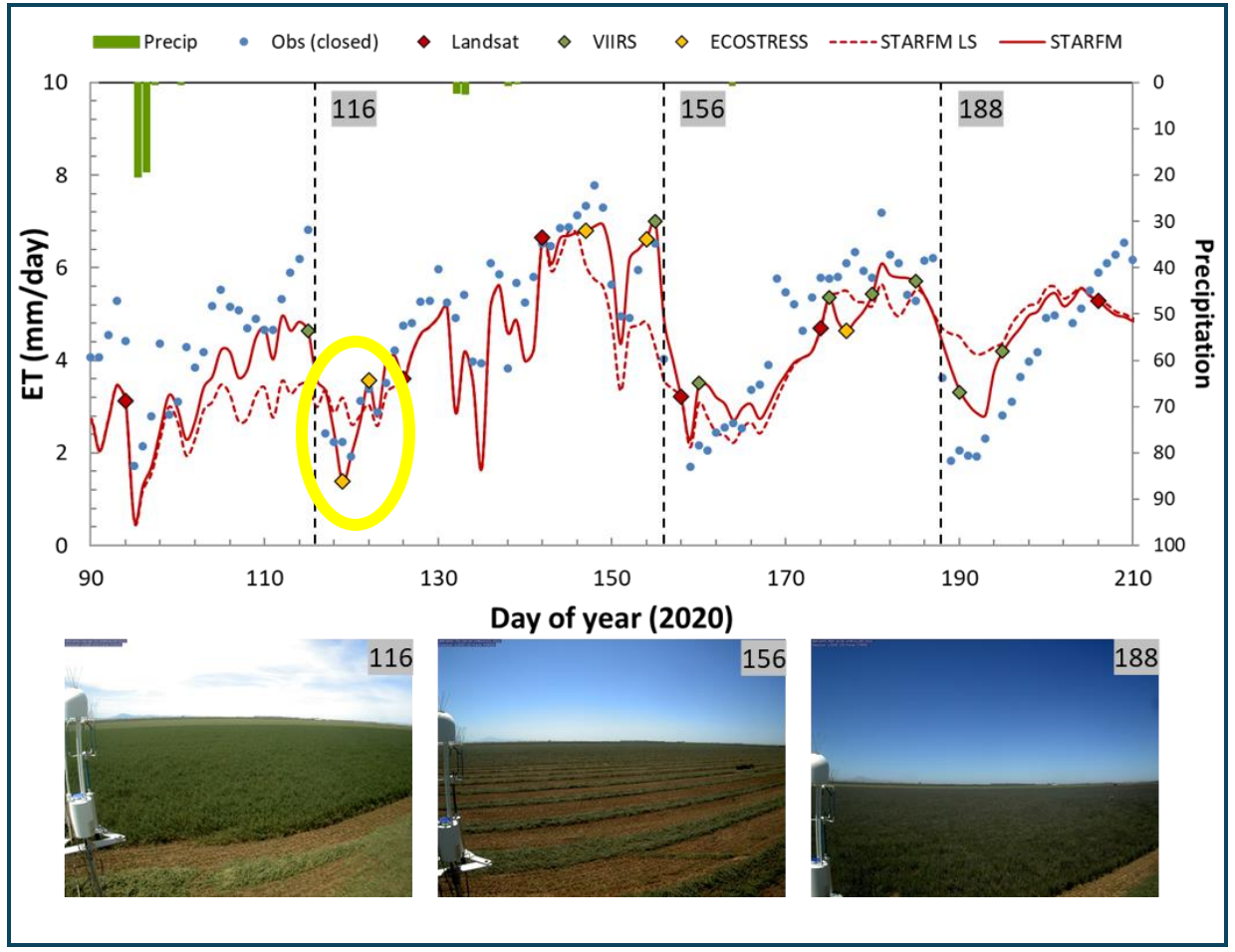
Agricultural Science and Applications

ECOSTRESS

Measure agricultural water consumptive water use at spatiotemporal scales applicable to improve drought estimation accuracy



Credit: Yang, Anderson

ECOSTRESS enables observation of water stress in agricultural regions at high temporal resolution and at field-scale

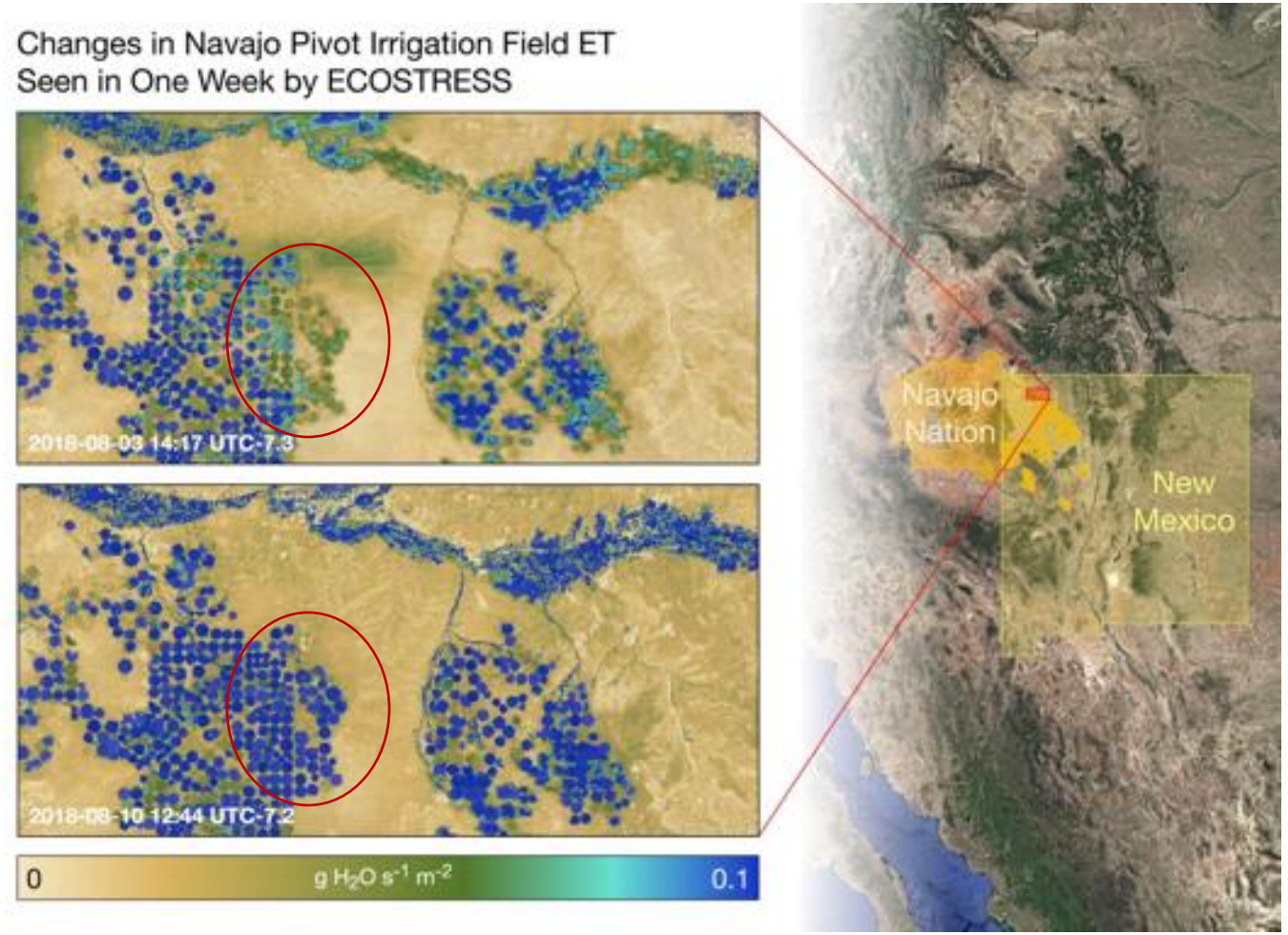
Kerry Cawse Nicholson and the ECOSTRESS Team
Jet Propulsion Laboratory, California Institute of Technology

Agricultural Science and Applications

ECOSTRESS

Prime mission Objective 3: Measure agricultural water consumptive water use at spatiotemporal scales applicable to improve drought estimation accuracy

Credit: Halverson, Fisher



ECOSTRESS for agricultural water management

- Robust information on consumptive water use derived from remote sensing can significantly benefit water decision-making in agriculture, informing irrigation schedules and water management plans over extended regions.
- Several remote sensing observations have been fused over several irrigated cropping systems in the Central Valley of California
- This study shows the value of ECOSTRESS for providing high-frequency monitoring of agricultural water use

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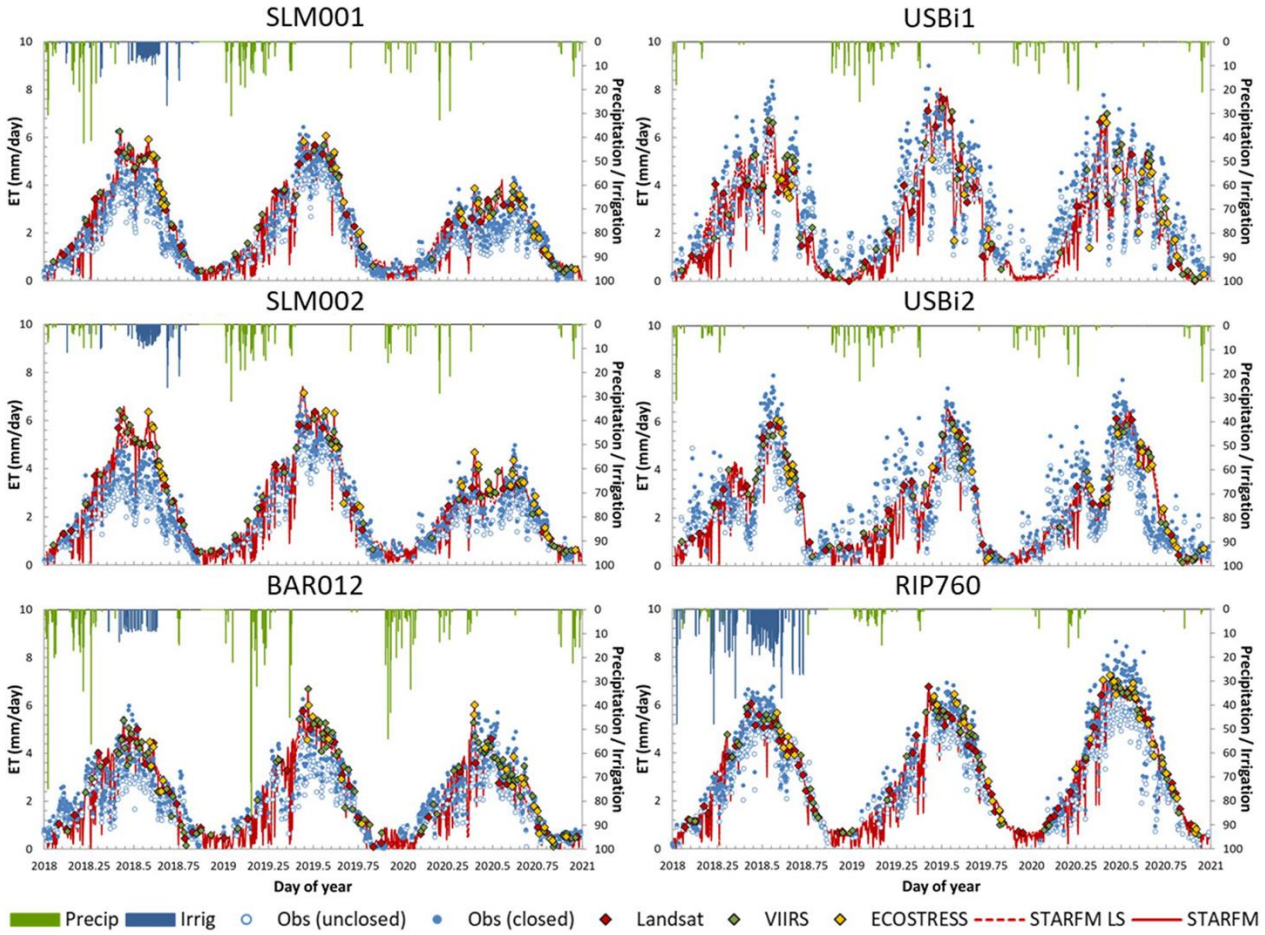
Improving the spatiotemporal resolution of remotely sensed ET information for water management through Landsat, Sentinel-2, ECOSTRESS and VIIRS data fusion

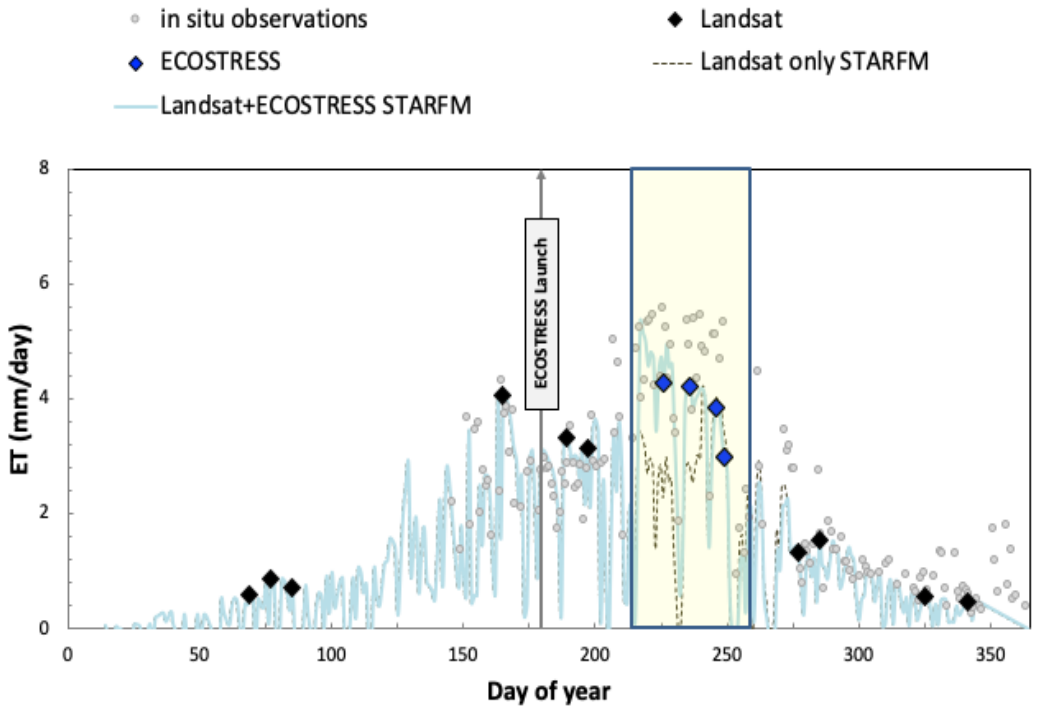
Jie Xue, Martha C. Anderson, Feng Gao, Christopher Hain, Kyle R. Knipper, Yun Yang, William P. Kustas, Yang Yang, Nicolas Bambach, Andrew J. McElrone, Sebastian J. Castro, Joseph G. Alfieri, John H. Prueger, Lynn G. McKee, Lawrence E. Hipps & María del Mar Alsina

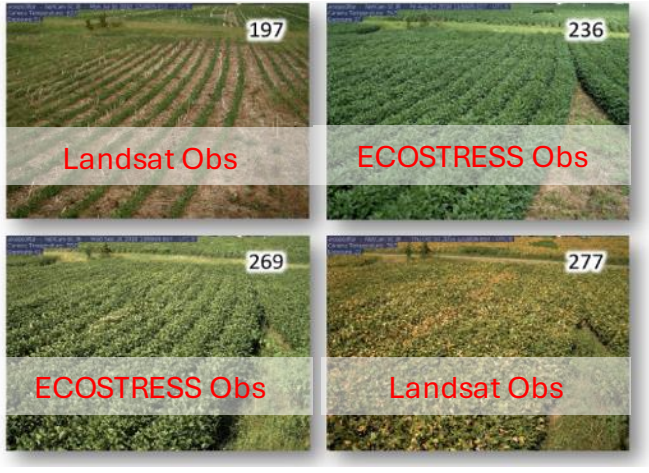
Irrigation Science **40**, 609–634 (2022) | Cite this article



Time series comparison between measured and modeled daily ET obtained from both Landsat-only and Landsat + ECOSTRESS + VIIRS/ S2 fusion at the six flux tower sites for the 3-year study period.

ECOSTRESS provides critical ET observations during the growing season that are missed by Landsat





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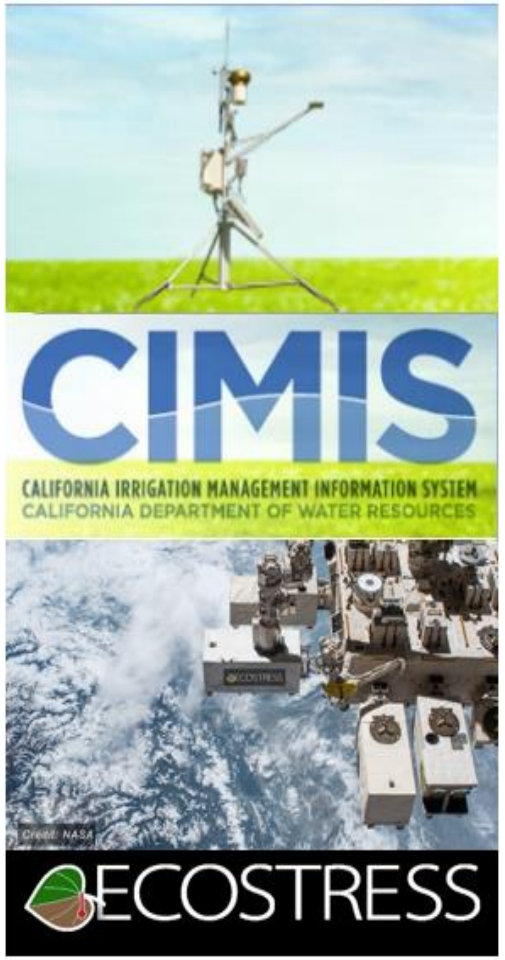
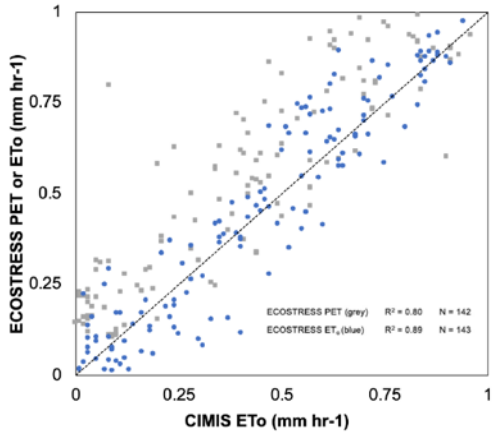
Interoperability of ECOSTRESS and Landsat for mapping evapotranspiration time series at sub-field scales

Martha C. Anderson [a,*], Yang Yang [a], Jie Xue [a], Kyle R. Knipper [a], Yun Yang [a,b], Feng Gao [a], Chris R. Hain [c], William P. Kustas [a], Kerry Cawse-Nicholson [d], Glynn Hulley [d], Joshua B. Fisher [d], Joseph G. Alfieri [a], Tilden P. Meyers [e], John Prueger [f], Dennis D. Baldocchi [g], Camilo Rey-Sanchez [g]

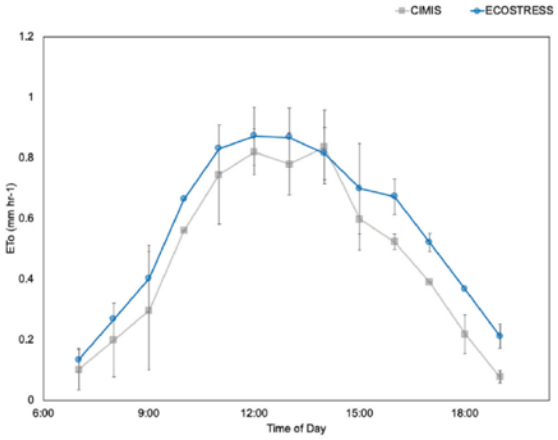
ECOSTRESS utility for operational water agencies

Christine Lee (JPL)





Strong correlation between ECOSTRESS and CIMIS estimates of reference ET (R^2=0.89)



Diurnal variability of reference evapotranspiration conditions are captured by ECOSTRESS and CIMIS

Background: The Eastern Municipal Water District (EMWD) in Southern California, uses a ground-based network of reference evapotranspiration (ET_o) estimates from the California Irrigation Management Information System (CIMIS). EMWD was interested in how ECOSTRESS could fill some of the spatial and temporal gaps in CIMIS ET_o estimates.

Results: CIMIS ET_o and ECOSTRESS ET_o were strongly correlated (R^2 = 0.89, RMSE = 0.11 mm hr^{-1}). Both CIMIS and ECOSTRESS ET_o captured similar seasonal patterns throughout the study period as well as diurnal variability.

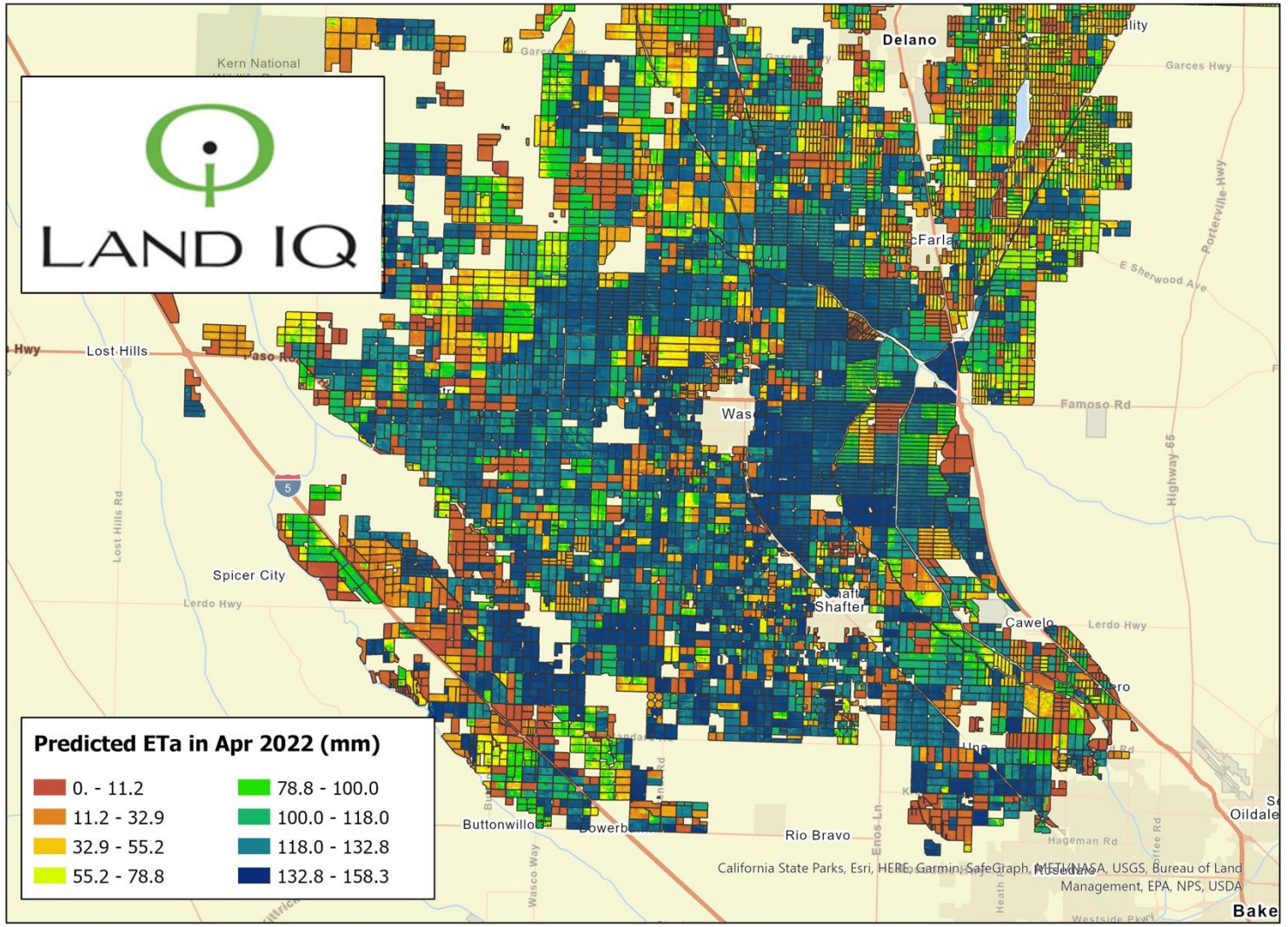
Significance: These results demonstrate the utility of high spatio-temporal thermal measurements for assessing ET and extending ground based networks in support of water use applications and conservation decision-making.

• Kohli G, Lee CM, Fisher JB, Halverson G, Variano E, Jin Y, Carney D, Wilder BA, Kinoshita AM. ECOSTRESS and CIMIS: A Comparison of Potential and Reference ET in Riverside County, CA. *Remote Sensing, 2020*.

New Application: ECOSTRESS monitors wate use in California Central Valley

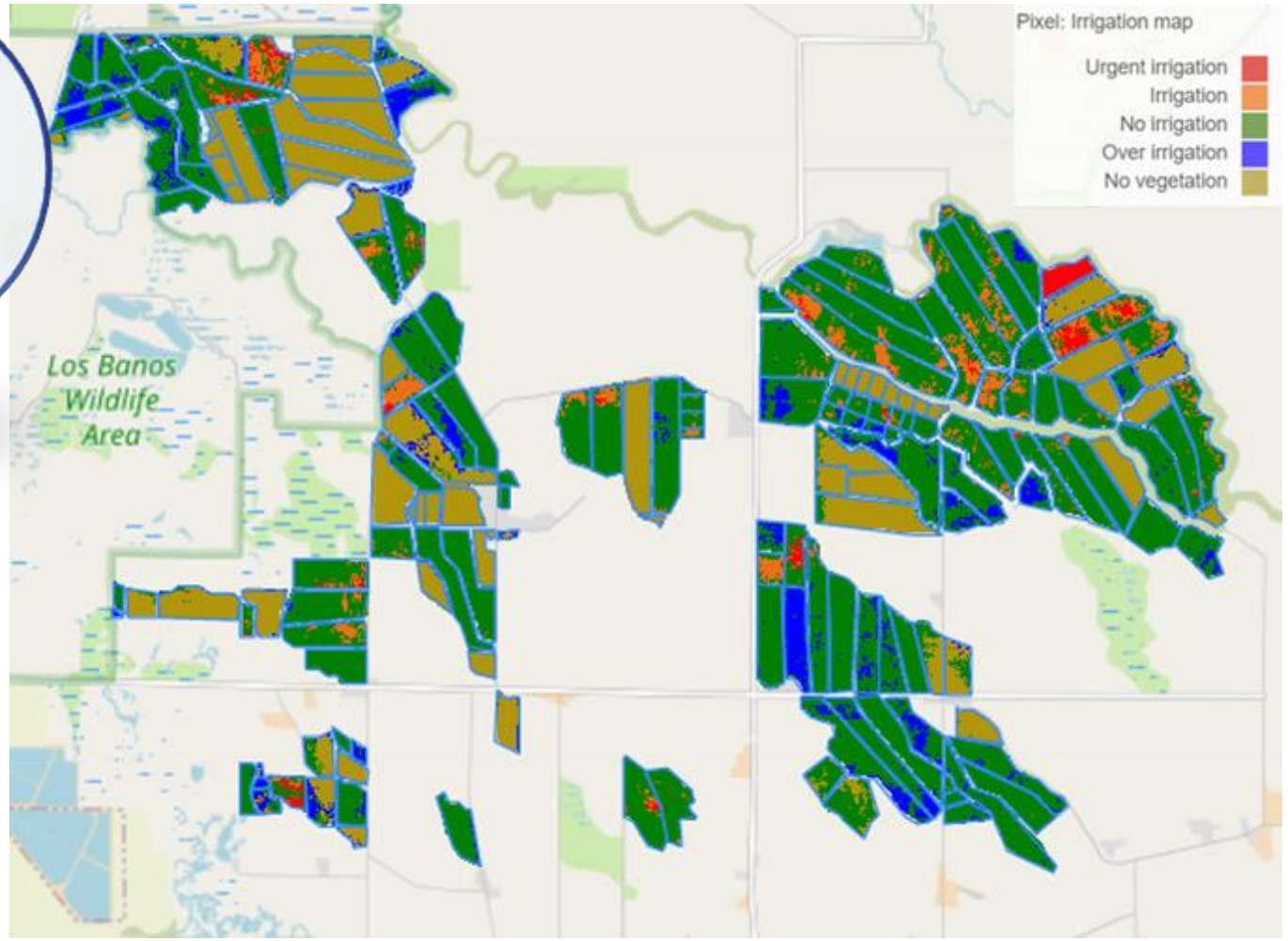
Land IQ uses ECOSTRESS surface temperature as one of its inputs to produce field-by-field evapotranspiration for 3.3M acres in the Central Valley of California. These data are used by 40 groundwater sustainability agencies and irrigation districts to support overall water management, regulatory compliance, fee structures, water trading, and land management decisions related to California's Sustainable Groundwater Management Act implementation.

- Joel Kimmelshue, LandIQ



Providing irrigation advisories for agriculture

MAXIMIZE THE “CROP PER DROP” USING COMMERCIAL APPS



San Bernardino county

Data sources:

ECOSTRESS

IrriWatch

IrriWatch integrates ECOSTRESS data into high quality estimates of water use and delivers irrigation advisories to over 18,000 fields in 25 countries around the world.

- IrriWatch CEO Wim Bastiaanssen