An Enterprise Land Surface Temperature (LST) Algorithm for the GOES-R and Himawari Satellites

*Yunyue Yu[1], Jaime Daniels[1], Satya Kalluri[1], Peng Yu[1]

1. NOAA National Environmental Satellite, Data, and Information Service

As one of the essential climate variables defined by the Global Climate Observing System of the World Meteorological Organization, land surface temperature (LST) is a fundamental parameter in the physics of land surface processes from regional to global scales. LST products have been widely applied in and closely linked to radiative, latent and sensible heat fluxes at the surfaceatmosphere interface. Satellite platforms provide an excellent opportunity of measuring LSTs continuously at such scales. Among satellites with different types of orbits, geostationary satellites uniquely provide LST measurements with very high temporal resolution, which are critical for many LST applications.

An enterprise LST algorithm has been developed and applied to the U.S. Geostationary Environmental Observation Satellite (GOES) R series (GOES-R) at the U.S. National Environmental Satellite Data Information Service (NESDIS), which currently consists of GOES-16 and GOES-17. The algorithm is based on a traditional linear regression split-window LST retrieval technique in the thermal infrared spectrum, with a mitigation package to reduce risks from abnormal Focal Plane Module (FPM) performance found on the Advanced Baseline Imager (ABI) onboard GOES-17. The enterprise algorithm was evaluated using in-situ measurements and compared with the baseline algorithm that has been used for operational GOES-16 LST production since it was launched. Polar-orbiting satellite data such as JPSS LST products have also been used for the comparison analyses. Furthermore, the algorithm has been applied to Advanced Himawari Imager (AHI) data to extend the spatial coverage of the geostationary satellite LST product, since the AHI sensor is mostly similar to the ABI sensor. This presentation will provide scientific details of the enterprise LST algorithm and its performance on GOES-16 and -17 satellite data, as well as some samples based on Himawari satellite data.

Keywords: Land Surface Temperature, Geostationary Satellites, Algorithm

