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MEaSUREs Land Surface Temperature from GOES satellites

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Information on Land Surface Temperature (LST) can be generated from observations made from satellites in low Earth orbit (LEO) such as MODIS and ASTER and by sensors in geostationary Earth orbit (GEO) such as GOES. Both observations have unique advantages, however, when combined, introduced are challenges related to inhomogeneity of the resulting information. NASA has identified a major need for developing long-term, consistent, and calibrated data and products that are consistent across multiple missions and satellite sensors. Under a project titled: "A Unified and Coherent Land Surface Temperature and Emissivity Earth System Data Record (ESDR) for Earth Science" led by Jet Propulsion Laboratory, such an effort is underway. In this presentation we will describe part of that effort, dealing with the generation of an approach to derive LST information from the GOES satellites from 2000 and onward. Since implementation of the well-established split window approach is not possible after mid-2003 (will be possible again after the launch of GOES-R in October of 2016), there is a need to focus on retrievals from a single thermal channel in order to provide continuity in the LST record. The methodology development requires the generation of consistently calibrated GOES observations, identification of clear sky radiances, and development of retrieval algorithms that benefit from most recent advances in related fields that provide auxiliary information required for driving the inference schemes. Results will be presented from two approaches. One is based on a regression approach that utilizes a wide range of simulations using MODTRAN, SeeBor Version 5.0 global atmospheric profiles and. The second approach uses MERRA-2 reanalysis fields with the RTTOV radiative transfer model approach to derive LST from the LEO satellites, adjusted for the GEO characteristics. The advantage of this latter approach is in the consistency between this retrieval approaches and those used at JPL to generate the MOD21 product. The MEaSUREs (MODIS- ASTER Global Infrared Combined Emissivity) product produced from the University of Wisconsin Global Infrared Land Surface Emissivity (UWIREMIS) and the ASTER Global Emissivity (GED) Database have been used in both methods. We will describe the two methodologies and present results of evaluation for the year 2004 against various available products, such as MOD11, and ground observations.