LST & Emissivity

Conferences

- Int. High Resolution Thermal Workshop, ESRIN, Italy, 10-12 May 2023
- EUMETSAT Met. Satellite Conference, Malmö, Sweden, 11-15 Sep 2023
- Sentinel-3 Val. Team (S3VT) meeting, Darmstadt, Germany, 5-7 Dec 2023

Project news

- Continuation of LST validation stations of Copernicus LAW (within OPT-MPC): accepted by ESA
- ECOSTRESS collection 2 LST&E and cloud products available in forward processing – reprocessing of archive to begin in early 2022
- New VIIRS 375-m near real time LST product currently in testing and will be available in Spring 2022
- Release of VIIRS collection 2 LST&E expected soon at LPAAC
- As of 2023-06-01 Lluís Pérez-Planells is new LST&E focus area lead (Europe)

An atm. influence correction method for longwave radiation-based in-situ land surface temperature (Ma et al., 2023)

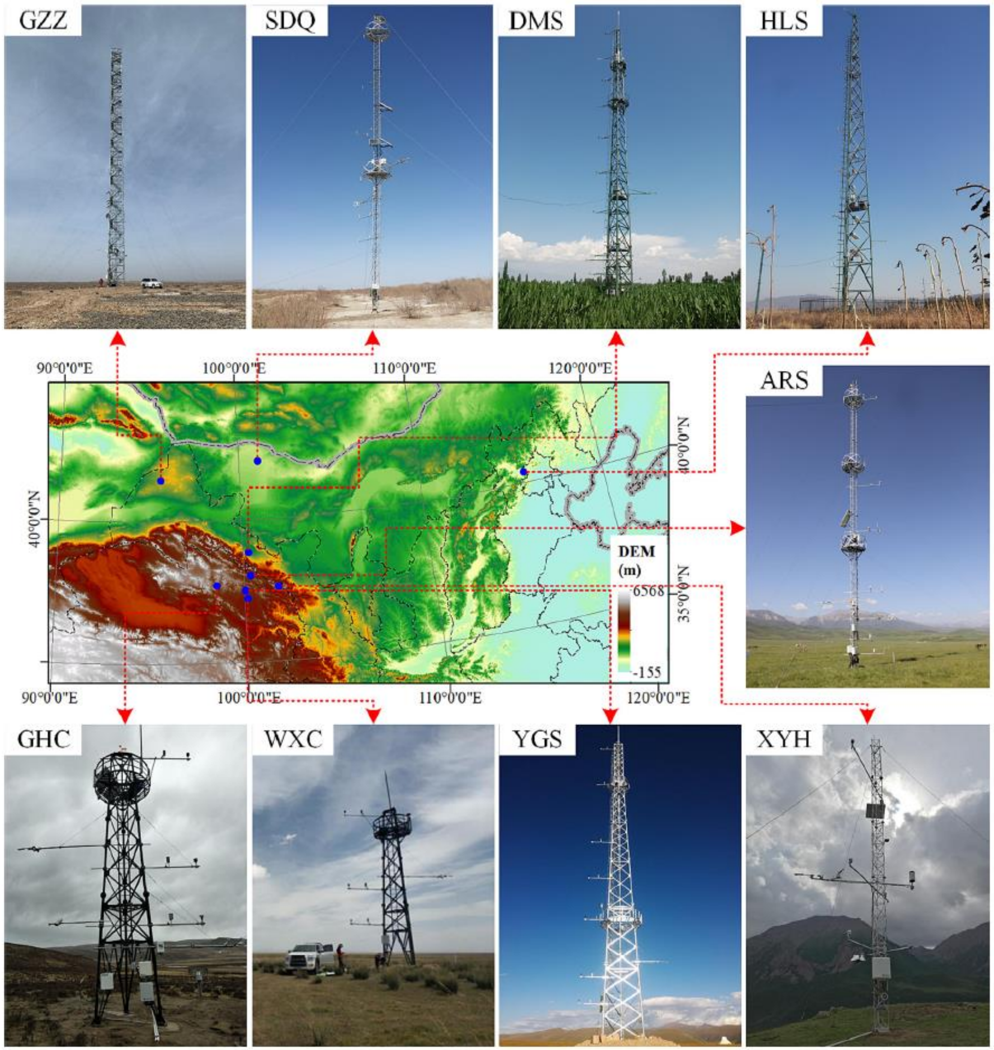


Fig. 1. The nine selected ground stations and their locations. The tower pictures were provided by the National Tibetan Plateau Data Center (TPDC, http://data.tpdc.ac.cn/).

Nine stations on Tibetan Plateau equipped with <u>broad-band</u> pyrgeometers (Kipp & Zonen CNR4, FOV 150°, 4.5-42 µm)

doi: 10.1016/j.rse.2023.113611

An atm. influence correction method for longwave radiation-based in-situ land surface temperature (Ma et al., 2023)

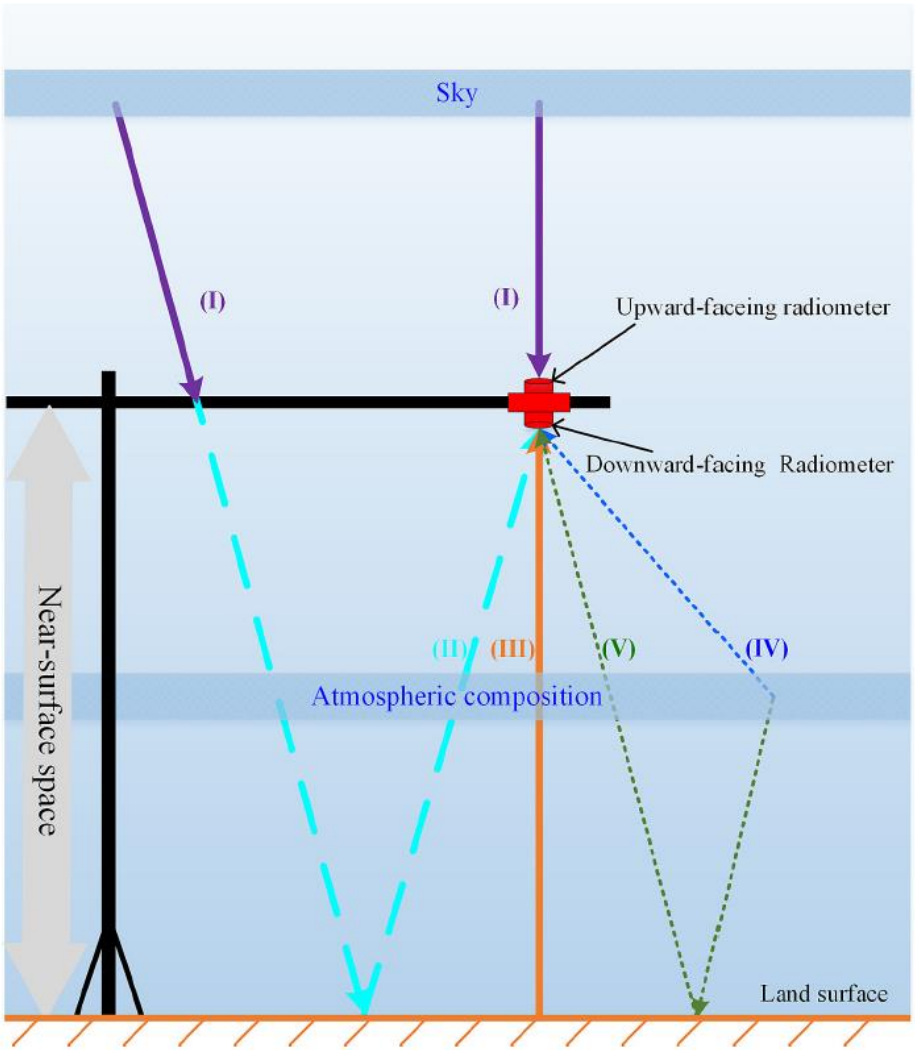


Fig. 2. Schematic diagram of the radiative transfer process of *in-situ* longwave radiance observation.

"At 10 m height above the ground surface, the radiance emitted by the near-surface atmosphere is 32%–36% of the radiance emitted by the entire atmosphere"

Perform atmospheric correction using Radiative Transfer Equation (RTE) & Multi-Layer Meteorological Parameters (MLMP): uses near-surface atmospheric transmittance and radiance.

An atm. influence correction method for longwave radiation-based in-situ land surface temperature (Ma et al., 2023)

From simulations for meteorological profile data:

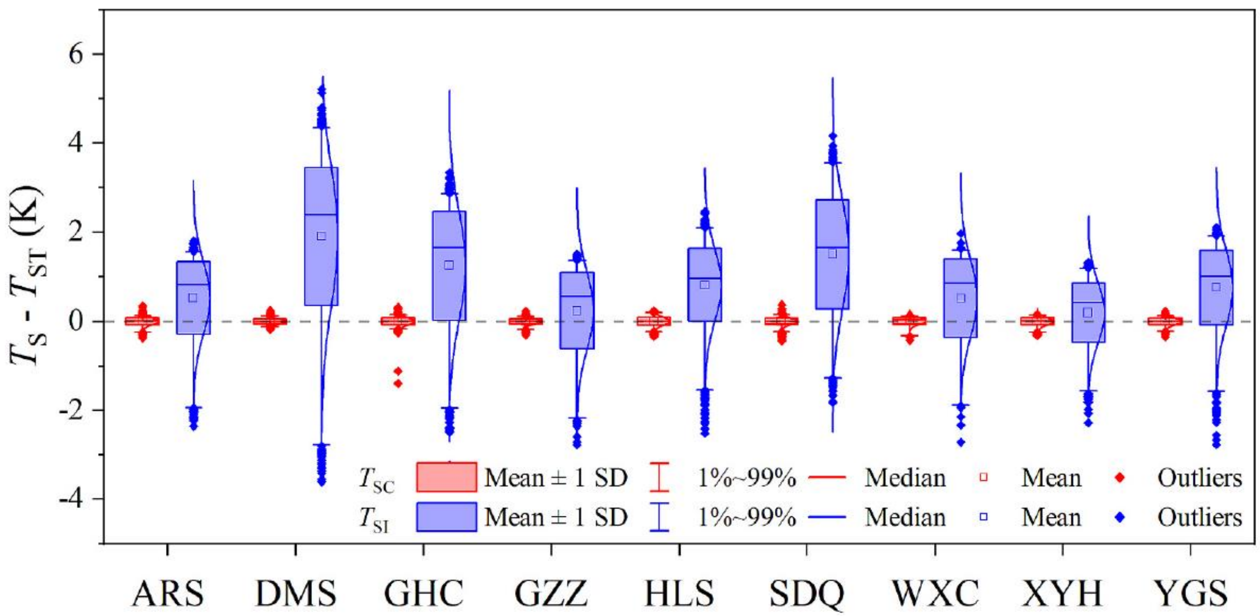
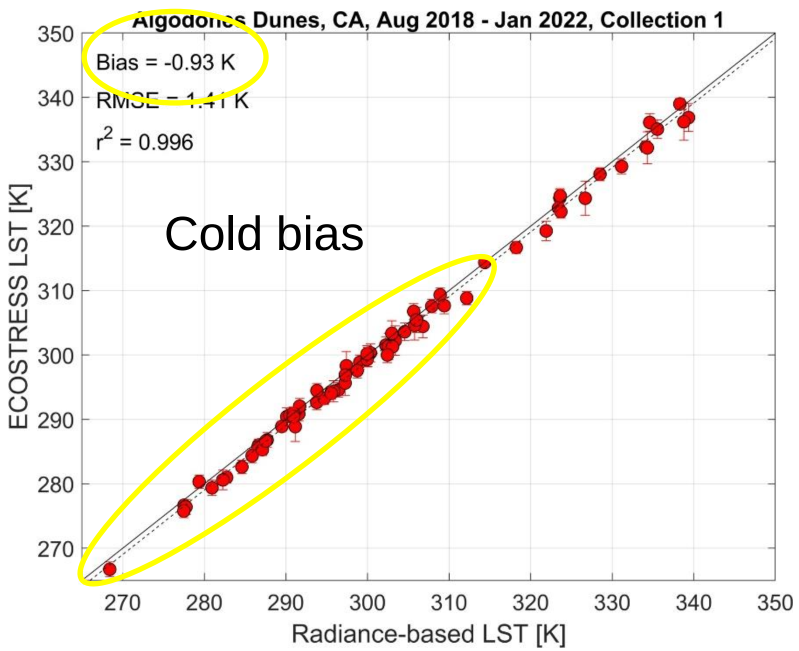


Fig. 9. Boxplot for the difference between the calculated *in-situ* LST (atmospheric corrected: T_{SC} in red; atmospheric ignored: T_{SI} in blue) and the true *in-situ* LST. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

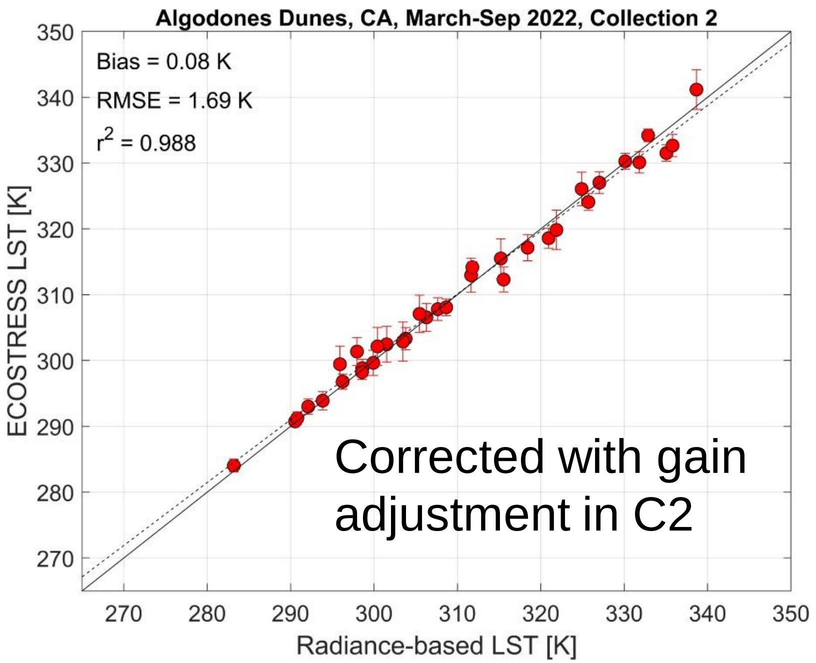
Ma et al. (2023), An atmospheric influence correction method for longwave radiation-based in-situ land surface temperature. RSE, doi: 10.1016/j.rse.2023.113611

ECOSTRESS calibration fix in collection 2

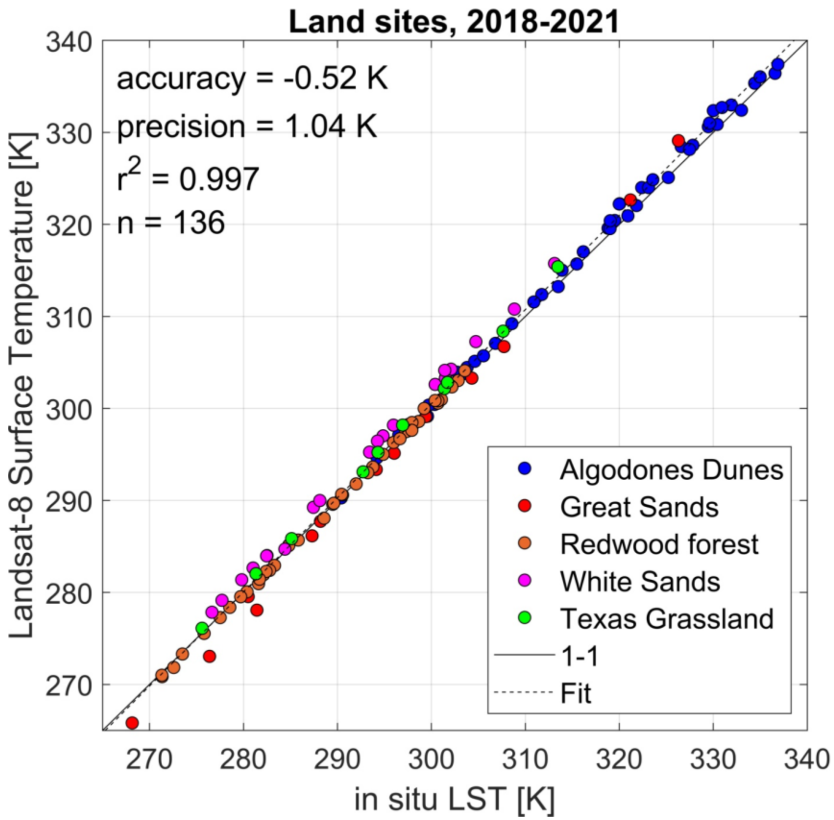
Collection 1

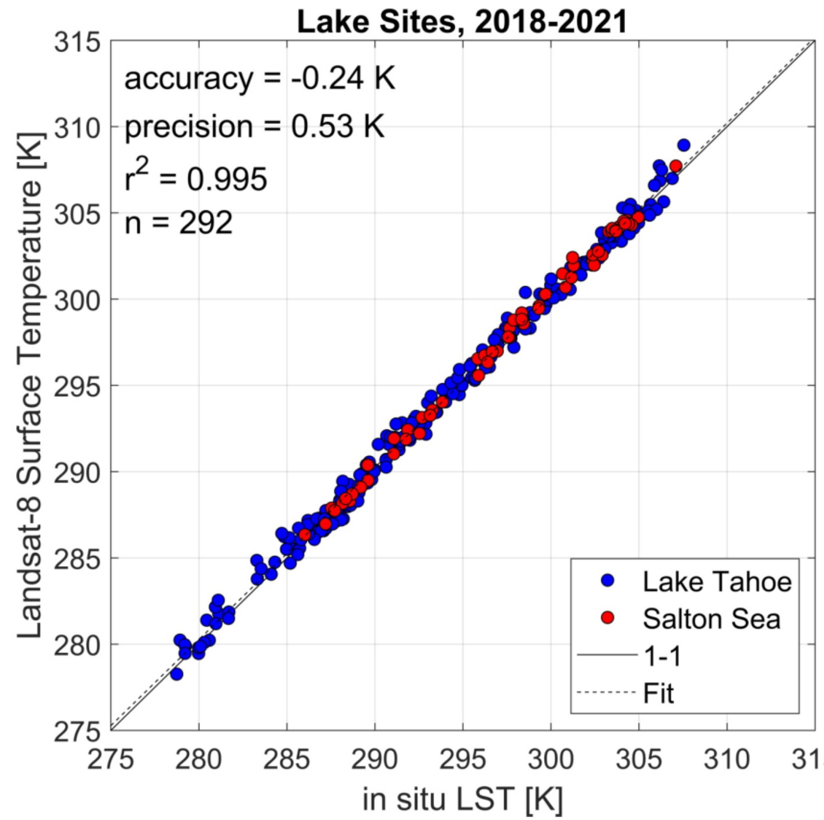


Collection 2

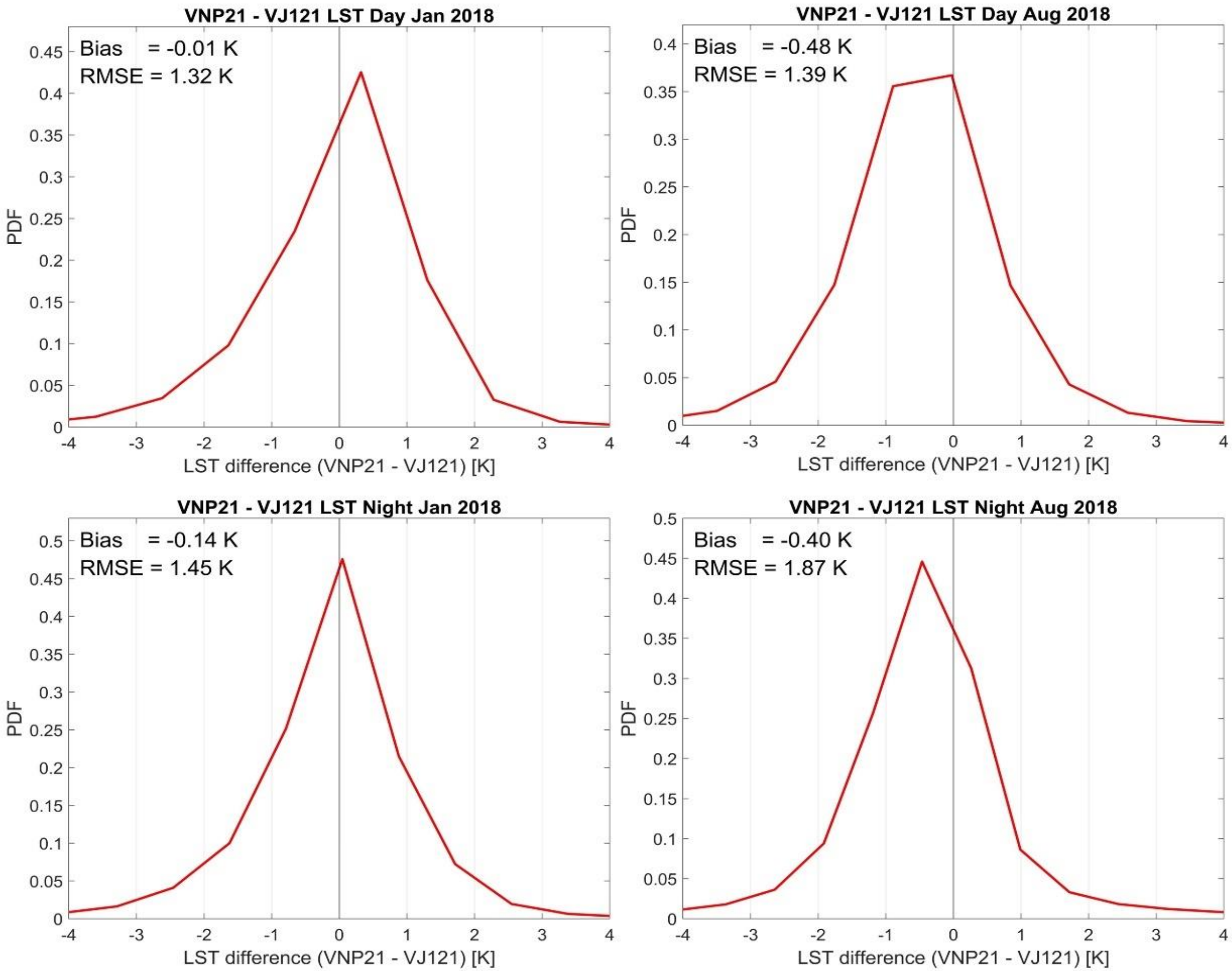


Landsat-8 LST in-situ validation



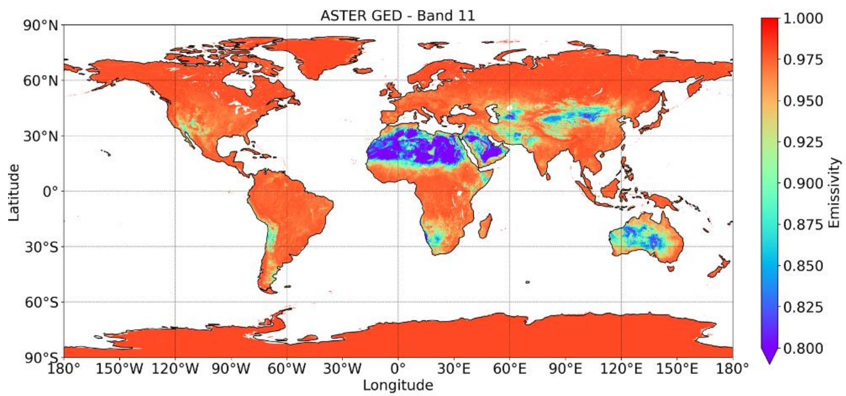


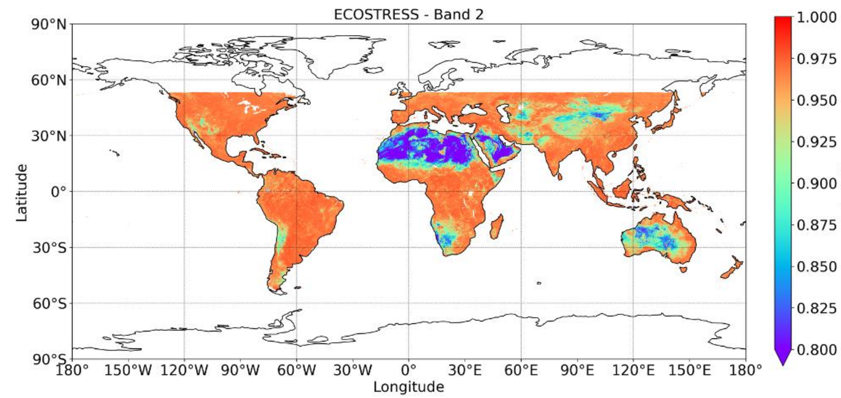
VNP21 (SNPP) and VJ121 (NOAA-20) LST continuity

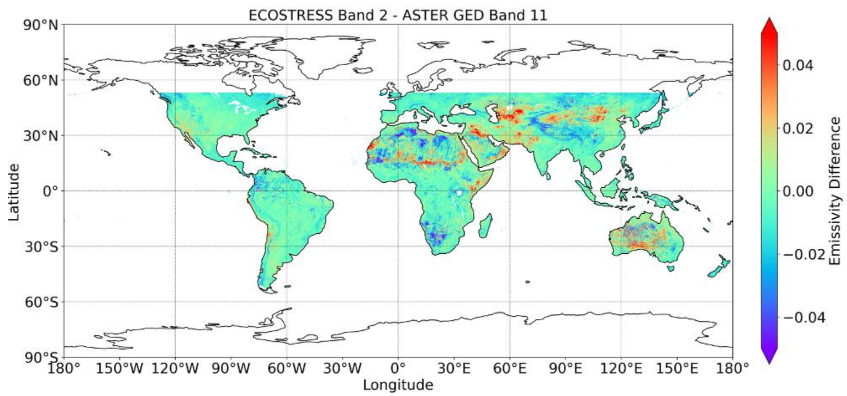


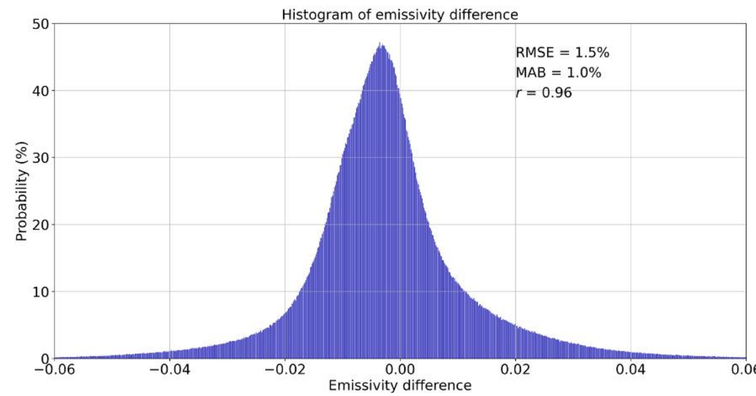
- The VIIRS TES algorithm for SNPP (since 2011) was successfully adapted and used to generate LST&E products with VIIRS data from JPSS-1/NOAA-20 (since 2018)
- Differences are <0.5 K on average and can be attributed to different overpass time (up to an hour) and cloud mask differences

ASTER GED (AG5KMMOH v041) in band 11 (8.6 µm) and ECOSTRESS GED in band 2 (8.78 µm). (Hu et al., 2023)

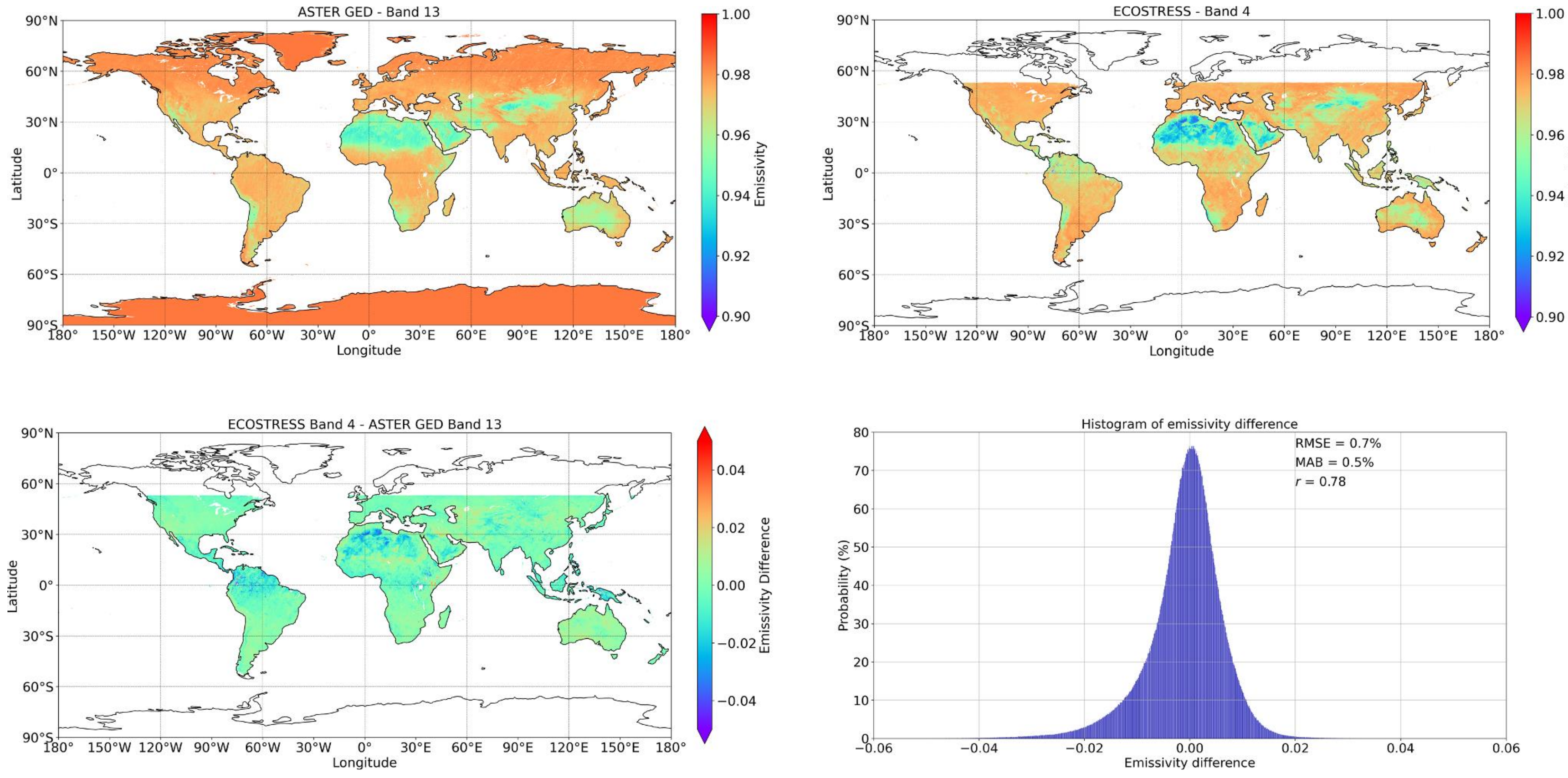








ASTER GED (AG5KMMOH v041) in band 13 (10.6 µm) and ECOSTRESS GED in band 4 (10.49 µm). (Hu et al., 2023)



Hu et al. (2023), Comparison between the ASTER and ECOSTRESS global emissivity datasets. Int. J. of App. Earth Obs. and Geoinf., doi: 10.1016/j.jag.2023.103227

Recent LST&E publications

- Hu et al. (2023), Comparison between the ASTER and ECOSTRESS global emissivity datasets. Int. J. of Applied Earth Observation and Geoinformation, doi: 10.1016/j.jag.2023.103227
- Ma et al. (2023), An atmospheric influence correction method for longwave radiation-based in-situ land surface temperature. Rem. Sens. of Environment, doi: 10.1016/j.rse.2023.113611
- Wang et al. (2023), Evaluation of Three Land Surface Temperature Products From Landsat Series Using in Situ Measurements. IEEE Transactions on Geoscience and Remote Sensing, doi: 10.1109/TGRS.2022.3232624.
- Yamada et al. (under review), 2022 CEOS International Thermal Infrared Radiometer Comparison: Part I: Laboratory Comparison of Radiometers and Blackbodies. Submitted to Journal of Atmospheric and Oceanic Technology.
- Yamada et al. (under review), 2022 CEOS International Thermal Infrared Radiometer Comparison: Part II: Field Comparison of Radiometers. Submitted to Journal of Atmospheric and Oceanic Technology.