which first entered service in 1998. The first ATMS was launched aboard the Suomi NPP (S-NPP) satellite in late 2011. The second ATMS is manifested on the Joint Polar Satellite System-1 Satellite (JPSS-1). ATMS provides 22 channels of temperature and humidity sounding observations over a frequency range from 23 to 183 GHz. These microwave soundings provide the highest impact data ingested by operational Numerical Weather Prediction (NWP) models, and are the most critical of the polar-orbiting satellite observations, particularly because microwave sensing can penetrate clouds.

This paper will present performance characterizations from pre-launch calibration measurements of the JPSS-1 ATMS just completed in December, 2015. The measurements were conducted in a thermal vacuum chamber with blackbody targets simulating cold space, ambient, and a variable Earth scene. They represent the best opportunity for calibration characterization of the instrument since the environment can be carefully controlled.

We will present characterizations of the sensitivity (NEDT), accuracy, nonlinearity, noise spectral characteristics, gain stability, repeatability, and inter-channel correlation. An estimate of expected “striping” will be presented, and a discussion of reflector emissivity effects will also be provided. Comparisons will be made with the S-NPP flight unit. Finally, we will describe planned on-orbit characterizations—such as pitch and roll maneuvers—that will further improve both the measurement quality and the understanding of various error contributions.