

OPENET

FILLING THE BIGGEST DATA GAP IN WATER MANAGEMENT

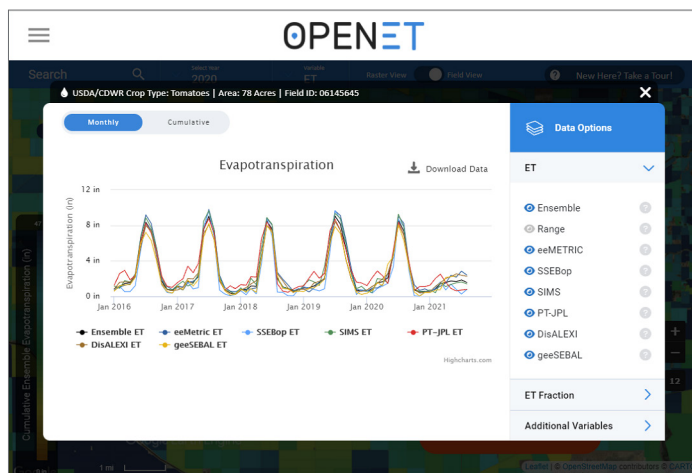
OpenET: Ground-truthed, transparent, and accessible evapotranspiration data

OpenET is a nonprofit collaborative that generates evapotranspiration (ET) data at the scale of individual fields for user-defined geographies and time frames across the western United States. The collaborative includes nationally recognized scientists brought together to develop a credible, trusted source of ET data. OpenET conducted the largest intercomparison and accuracy assessments of field-scale, satellite-based ET models, and continues to work with the water user and broader academic community to refine and improve the accuracy of the data. **OpenET provides ground-truthed, scientifically rigorous satellite-based evapotranspiration data. Our transparent data and methodologies allow for open dialogue with growers across the western U.S. so that we can continually advance the science for all.**

FOUNDED ON INDEPENDENT SCIENCE

The OpenET technical team includes more than 30 scientists, practitioners, and developers from NASA, Desert Research Institute, U.S. Department of Agriculture, U.S. Geological Survey, University of Nebraska, University of Idaho, University of Wisconsin, University of Maryland, California State University Monterey Bay, University of Montana, University of California Los Angeles, Google Earth Engine, and web development firm HabitatSeven. OpenET has also been partnering with key stakeholders from the agriculture, water management, and conservation communities to develop the platform.

OpenET provides data from six different models that are used to calculate ET and also provides a single ET value, or “ensemble value.” All models selected for inclusion in OpenET have been used by government agencies with responsibility for water use reporting and management in the western U.S., and some models are widely used internationally. Each model has its own strengths and limitations for different geographies, crops, and conditions.



This graph shows data from six models and the “ensemble value” for a 78-acre field of tomatoes.

“Gallo has invested substantially in ET data research because it enables us to use water much more sustainably as we face more frequent heat spikes and increasingly severe droughts. Working with USDA and NASA, we have experimentally used ET data to adjust irrigation amounts to actual vine water needs and to reduce applied water by up to 20%. But we need OpenET to be able to scale this application to all our vineyard acres.”

—**Maria Mar Alsina**, Research Scientist,
E. & J. Gallo Winery

OpenET builds upon decades of investment by NASA, USGS, NOAA, and the European Space Agency to launch and operate a constellation of satellites and develop the ground data systems required to capture, process, store, and distribute satellite data freely to the public. OpenET uses Google Earth Engine as a shared platform that allows teams from multiple federal agencies and universities to collaborate on development of the OpenET software architecture, increase the consistency of data processing, identify model biases, and resolve differences among models.

OpenET uses gridded weather datasets for various model parameters such as atmospheric stability, net radiation, wind speed, precipitation, surface air temperature gradients, and to calculate reference ET. To ensure that reference ET data are representative of agricultural conditions, hundreds of weather stations located in agricultural areas are used by OpenET for bias correction of reference ET data. Weather station data were passed through rigorous quality assurance and quality control procedures.

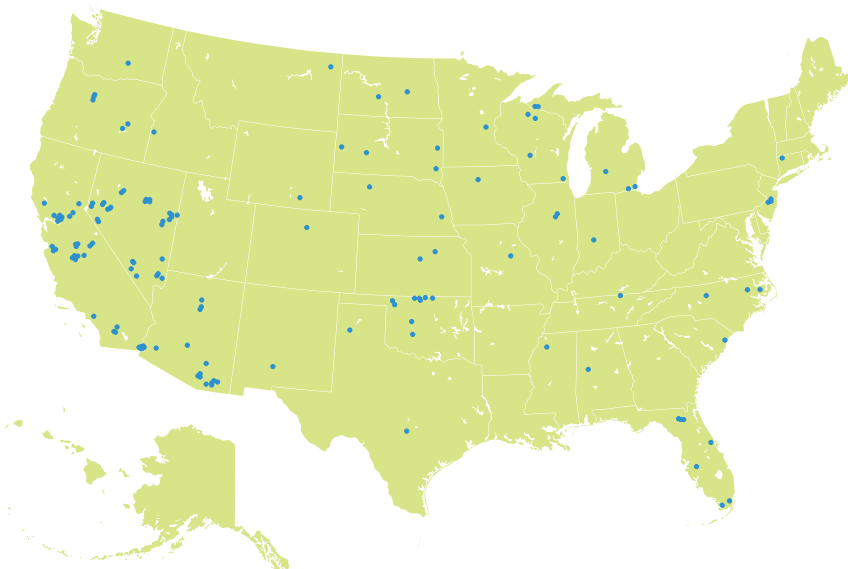
EXTENSIVELY GROUND-TRUTHED

OpenET completed one of the largest, most rigorous ET intercomparison efforts to date, which included ground-truthing the data across 142 flux tower sites to assess overall accuracy. The stations span a diverse range of crop types and natural ecosystems, providing a robust assessment of model accuracy across varying conditions.

The intercomparison study was used to determine which models provide the highest accuracy for different crops, land cover types, regions, and seasons. The results were also used to evaluate the accuracy of the ensemble ET value and evaluate the outlier detection and removal approach used by OpenET in the development of the ensemble ET value. Accuracy was evaluated across multiple statistical measures, and reported at daily, monthly, seasonal, and annual timescales.

For croplands, the ensemble performed as well as or better than any individual model across most accuracy metrics, with a mean absolute error (MAE) for the growing season of 13.2% (80.3 mm) and a MAE value of 16.6% (15.6 mm) at monthly time steps. The mean bias error is less than 4% for both the growing season and monthly averages, indicating that many of the errors are random errors and the overall bias in the OpenET ensemble values are minimal for croplands. OpenET is committed to working with growers, local communities, water managers, and the scientific community to continually refine the models and reassess accuracy as new information is made available.

Flux Tower Locations



Learn more at openetdata.org.



“If you give farmers better information on when they should and shouldn’t have their water on, you’re going to save water. I think that’s the great value of OpenET.”

—Denise Moyle, Nevada Alfalfa Farmer



“Measuring water use in the Delta with traditional ground-based tools is a fool’s errand because of the region’s unique hydrology. OpenET provides us the ability to gain a more precise, timely and meaningful measurement of water use in the Delta. OpenET will be of great value for Delta farmers, state regulators, and policymakers as we collaborate to better manage our common vital water resources for our future.”

—Brett Baker, Sixth-generation Pear Farmer and Attorney, Central Delta Water Agency



DEDICATED TO TRANSPARENCY AND TRUST

OpenET's ensemble approach is designed to better inform users regarding ET model agreement and disagreement, ensure data continuity, and take advantage of the strengths of the different ET mapping methods across different regions and land cover types. A key strength of the ensemble approach is that it addresses questions from the water management community about which model to use while providing transparency about the range of estimates as an indicator of model error. **Methodologies, inputs, known issues, and intercomparison results are all publicly available via the OpenET website.**

As a nonprofit, OpenET has made advancing the underlying science and ensuring the best available data are publicly accessible the core of its mission. Making the data easily accessible fosters an open dialogue with the water user community. OpenET has convened farmers and agricultural companies, representatives from state and federal agencies, policymakers, nonprofits, and other practitioners to collect input from a broad range of perspectives. Growers and water managers at the local scale are providing feedback for our team of over 20 scientists, creating an iterative process that continually improves the data and benefits all users.

"As the basin where I farm runs a substantial groundwater deficit, I have used ET data to design more efficient irrigation systems that reduce applied water by up to 25% and electricity costs by up to 20%. Because ET data is so important, I introduced legislation to use OpenET to develop water budgets for every groundwater basin in Oregon to ensure we have enough water for a growing population as droughts become more extreme. If you haven't experienced climate change yet, it's coming, and we need data and technology like OpenET to help us adapt."

—Mark Owens, Oregon State Representative and Alfalfa Farmer

