



ROSES 2018
NRA NNH18ZDA001N-ECOSTRESS

A.7 ECOSTRESS SCIENCE AND APPLICATIONS TEAM
IMPROVEMENTS TO ECOSTRESS DATA

Improvements to ECOSTRESS Data for Science and Applications

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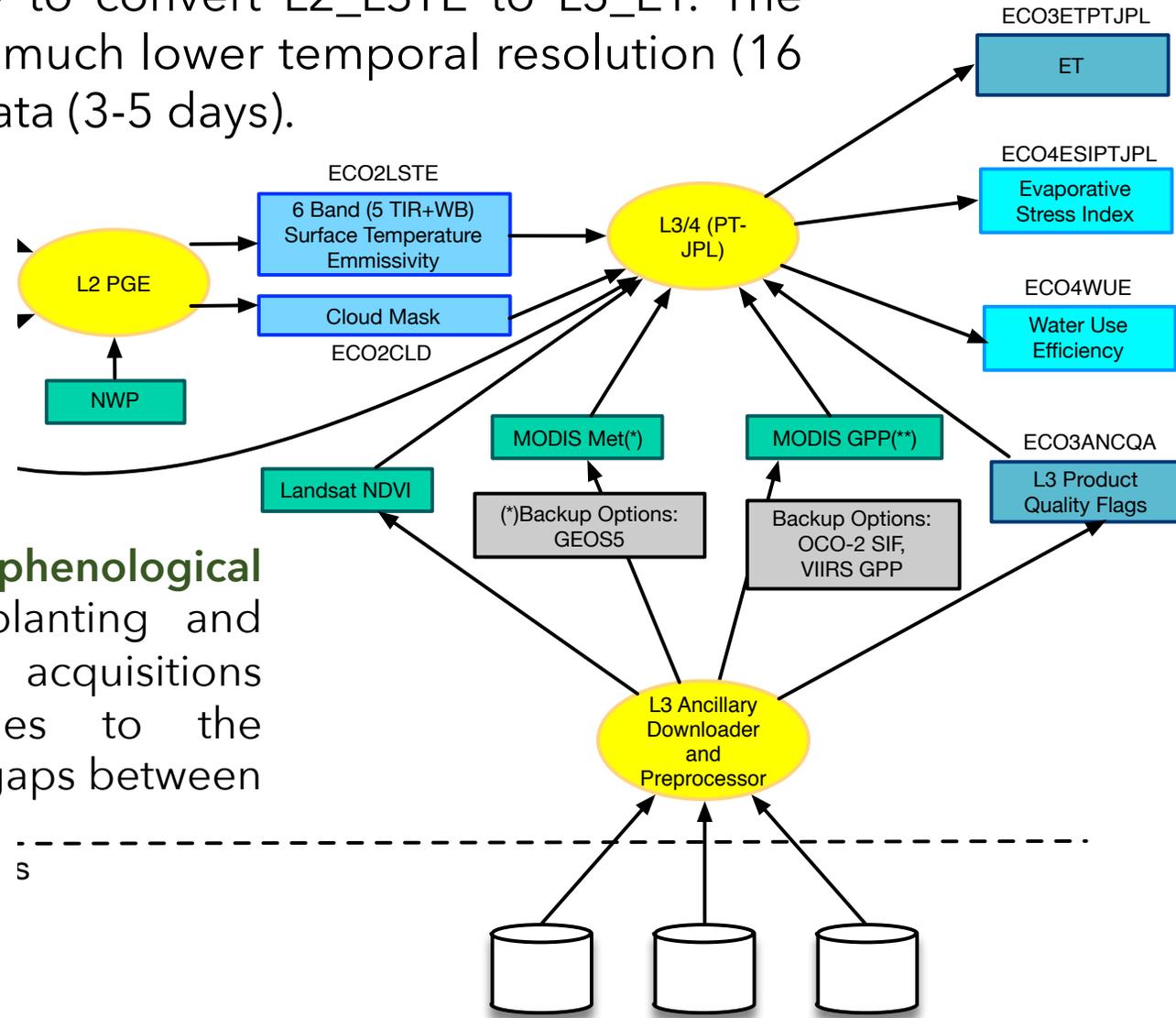
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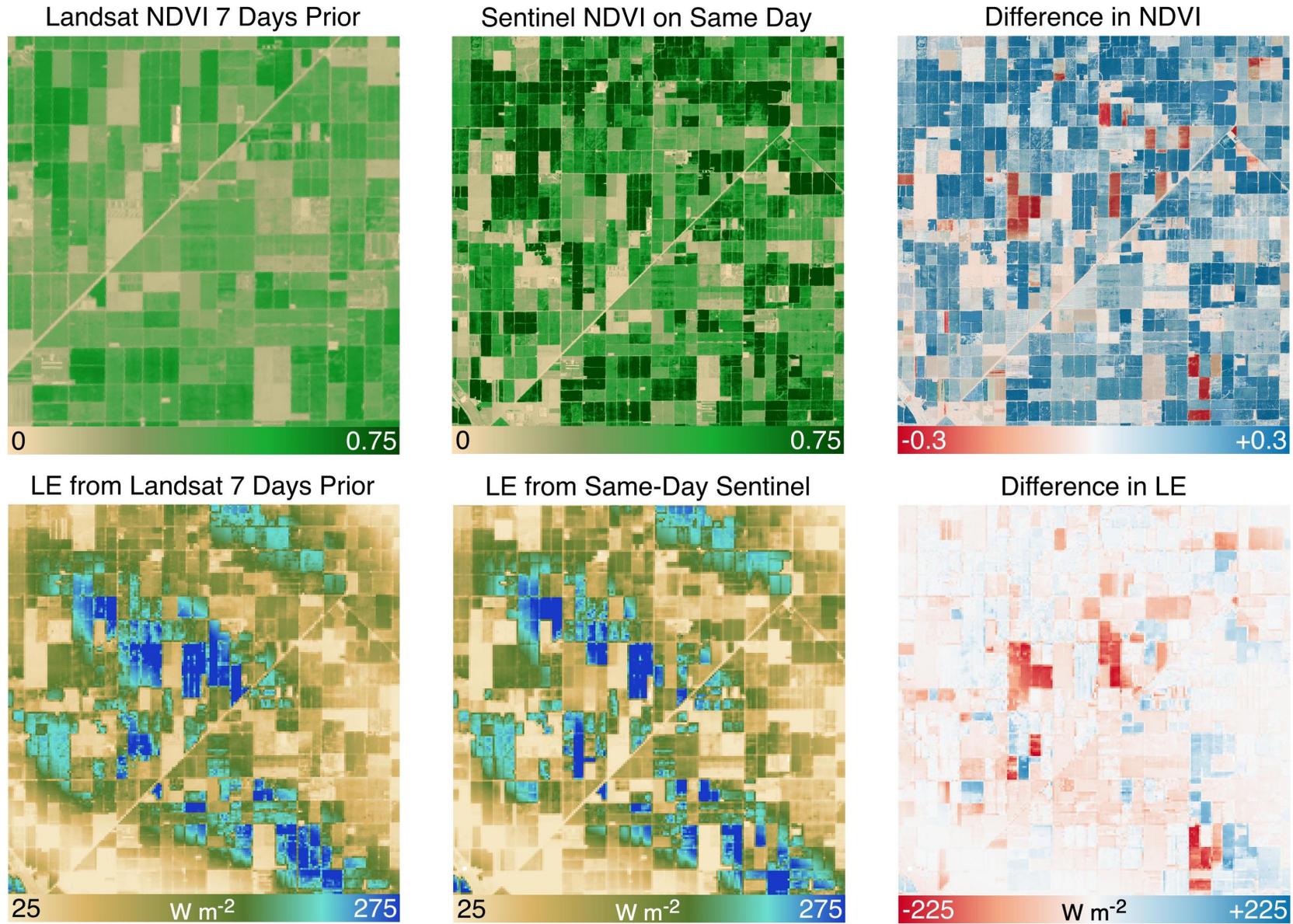


The high spatial resolution of the L3 ET data is primarily the result of the 70 m L2 land surface temperature and emissivity (LSTE) data in conjunction with corresponding **ancillary VNIR data from Landsat 8**, the latter of which is necessary to convert L2_LSTE to L3_ET. The Landsat data are provided on a much lower temporal resolution (16 days) than the ECOSTRESS L2 data (3-5 days).

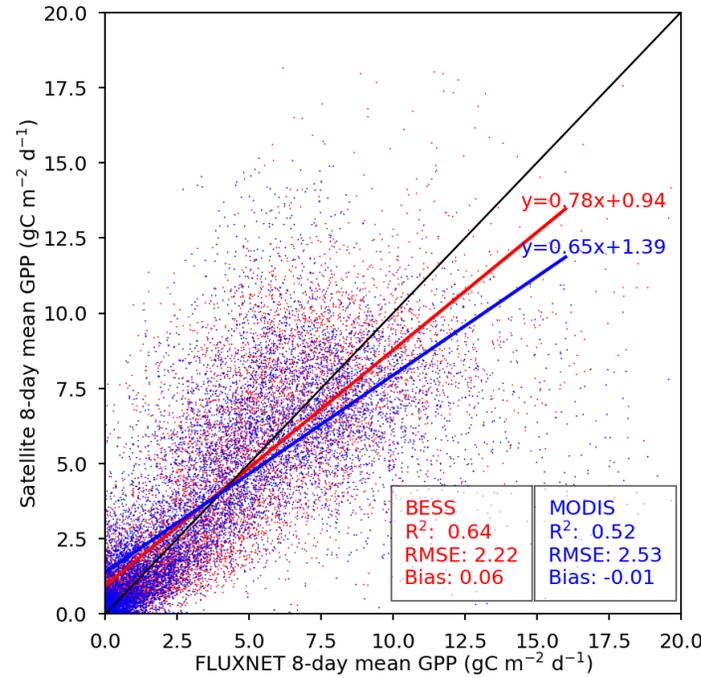


We hypothesize that major **phenological changes**, including agricultural planting and harvest, in between Landsat acquisitions introduce significant uncertainties to the ECOSTRESS L3 ET product during gaps between concurrent Landsat observations.

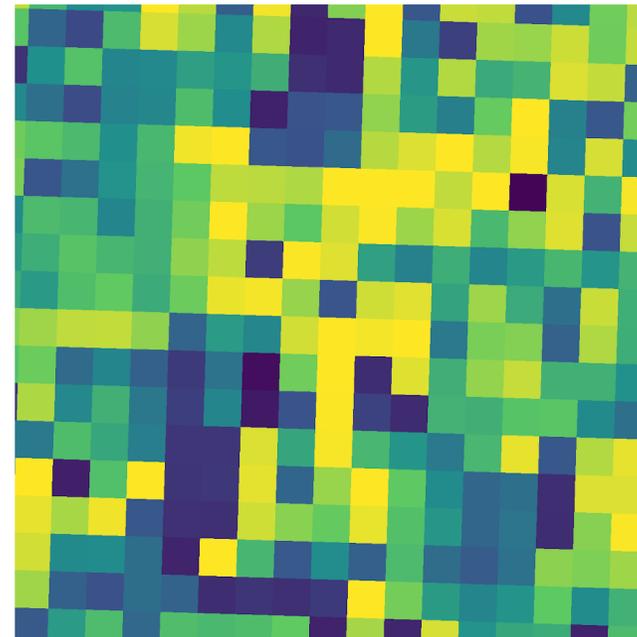
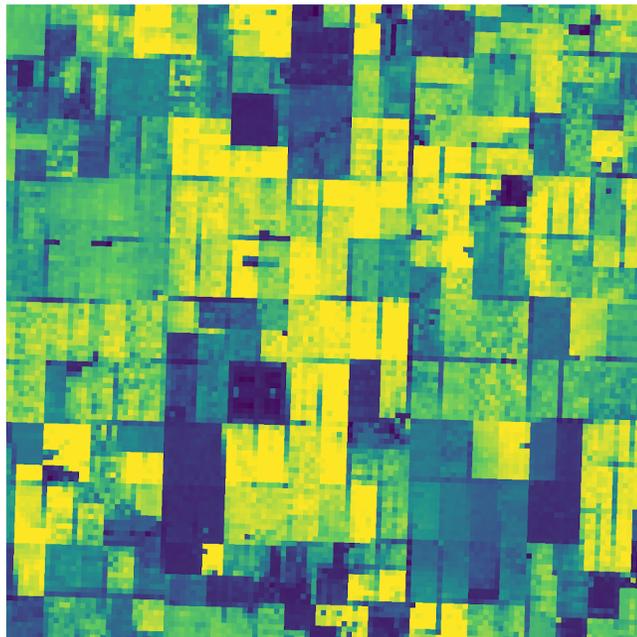
High spatial (10 m) and temporal (5 day) resolution Sentinel 2AB VNIR data became available just prior to ECOSTRESS launch. **We propose to incorporate Sentinel 2AB VNIR data into the L3 ET operational data processing.** Our science objective is to quantify *uncertainty reductions during major phenological changes* across spatial domains. [Objective 1]



- Currently, ECOSTRESS ingests the GPP product from MODIS, which is combined with the ECOSTRESS L3 ET to produce the L4 WUE product.
- The MODIS GPP product is substantially coarser (500 m) than the 70 m ECOSTRESS L3 ET, and has large errors in some biomes.
- We hypothesize that *WUE uncertainty can be significantly improved through replacement of the MODIS GPP product with a GPP algorithm directly into the ECOSTRESS data processing system at 70 m.*
- We propose to incorporate the state-of-the-art Breathing Earth System Simulator (BESS) GPP algorithm, demonstrated as a significant improvement over the MOD17 algorithm and product, **enabling a consistent 70 m WUE product with improved accuracy** [Ryu et al., 2011]. [Objective 2] **ECOSTRESS 70 m Resolution**

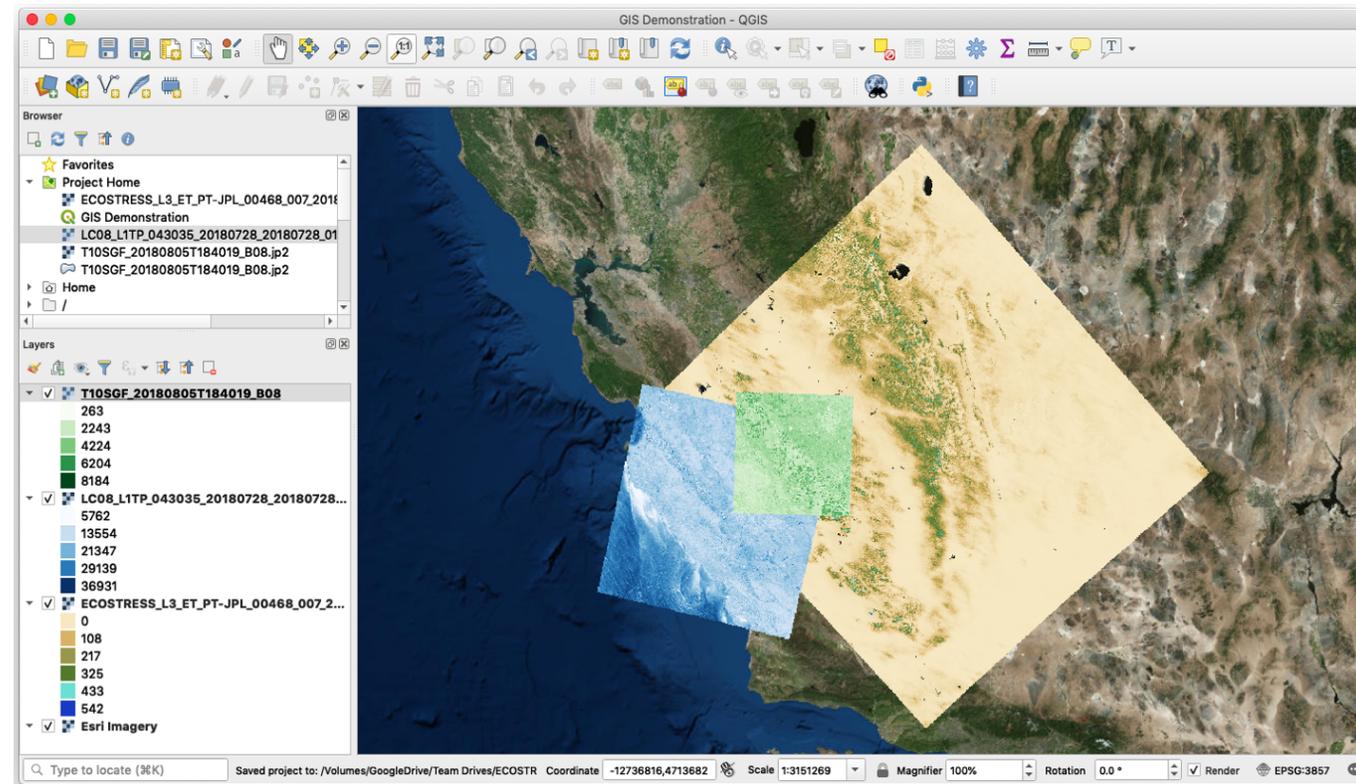


MOD17 500 m Resolution



ECOSTRESS data are provided as ISS ground-track swaths with separate files for geolocation, which requires cumbersome downloading and reprojection of very large files to produce useable rasters. On-the-fly analysis tools from the LP-DAAC, such as AppEEARS, which allow for data extraction and analysis sans download/reprojection, are severely hindered. **We propose to produce and deliver the new ECOSTRESS L2-4 data gridded in GeoTIFF**, enabling AppEEARS and other tools for analysis. We will grid the data directly onto that used by Sentinel for ready comparisons, as already compatible with multiple data archives such as Landsat. [Objective 3]

	Swath HDF5 MB	Zipped GeoTIFF MB	Reduction
LST	700	77	89%
ET	730	645	12%
ESI	244	218	11%
WUE	122	98	20%
ET QA	1,280	12	99%
L1B_GEO	1,220	0	100%
Total	4,296	1,050	76%



In summary, our objectives include:

- 1. Improve the accuracy of the L3 ET product through incorporation of Sentinel 2AB;**
- 2. Improve the spatial resolution and accuracy of the L4 WUE product through incorporation of the BESS GPP algorithm;**
- 3. Produce and deliver all gridded ECOSTRESS L2-4 data in GeoTIFF.**