Calibration and Validation of Low Earth Orbit Observations From NOAA to Support Global Environmental Monitoring

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The National Oceanic and Atmospheric Administration’s (NOAA) Joint Polar Satellite System (JPSS) provides critical observations of the Earth and its atmosphere from the ultraviolet region to the microwave region in LEO. The mission now has three satellites in the same orbit: NOAA20 the primary satellite, NOAA21 as secondary and Suomi National Polar-orbiting Partnership (Suomi NPP) as the tertiary satellite. The primary and secondary satellite provide redundancy since measurements from the mission provide critical inputs to global numerical weather prediction. Since 2011, the multi-mission series of LEO polar-orbiting environmental satellites is serving as one of the most important sources of continuous state-of-the-art observations of the Earth’s land, oceans, and atmosphere to protect lives and property, and support the global economy by providing accurate and timely environmental information. The Visible Infrared Imaging Radiometer Suite (VIIRS), the Cross-track Infrared Sounder (CrIS), the Advanced Technology Microwave Sounder (ATMS), the Ozone Mapping and Profiler Suite (OMPS), and the Clouds and the Earth’s Radiant Energy System (CERES) observe a large part of the electromagnetic spectrum from the UV region to the microwave region. All the sensors have state of the art onboard calibration sources and the data undergo extensive pre and post launch calibration and validation activities before the data are declared operational. Additionally, NOAA/NESDIS center for satellite applications and research maintains an integrated calibration and validation system to continuously monitor and track the performance of the sensors through the mission life cycle. NOAA also co-leads the Global Space-based Inter-Calibration Sytem (GSICS) which is an international collaborative effort initiated in 2005 by the World Meteorological Organization (WMO) and the Coordination Group for Meteorological Satellites (CGMS) to monitor, improve and harmonize the quality of observations from operational weather and environmental satellites of the Global Observing System (GOS). The level 2 geophysical measurements and products also go through extensive verification and validation through comparison of satellite products with surface-based, airborne, and/or space-based observations that are extensively documented and shared with users. This presentation will highlight the calibration activities and the performance of JPSS sensors and products.