



## **Retrieving Land Surface Temperature and Emissivity from Multispectral and Hyperspectral Thermal Infrared Instruments**

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Land Surface Temperature and Emissivity (LST&E) data are critical variables for studying a variety of Earth surface processes and surface-atmosphere interactions such as evapotranspiration, surface energy balance and water vapor retrievals. LST&E have been identified as an important Earth System Data Record (ESDR) by NASA and many other international organizations. Accurate knowledge of the LST&E is a key requirement for many energy balance models to estimate important surface biophysical variables such as evapotranspiration and plant-available soil moisture. LST&E products are currently generated from sensors in low earth orbit (LEO) such as the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) instruments on the Terra and Aqua satellites as well as from sensors in geostationary Earth orbit (GEO) such as the Geostationary Operational Environmental Satellites (GOES) and airborne sensors such as the Hyperspectral Thermal Emission Spectrometer (HyTES). LST&E products are generated with varying accuracies depending on the input data, including ancillary data such as atmospheric water vapor, as well as algorithmic approaches. NASA has identified the need to develop long-term, consistent, and calibrated data and products that are valid across multiple missions and satellite sensors. We will discuss the different approaches that can be used to retrieve surface temperature and emissivity from multispectral and hyperspectral thermal infrared sensors using examples from a variety of different sensors such as those mentioned, and planned new sensors like the ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) and the Hyperspectral Infrared Imager (HyspIRI). We will also discuss a project underway at NASA to develop a single unified product from some of the individual sensor products and assess the errors associated with the product.