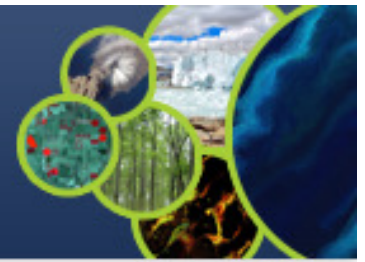




A Network dedicated to TIR  
optical missions calibration &  
validation

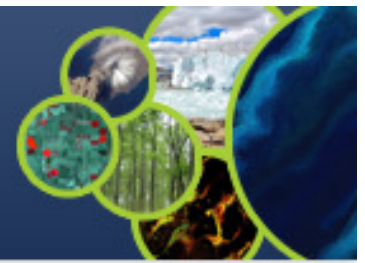


## CONTEXT

- Several TIR operational missions: ECOSTRESS, ASTER, LANDSAT-8&9, MODIS, VIIRS, SLSTR, SEVIRI...
- TIR future missions with increased spatial resolution: TRISHNA, LSTM, SBG,...
- More and more demanding LST accuracy requirements (better than 0.1K for climate studies)
- Importance of vicarious calibration for the validation of on-board calibration systems (black bodies) or direct calibration
- L2 products (temperature, emissivity) validation need



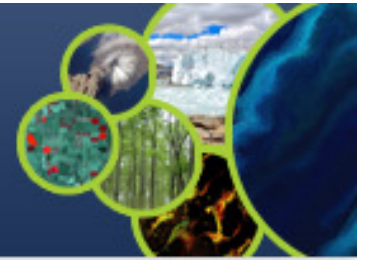
A Network dedicated to TIR  
optical missions calibration &  
validation



## CONTEXT

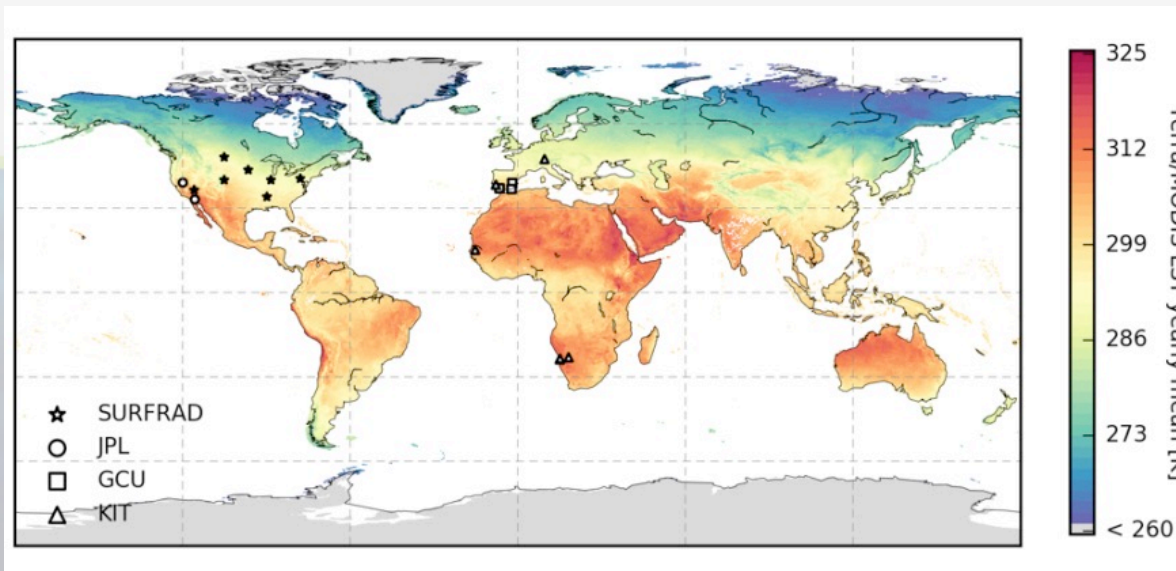
Why a new network of instrumented sites dedicated to the radiometric calibration of EO TIR optical sensors?

- To collect surface temperature and emissivity, and atmospheric data necessary for the simulation of observations by TIR optical sensors and thus verify their radiometric calibration
- To increase the number of matchups between in-situ measurements and space sensor observations and reduce the overall uncertainties, and reduce the efforts of individual agencies
- To ensure traceability of the space sensor radiometry to the “Système International” (SI)
- To support the establishment of the Global Earth Observation System of Systems by providing measurements to verify the radiometric consistency between EO space sensors
- The success and experience return from RadCalNet network dedicated to VNIR-SWIR optical sensors cal/val



## THE EXISTING “NETWORKS”

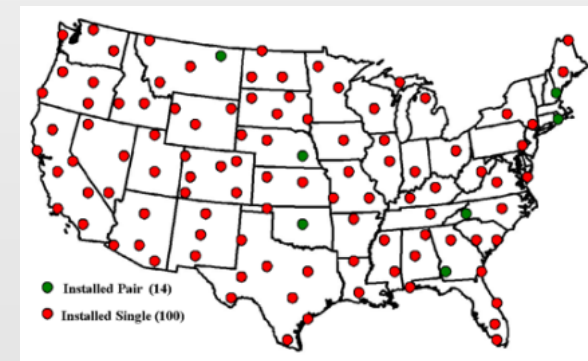
- Reference to the excellent work performed by WGCV/LPV subgroup and dedicated to Land Surface Temperature Product Validation Best Practice Protocol (jan. 2018) which identifies the existing networks and their limitations



Location of ground observational networks currently used to validate standard LST products derived from US and European spaceborne instruments.

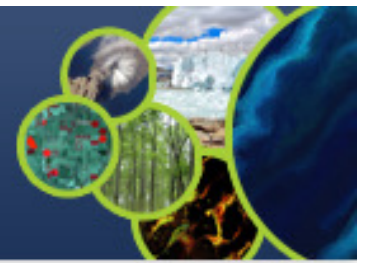
SURFRAD: Surface Radiation, NOAA  
GCU: Global Change Unit, University of Valencia  
KIT (Karlsruhe Institute of Technology) stations  
JPL network

USCRN: US Climate Reference network



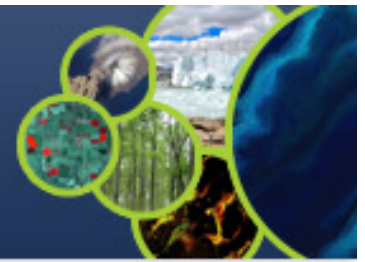


A Network dedicated to TIR  
optical missions calibration &  
validation



## LIMITATIONS OF EXISTING GROUND BASED MEASUREMENTS

- Spatial representativeness of the in situ reference measurements
- Directional effects
- Lack of emissivity measurements
- Data access
- Data harmonization
- Do not provide TOA radiances
- Data quality assurance (error budget traceable to SI)
- In situ instruments calibration quality and traceability
- Needs for the development of denser ground-based reference Network

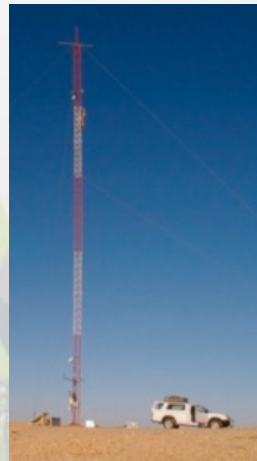


## NEXT STEP ?

- A network to set up jointly between IVOS and LPV subgroups
- A dedicated working group including sites owners
- Round robin of ground-based radiometers or is FICE sufficient ?



JPL, Russell Ranch



KIT, Gobabeb



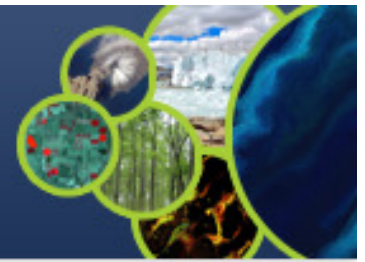
University of Valencia, Barrax



US CRN, Riley station . . .

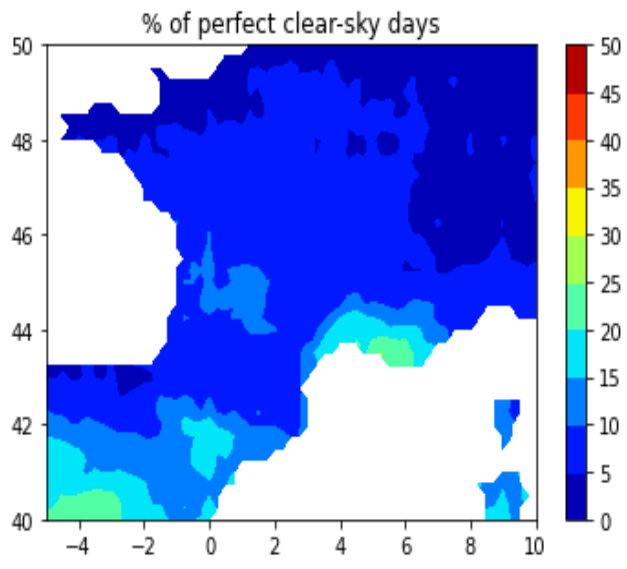


A Network dedicated to TIR optical missions calibration & validation



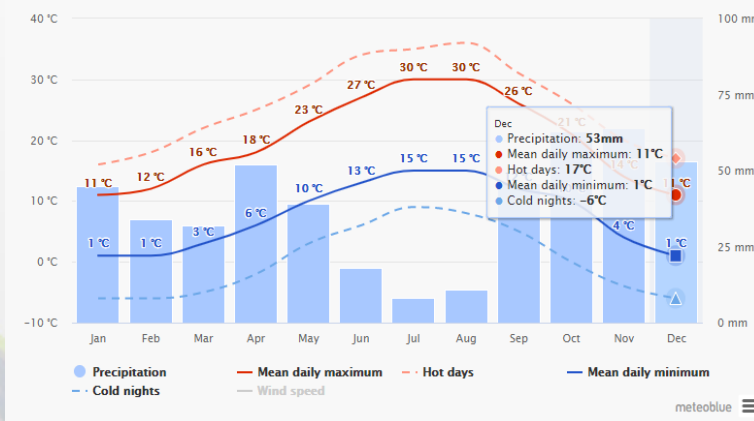
# CNES first site dedicated to TIR cal/val → a beta tester on « how to join the network »?

## Cloud Cover

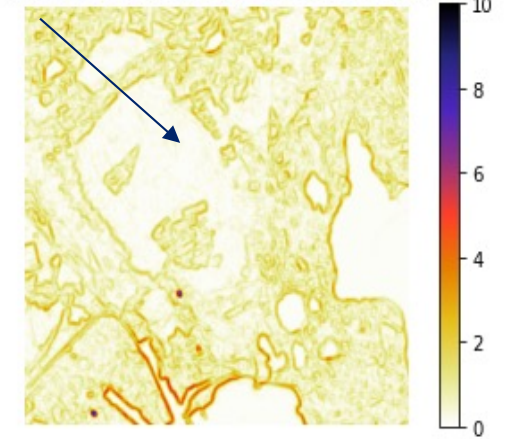


## Estimation of Spatial Homogeneity on a L8 TIRS image

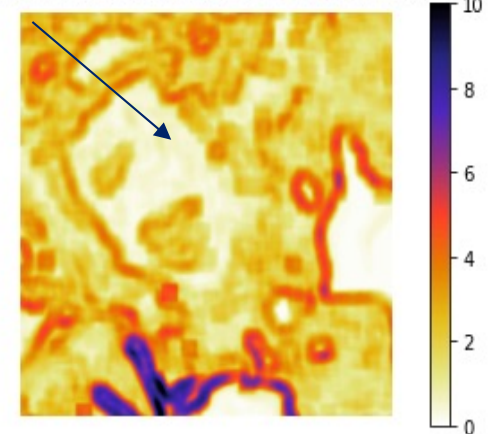
Average temperatures and precipitation



Spatial Homogeneity @ 200m scale (%)



Spatial Homogeneity @ 1000m scale (%)



La Crau (RadCalNet site) region is a good candidate



Telescopic mast test