



Workshop 105 – Ballroom E

June 2024

Retrieval and Application of On Demand Global Field-scale Actual Evapotranspiration Data Since 1982

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Applications of Evapotranspiration

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¹U.S. Geological Survey (USGS)

Earth Resources Observations and Science (EROS) Center,

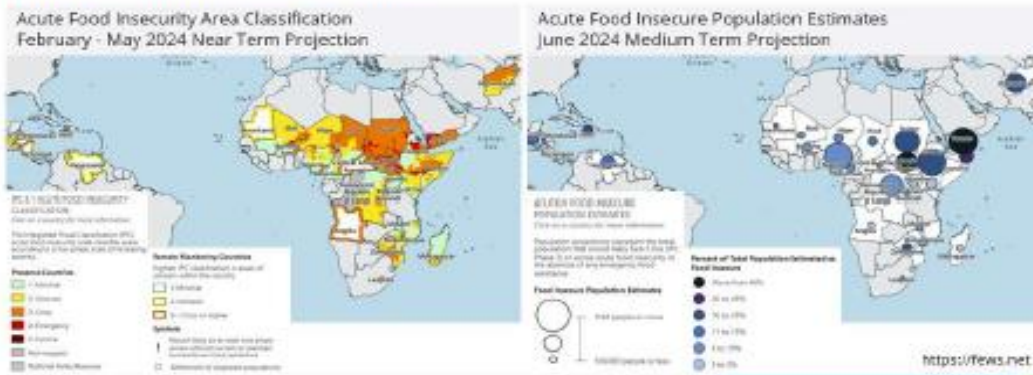
²ASRC Federal, ³Innovate!, Inc., ⁴KBR, Inc., contractors to USGS EROS Center, Sioux Falls, SD 57198, USA.
Work performed under USGS Contract 140G0124D0001.

Applications of Evapotranspiration

Drought Monitoring

Famine Early Warning Systems Network (FEWS NET)

- FEWS NET monitors and provides early warning analysis of ongoing, imminent, or emerging threats to food security around the world.
- FEWS NET analyses advises USAID on the need for humanitarian assistance for those populations most vulnerable to food crises.

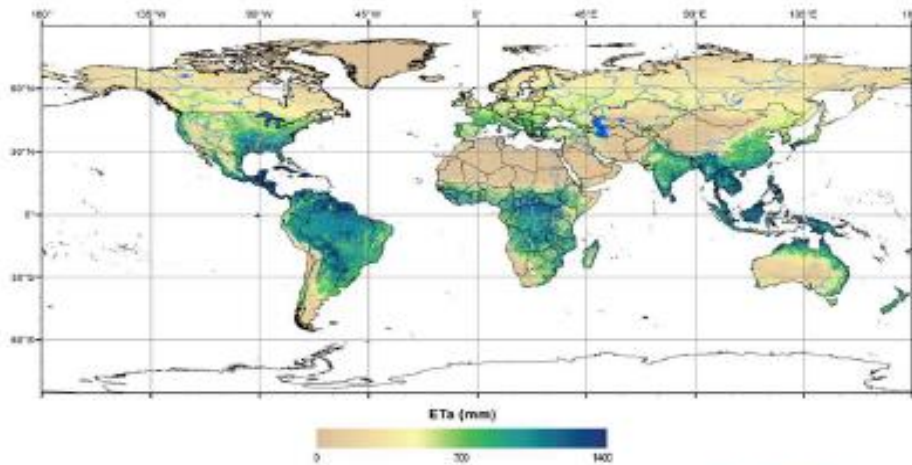


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Using MODIS/MIRS for Global Coverage

Global SSEBop Actual ET 2023

Operational: 1 km, updated every 10 days



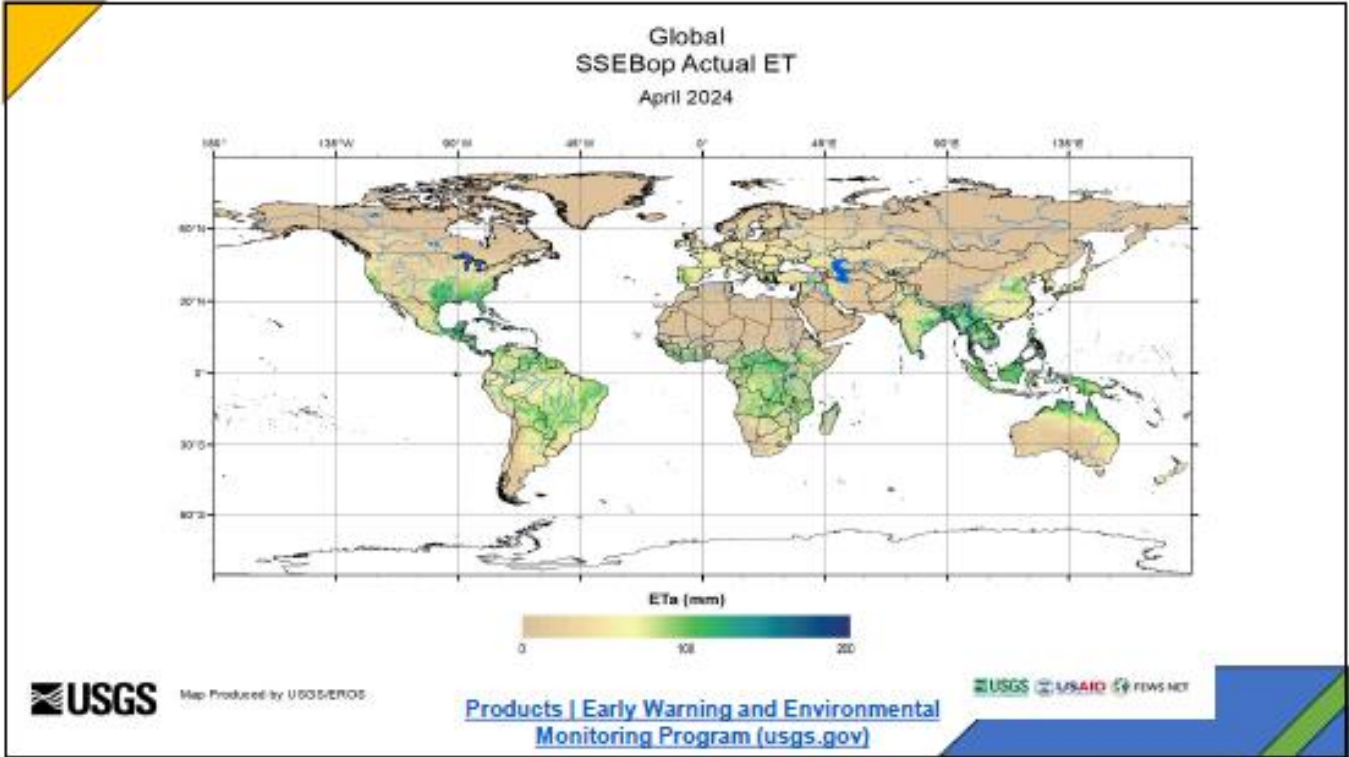
USGS

Map Produced by USGS/EROS

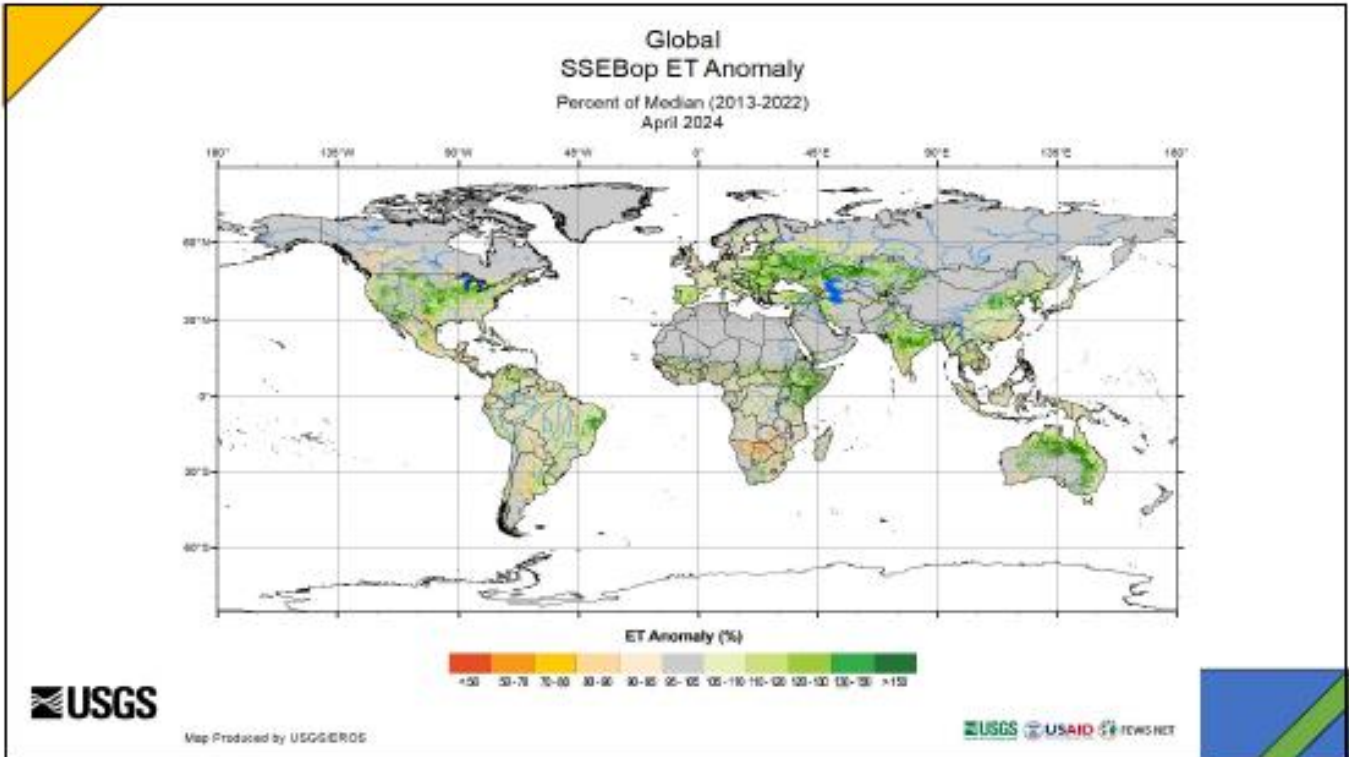
USGS USAID FEWS NET

[Products | Early Warning and Environmental Monitoring Program \(usgs.gov\)](https://usgs.gov)

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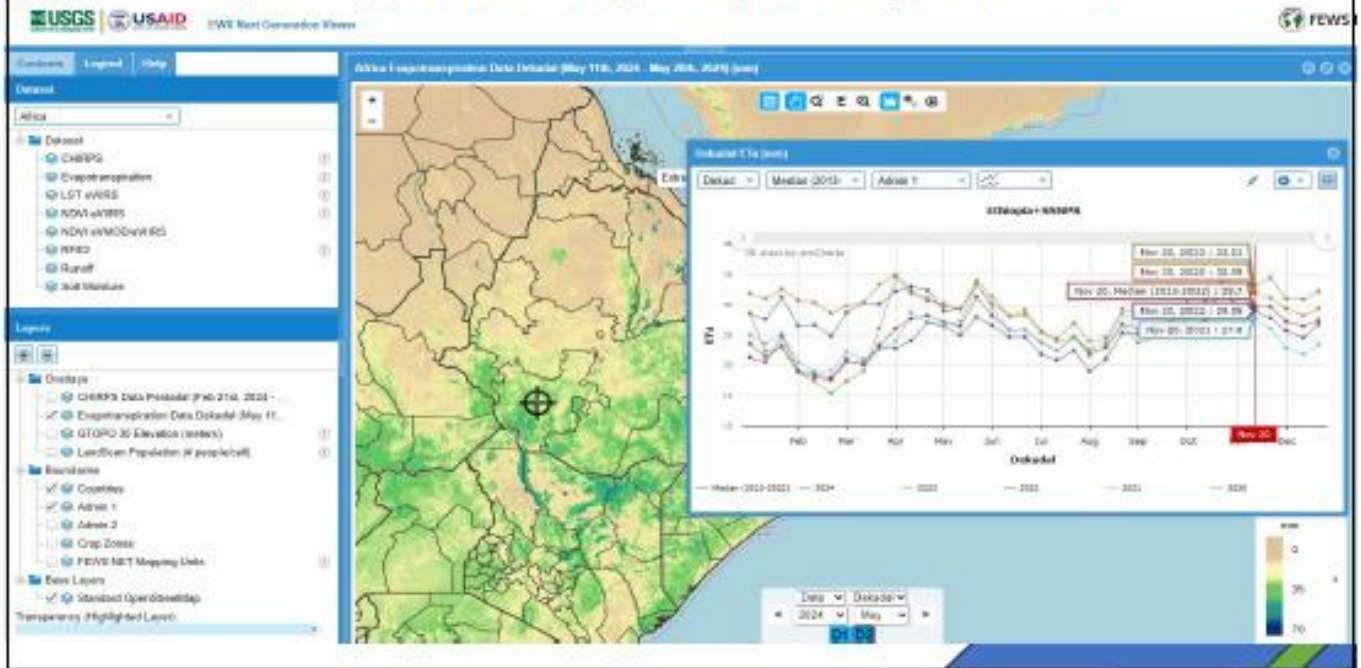


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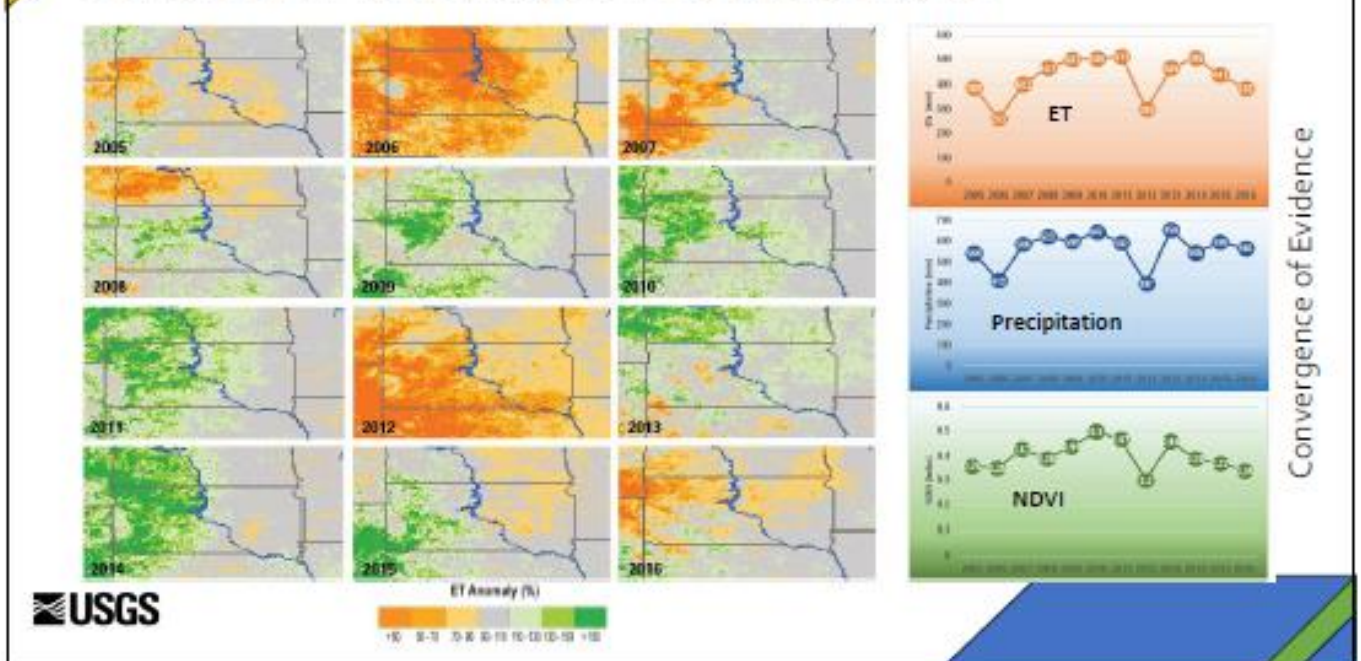
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EWX (Early Warning eXplorer) Viewer



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Annual ET Anomaly for South Dakota



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Crop Water Use and Irrigation Management

ET is used to plan, manage, and regulate agricultural water resources. Water use is controlled by hydroclimatic conditions, and by the management of water sources, such as:

- agriculture technology
- irrigation innovation
- water law and policy
- water use governance



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Blue and Green Water (FAO, 1995)



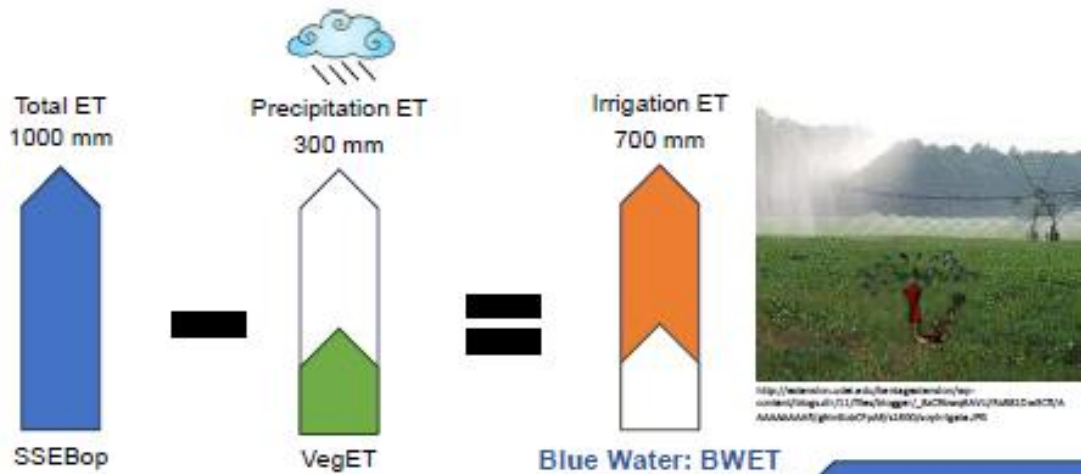
Green Water
(moisture in unsaturated soil layer)

Blue Water
(water in the rivers, streams, surface water bodies and groundwater)



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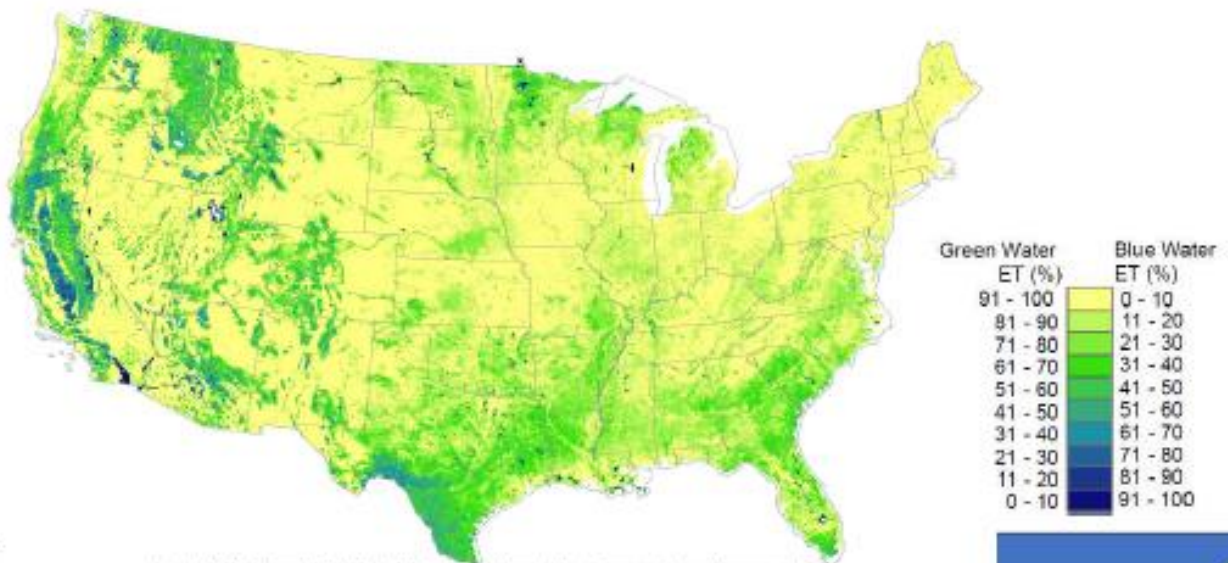
Net ET: ET from Irrigation Sources



Velupuri and Senay, 2017. Scientific Reports.

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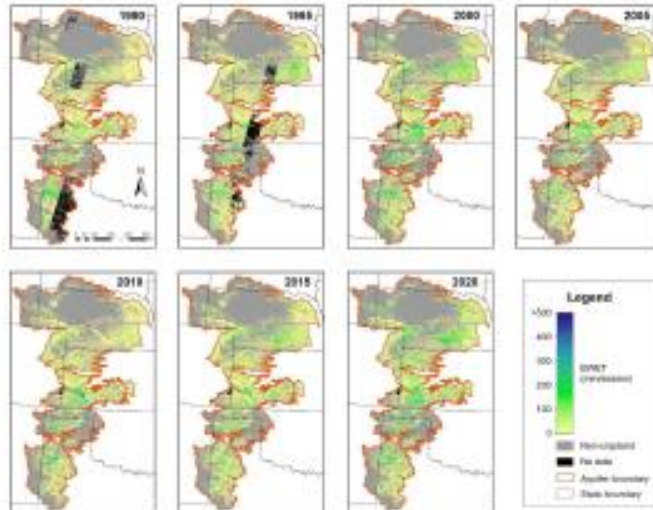
GW (precipitation) and BW (surface- and ground-water) ET in the CONUS



Velupuri, N. M., & Senay, G. B. (2017). Partitioning evapotranspiration into green and blue water sources in the contiguous United States. *Scientific reports*, 7(1), 6191.

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Seasonal (1 May to 30 September) BWET timeseries for croplands in the High Plains aquifer region



Remote Sensing Benefits:

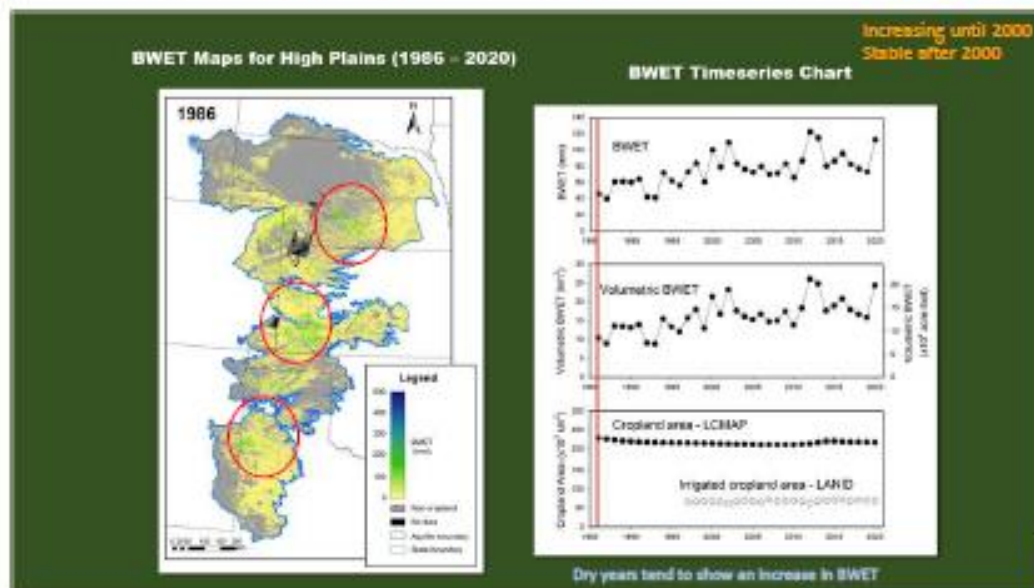
- High Spatial Detail
- Yearly
- Affordable

Missing = < 5 images per season with single satellite (L5)



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Yearly Blue Water ET over High Plains Croplands (No Yearly Withdrawal Data for High Plains)



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OpenET (OPENET)

Multi-agency collaboration among government, research institutions, universities, Google, and use case partners



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- OpenET uses best available science to provide easily accessible satellite-based evapotranspiration (ET) data for improved water management across the western United States.
- Field-scale data at daily, monthly, and annual time steps.
- Multiple satellite-driven models that are used to map ET and provide a single "ensemble ET" value that is calculated from those models for each location and timestep.



[OpenET – Filling the Biggest Gap in Water Data \(etdata.org\)](https://etdata.org/)

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OpenET: Reliable water use data

