

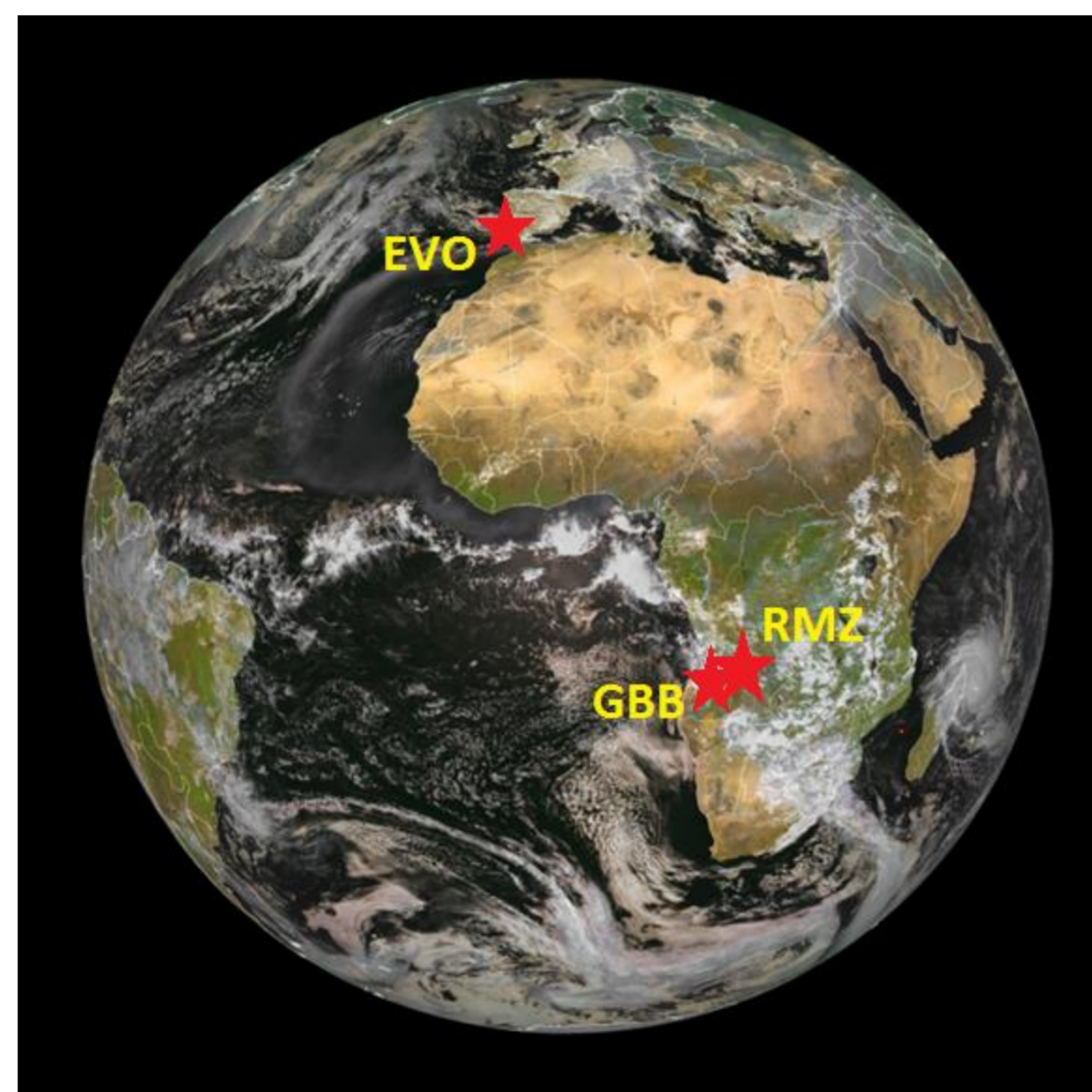
# Land Surface Temperature (LST) Validation With In Situ Station Data

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**Introduction:** Ultimately, the absolute accuracy of satellite LST products can only be validated with in situ LST data ('temperature-based validation'). Therefore, the ESA DUE GlobTemperature (GT) validates LST from the Advanced Along Track Scanning Radiometer (AATSR) against in situ LST from Surface Radiation Budget Network (SURFRAD) stations. Furthermore, hourly LST obtained from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) were validated against in situ LST from Karlsruhe Institute of Technology's (KIT) stations. Here, we present initial results obtained for satellite and in-situ LST, which were transformed into GT's harmonised data format. As anticipated, data harmonisation greatly simplifies the matching and comparing of LST data sets. The results show that satellite LST and in situ LST generally agree to within 2 K, but with significant differences between the validation stations.

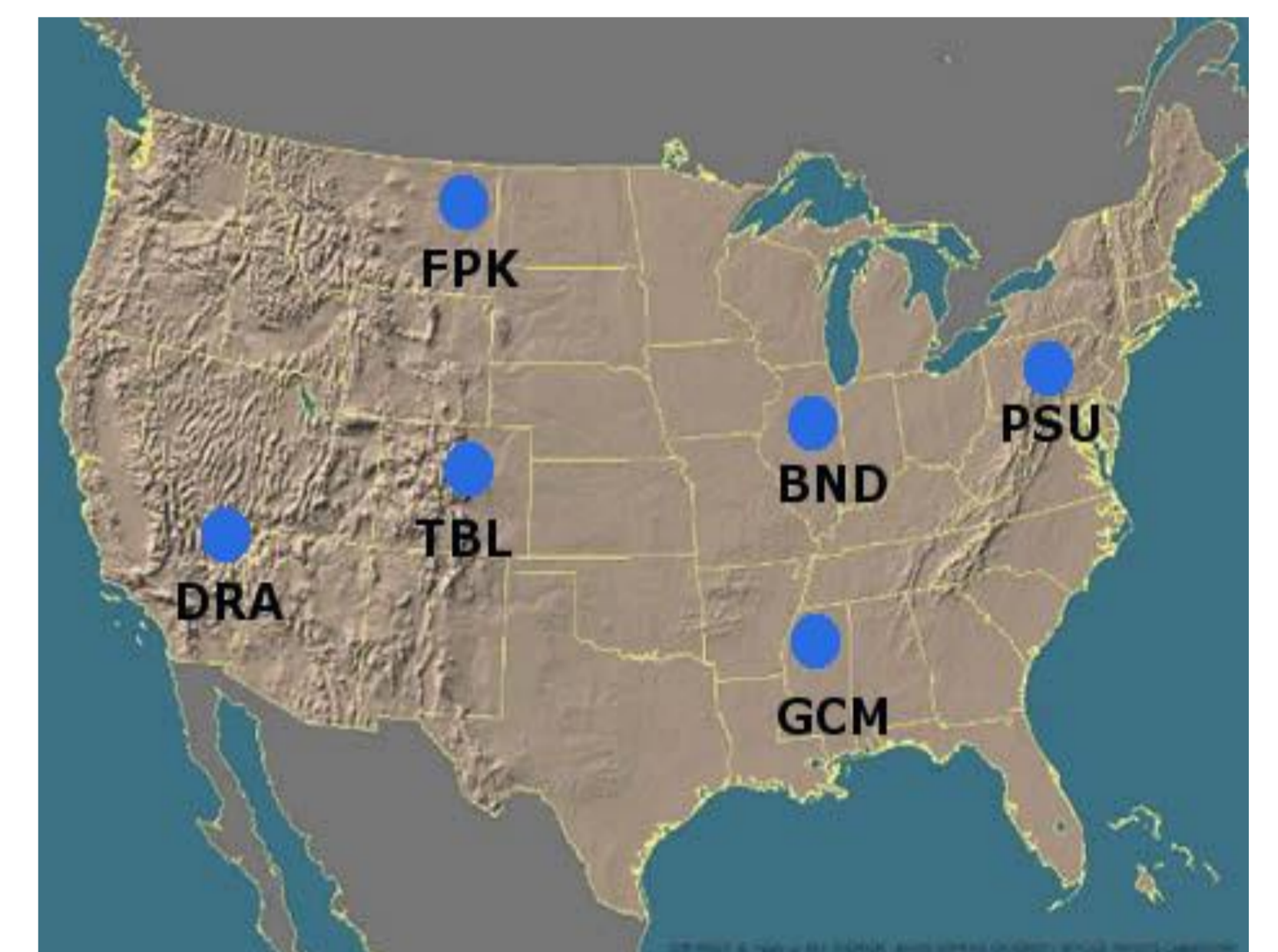
## SEVIRI - KIT stations for 2010:

- **In situ LST** for KIT's LST validation stations EVO, Portugal, and GBB & RMZ, Namibia. The stations are located in large, flat areas with homogenous surface cover
- LSA SAF emissivity used for EVO and RMZ, constant emissivity for GBB
- **Satellite LST data** from SEVIRI produced by the Instituto Português do Mar e da Atmosfera, Portugal



## AATSR – SURFRAD stations 2003 - 2012:

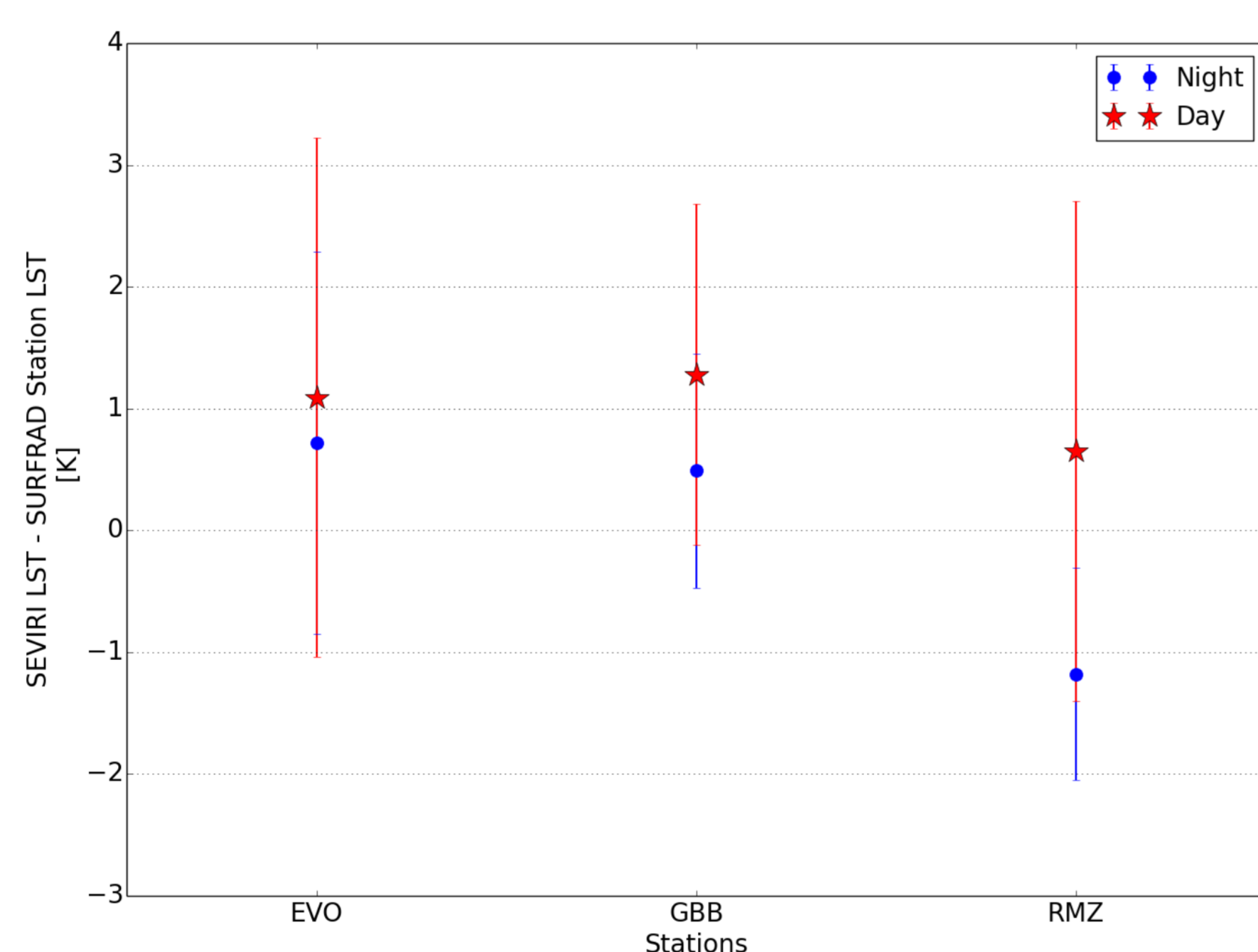
- **In situ LST** for six SURFRAD stations in the USA
- Broadband emissivities derived from CIMMS Baseline Fit Emissivity Database, University of Wisconsin
- **Satellite LST data** from AATSR produced by the University of Leicester, UK



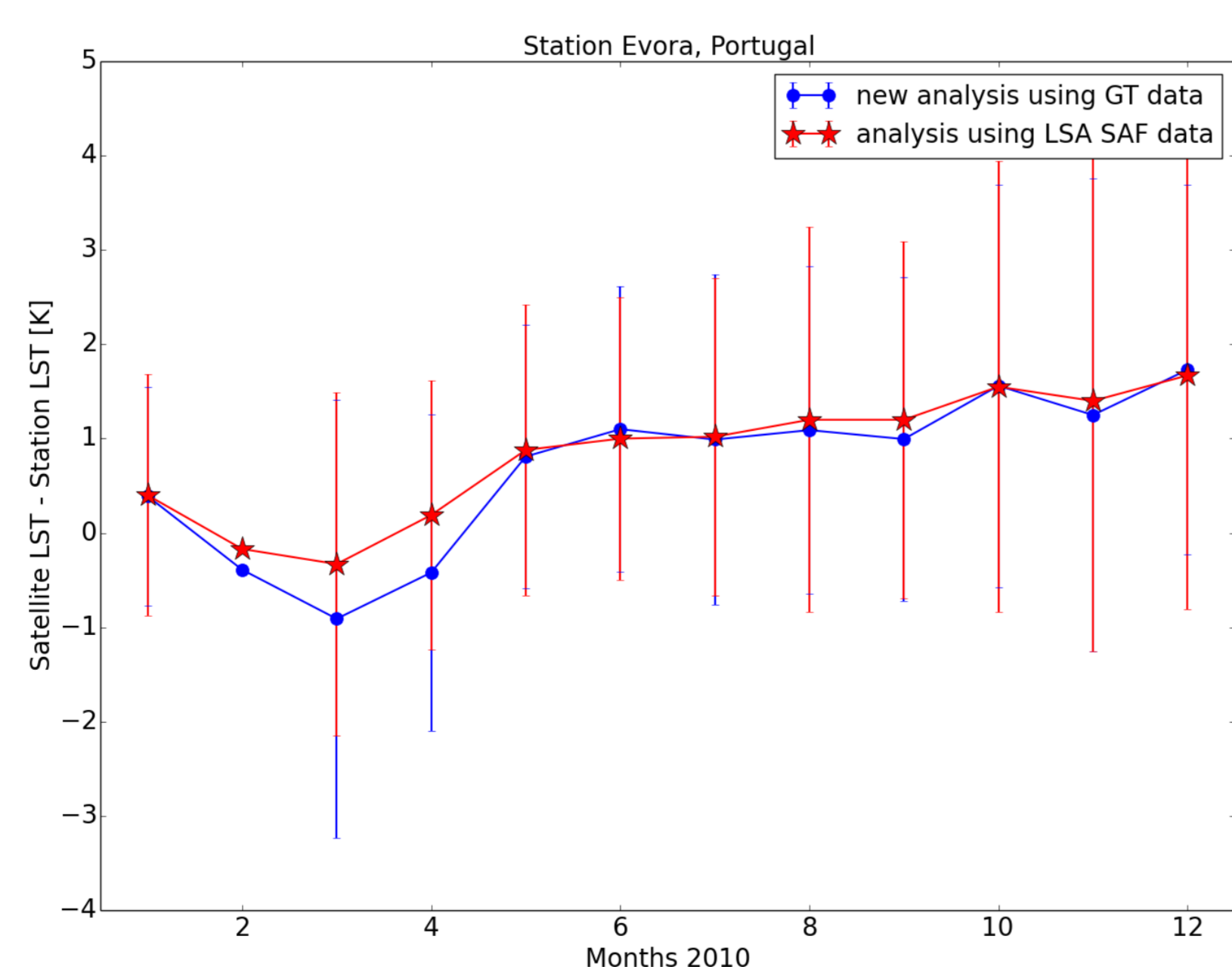
Modified from <http://fermi.jhuapl.edu/states>

## Results:

- LST agree within 2 K, LSA SAF's target accuracy

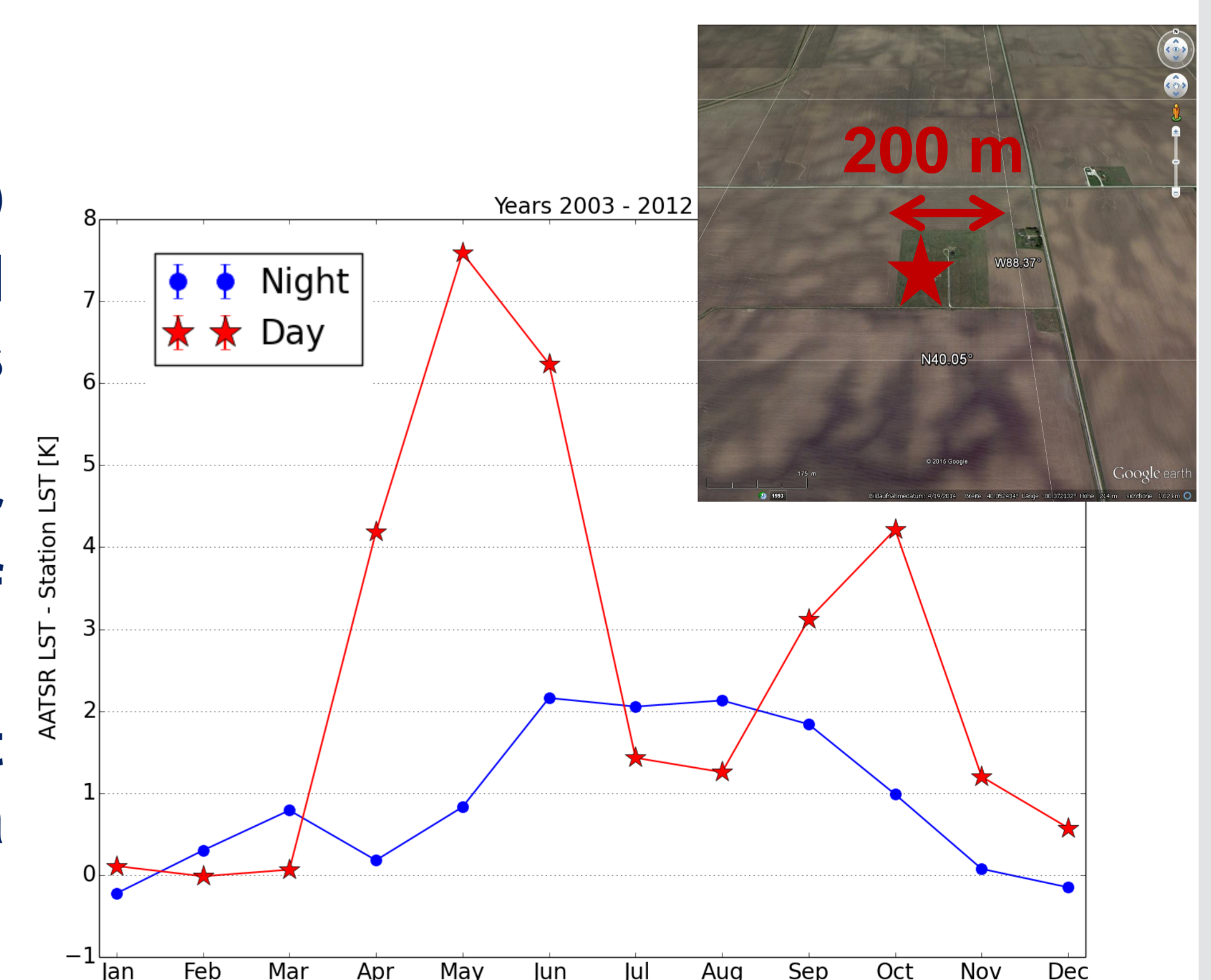
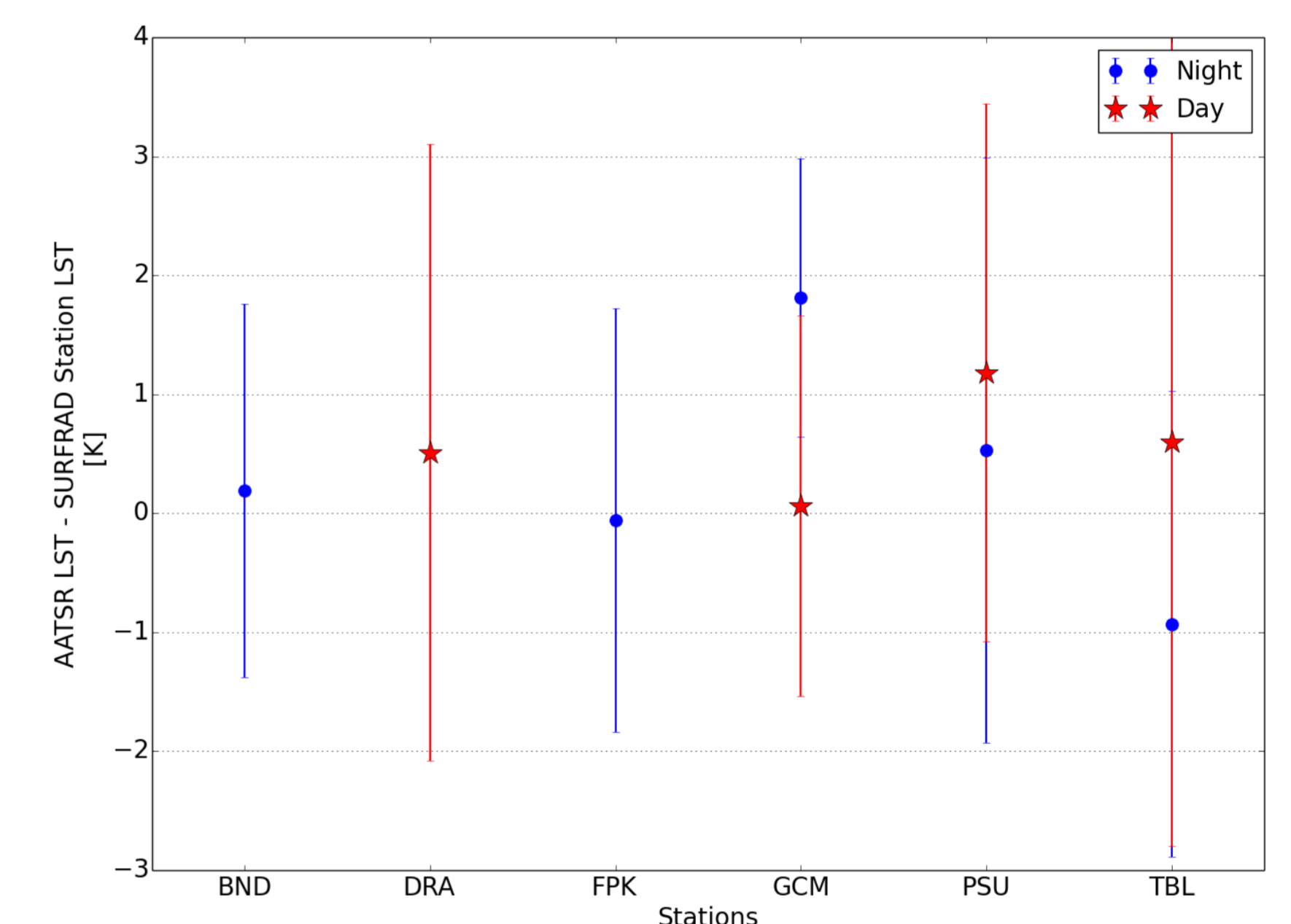


- Results agree within STD with those for operational LSA SAF LST with higher temporal and spatial resolution



## Results:

- Bias & STD vary with station and depend on surface homogeneity, orography, landscape and land cover
- Not all station data can be used
- Example BND station: observed surface area is not representative for satellite field of view
- Only winter night time data considered



**Outlook:** After these first encouraging results, validation will be expanded throughout the GT project to include LST data from further satellites and in situ stations. All LST will be transformed to GT's harmonised data format and used to populate GT's Matchup Database. First satellite-satellite intercomparisons are currently under way and will allow to assess relative LST product accuracies. GT's fast and standardised approach greatly simplifies the validation process for arbitrary LST products: data providers are welcome to validate & share their data via GlobTemperature's data portal!