

Validation and Evaluation of LST

Session Discussion Topics

- In situ networks with proxy data e.g. air temperature
- In situ networks with radiometer data e.g. radiometers
- Radiometers in use (COTS vs Custom)
- Procedures for calibration and validating radiometers, required accuracy and precision (protocols)
- Cross calibration of field radiometers - upcoming experiments
- Methods used for spatial and temporal sampling and implications for future measurements and models
- Satellite LST products – what/where
- Model LST products – what/where
- Cloud clearing/masking issues
- Validation approaches for Model data
- What is missing:
 - Spectral libraries?
 - Accurate radiometers?
 - Field radiometric measurements – which cover types?
 - Accurate airborne radiometers – how accurate?
 - Angular measurements?

- More work in certain areas, i.e. low emissivity targets.
- More work on how models perform in dynamic areas, e.g. monthly means do not capture harvesting.
- Certain datasets more useful for particular applications.
- More coordinated cross comparisons. Use a transfer standard.
- More long-term comparisons, need long-term sites.
- Need aircraft campaigns to understand heterogeneity for scaling up.
- Use Climate Reference Network sites, have 3 copies of each instrument. Use apogee sensor – can we adequately correct it. CRN has wide variety sites. 120 sites but not picked for homogeneity.
- NASA Core sites, collect as much data as possible.
- Skin temperature, valid for oceans not land, BT at surface may be more useful, i.e. use a radiative temperature in models. Incl. paper by Becker and Normal so understand nomenclature and terminology.
- Need clearing house to capture work that *has* been done.
- CDRs – major problems if keep changing algorithm. Need better control.
- Need to know when scene is clear for validation, cloud mask is major issue.
- Need to define a small number of heavily instrumented thermal sites, with a particular instrument package, incl. range of sites such as Tahoe but also need other targets i.e. Greenland. Use GEOS/CEOS.
- Cloud masks, need more than on/off.
- Need to deliver LST over all pixels and provide mask as separate product or layer that can be applied. MODIS LST varies with cloud mask – big problem.
- AWS – cannot use for ground truth, environment is too hostile.
- Need a few well instrumented sites that capture largest possible range of conditions with v. strict quality control. Snow/ice, Desert, Cropland, Lake. Must show traceability.
- Can we pick a few CRN sites to enhance. Need to check out with ASTER.

Guidelines/Protocols

- What we need to provide:
 - Rigorous instrument information. Radiometer Temperature, Surface kinetic temperature, Emissivity, System response function
 - All sky camera, ground camera, accurate IRT, wind speed, air temperature, relative humidity, ceilometer, fine resolution imagery (characterize site)
 - Rigorous error budget, incl. ground variability
 - Rigorous Site characteristics and how it is changing
 - Freely available products, as many products as possible.