

Enterprise LST Product Status and Its Readiness to Users

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Abstract

Land Surface Temperature (LST) is listed as an Essential Climate Variable (ECV) in the Global Climate Observation System (GCOS). It has been widely used in many fields such as irrigation and hydrological cycle particularly agricultural drought monitoring and urban heat island monitoring etc. Satellite LSTs have been routinely produced for decades from a variety of polar-orbiting and geostationary satellites. To produce seamless LST climate data record from these programs, consistency of the LST products from different satellite missions are considered for better cross-satellite evaluation and better geographic global validation. A primary objective of the enterprise LST development is to provide a state-of-the-art LST algorithm that is applicable to multiple sensors including geostationary orbit (GEO) e.g. ABI on GOES 16 and Low Earth orbit (LEO) satellite missions e.g. VIIRS on JPSS series.

The enterprise LST product developed for JPSS mission includes both the L2 granule swath LST product and the L3 global gridded LST product. The enterprise L2 SNPP VIIRS LST and NOAA 20 VIIRS LST have been in operational since Jun. 6th, 2019 and Sep. 19th, 2019, respectively. The L3 VIIRS LST is expected to be in operational by the end of this year. To evaluate the enterprise LST product performance, the theoretical analysis was conducted for the algorithm uncertainty using ~2000 profiles from SEEBOR collection for both daytime and nighttime, respectively. In addition, the ground validation was performed through the comparison with the in-situ LST observations from six sites in SURFace RADiation network (SURFRAD) and two sites in Baseline Surface Radiation Network (BSRN). Further, the cross satellite data comparison was performed at global scale using the latest L3 AQUA MODIS LST data i.e. MYD21A1 and MYD11A1. The validation results indicate that the enterprise VIIRS LST product has a good quality and is ready for user applications.