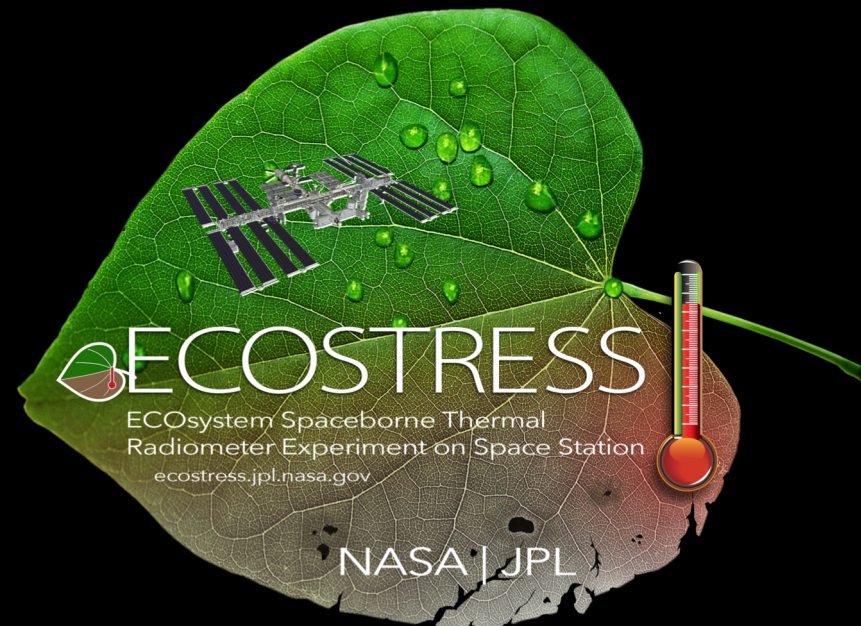


Jet Propulsion Laboratory
California Institute of Technology

ECOSTRESS Calibration and Validation

Kerry Cawse-Nicholson

Joshua Fisher

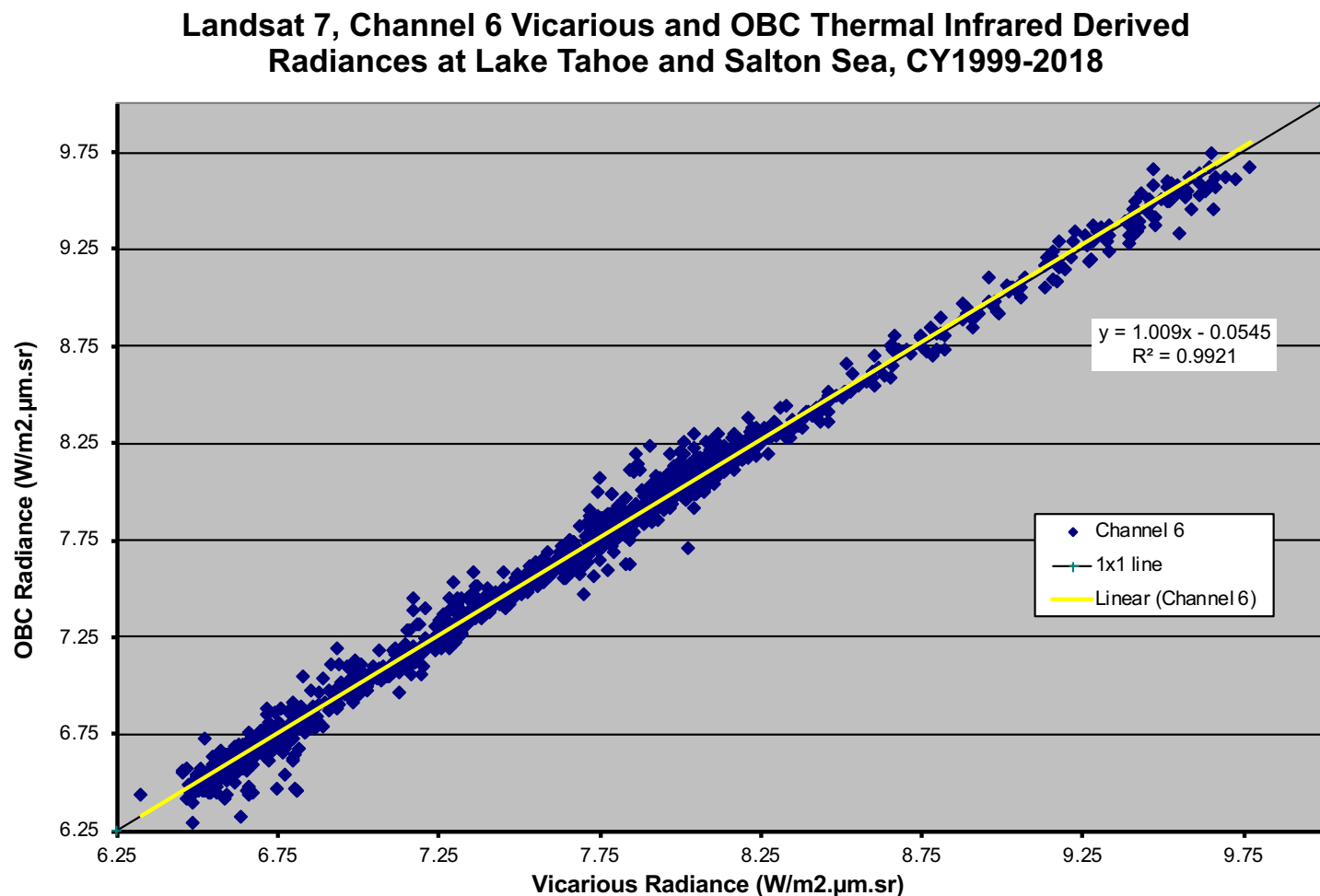


JPL Field Sites – Lake Tahoe and Salton Sea

- Permanent stations that measure the bulk and radiometric temperature every two minutes.
- Lake Tahoe CA/NV is high (small atmospheric correction) and large (~35x20km)
- Salton Sea is low (large atmospheric correction)
- Both sites are homogenous and available year round
- JPL has developed very accurate radiometers (<50 milli-kelvin)
- These are the only automated mid and thermal infrared calibration and validation sites in the world.

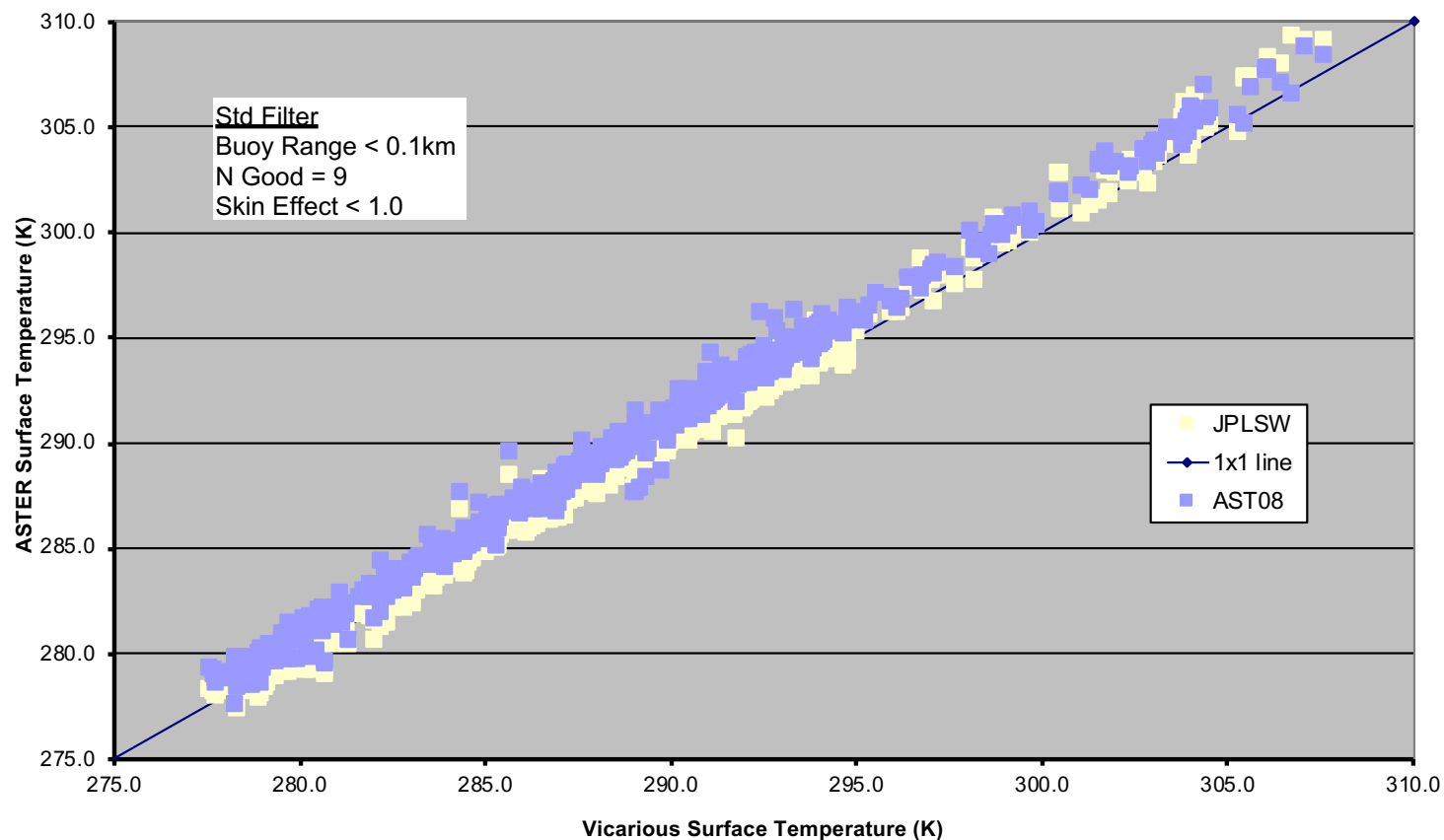


JPL Field Sites – Currently used for cal/val

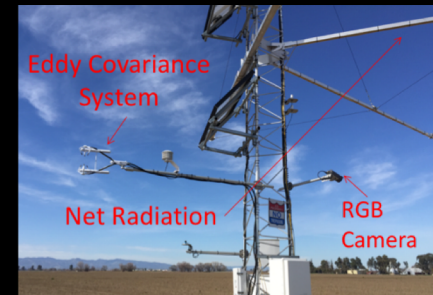


JPL Field Sites – Currently used for cal/val

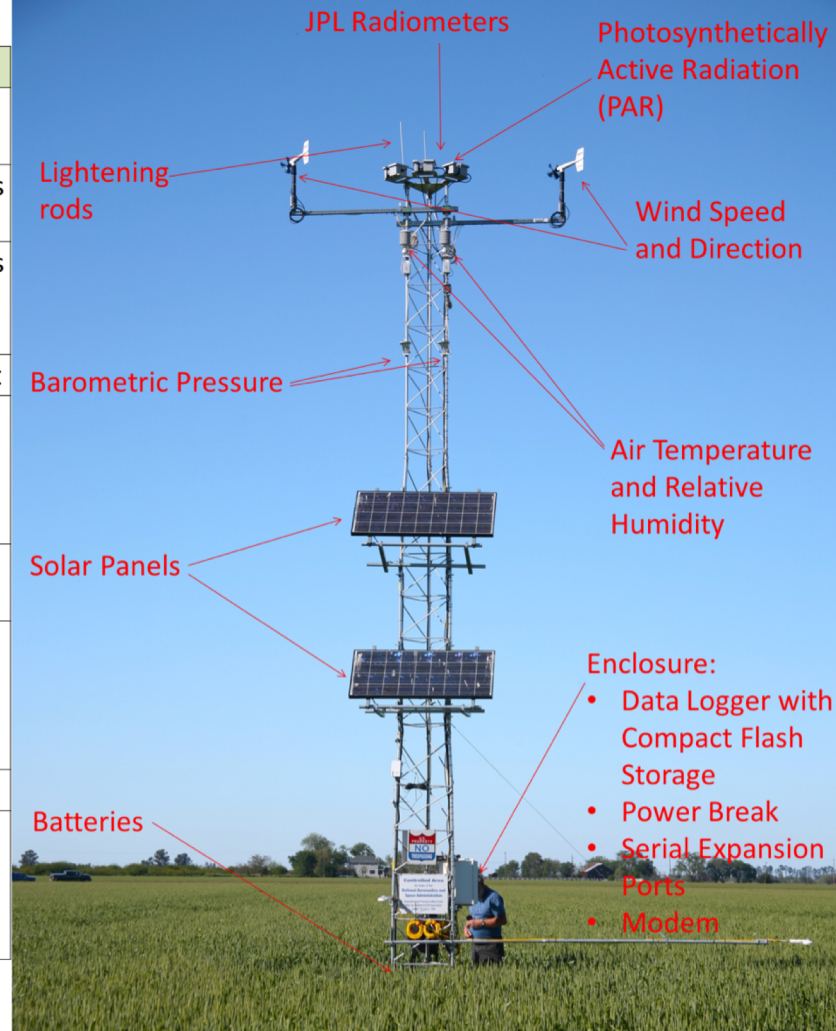
ASTER and In Situ (Vicarious) Surface Kinetic Temperatures at Lake Tahoe and Salton Sea CY2000-2018 v3.x,4.x



JPL Field Sites – Russell Ranch



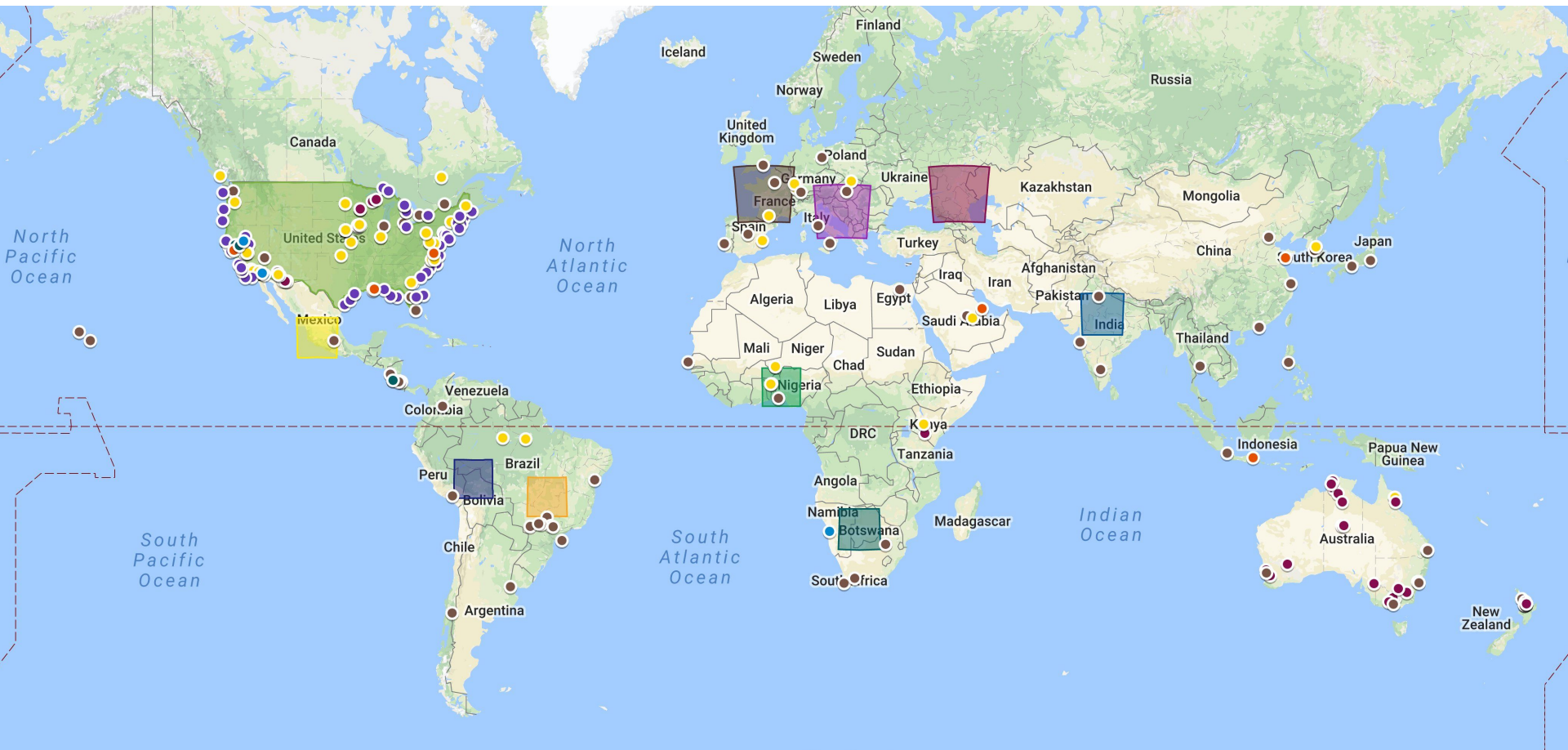
Instrument/Sensor Description	Data Collected
Wind speed indicator (MET)	The values are in counts and are converted to meters per second (ms^{-1})
Wind direction indicator (MET)	The values are in counts and are converted to degrees with respect to magnetic north
Air Temperatures with Gill radiation shield (MET)	The values are in counts and are converted to degrees Celsius (the air temperatures and relative humidity sensor are integrated together)
Relative Humidity (RH) (MET)	The values are in counts and are converted to percent
Barometric Pressure with Pressure Port (MET)	The values are in counts and are converted to hectopascals or millibars (hPa or mBar). The pressure port is used to prevent any errors in pressure due to wind over the sensor
Li-COR Photosynthetically Active Radiation (PAR) sensor	Sensor measures Photosynthetic Photon Flux Density (PPFD) in both natural and artificial light
Net Radiometer	Incoming solar radiation (short wave), reflected solar radiation, incoming far infrared radiation (long wave), outgoing far infrared radiation, sky temperature and ground temperature
JPL-built Radiometer	Land surface temperature
Eddy Covariance System	Air temperature, sonic air temperature, barometric pressure, absolute carbon dioxide and water vapor densities and the orthogonal wind components (three-dimensional)



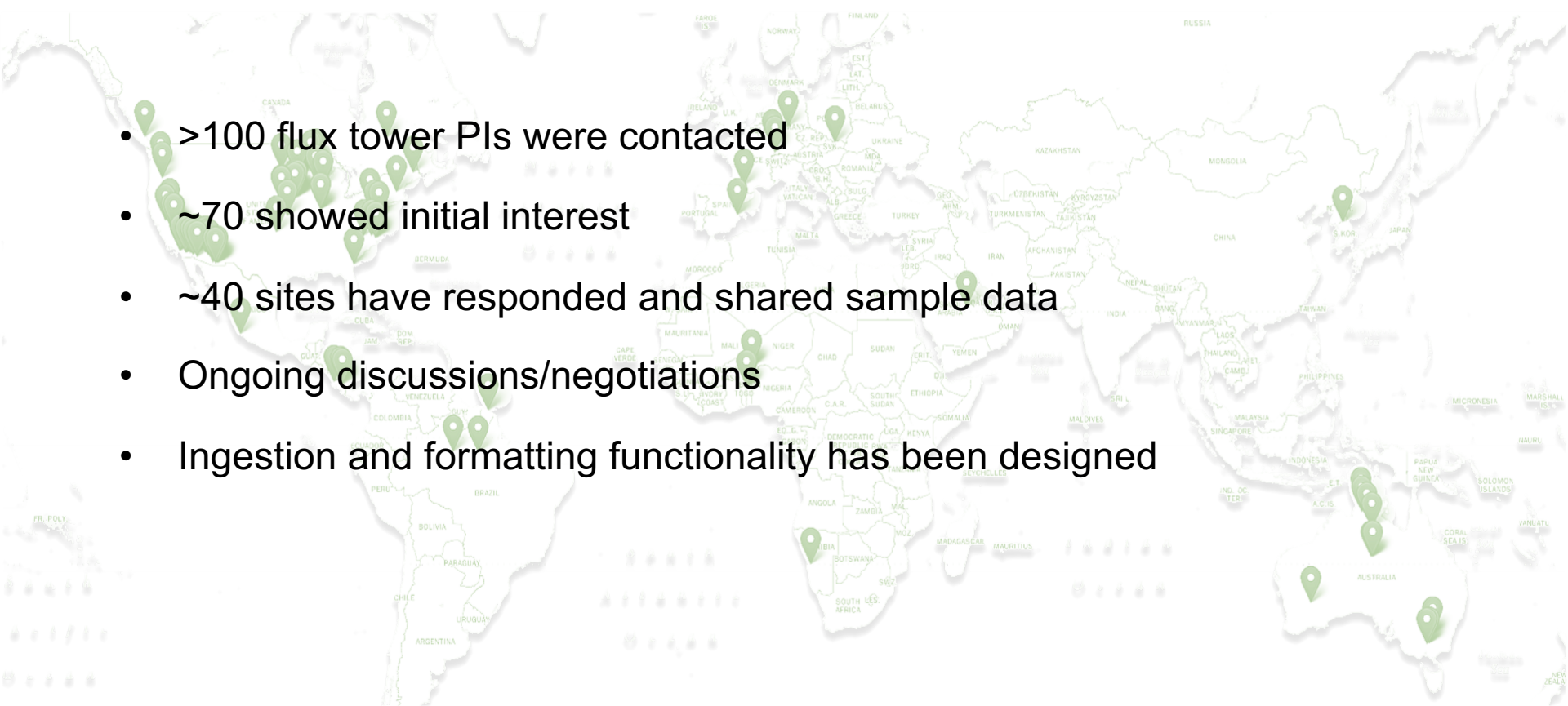
JPL Field Sites – Coming up!

- New JPL flux tower sites
 - EARTH university, Guanacaste, Costa Rica
 - Tonzi Ranch
- New equipment
 - Nulling field portable thermal infrared imager
 - Will allow regular measurements of brightness temperature for thousands of pixels over a field site, allowing better discrimination in heterogeneous sites.

Global Network

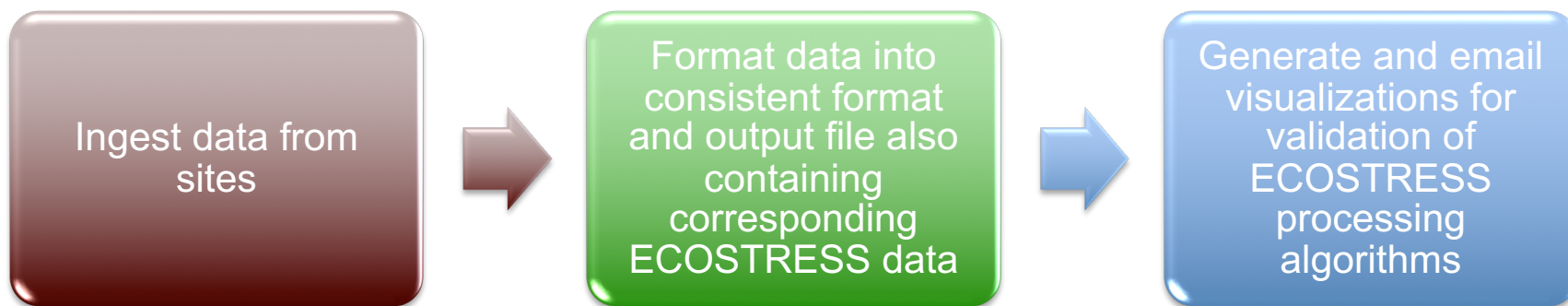


Global Network

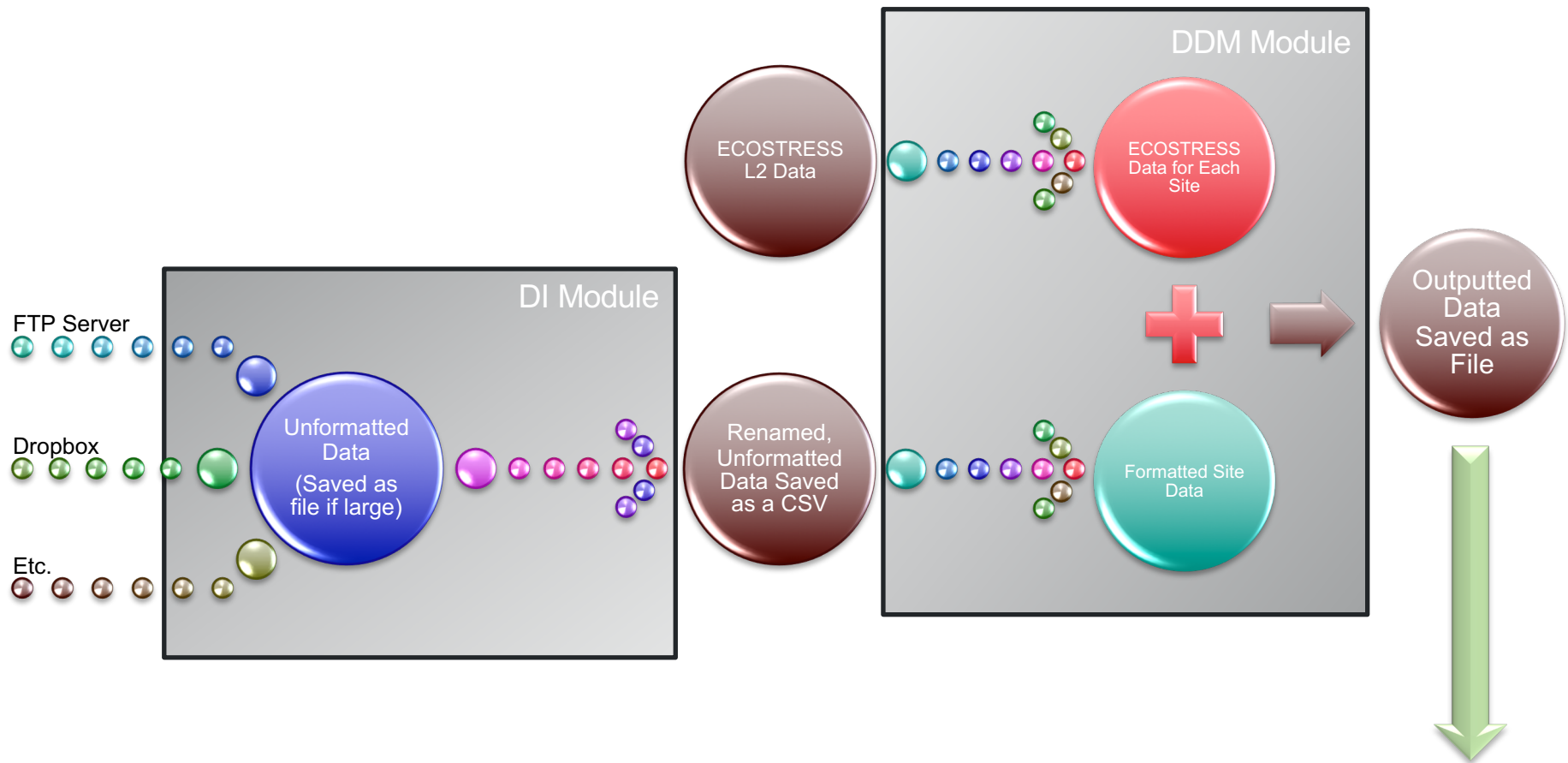
- 
- A world map with green location pins indicating global network sites. The pins are distributed across North America, Europe, Africa, Asia, and Australia. The map is light gray with country borders and names visible.
- >100 flux tower PIs were contacted
 - ~70 showed initial interest
 - ~40 sites have responded and shared sample data
 - Ongoing discussions/negotiations
 - Ingestion and formatting functionality has been designed

Goals

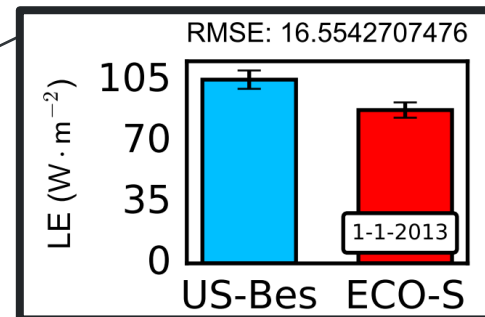
- Develop a Cal/Val infrastructure for ECOSTRESS
 - **DI**: Data Ingestion
 - **DDM**: Data Diagnostics and Matchup
 - **DVV**: Data Validation Visualization
- Automated!



Data Ingestion/Data Diagnostics and Matchup




Data Visualization




Quick-look Table #1

Compares ECOSTRESS data against site average, on a per site basis, each day.

Color based on percent difference

 → <10%

 → >10%

Closing

- In situ data has been sourced globally
- A mechanism has been designed to:
 - Automatically ingest data from different sources
 - Convert data to a consistent format
 - Provide visualizations for easy data monitoring
- These will enable calibration and validation of ECOSTRESS L2 and L3 products over a variety of biomes



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