A Progress Report on the Montana Mesonet and its Applications

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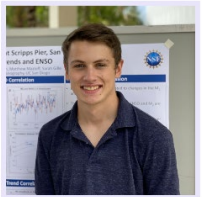

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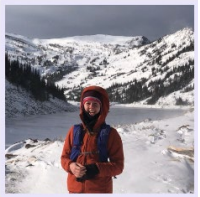

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NATIVE CLIMATE INTERN

Why install more weather and soil moisture stations in Montana?

Flood Prediction and Early Warning

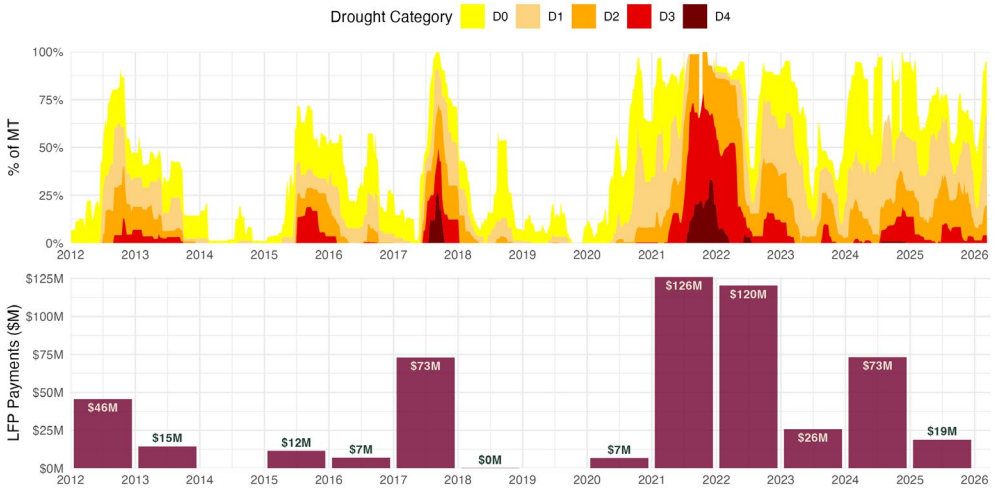
- Improved knowledge of precipitation and soil moisture conditions for modeling of flood potential
- Timing and amounts of reservoir releases to mitigate downstream flooding

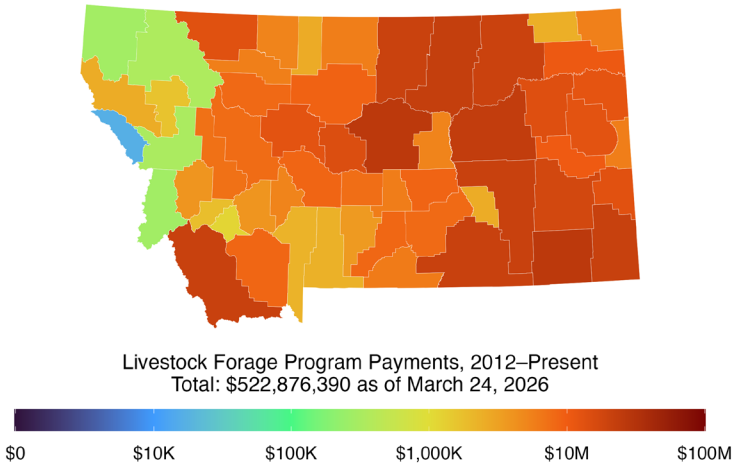
Drought Monitoring and Prediction

- Improved knowledge of water availability in agricultural, range, and forest settings
- Triggers state and federal emergency response
- Identified as critical by the 2023 MT Drought Management Plan

Infrastructure that forms the basis for additional measurements and tools - e.g. precision agriculture, fire weather, and natural resource management

A practical example of why valid data matter

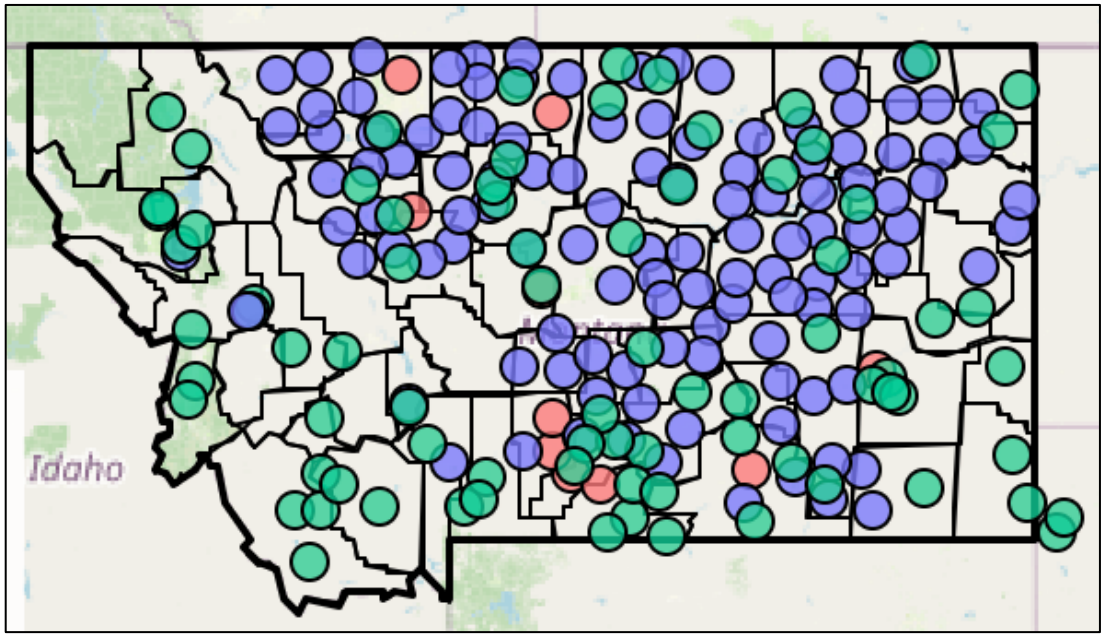




Livestock Forage Disaster Program alone has paid out $522,876,390 in MT since 2012

Ensuring the appropriate allocation of funds to support producers and rural communities across Montana

MT Mesonet - A Collaborative Framework



Agrimet Stations Hydromet Stations Both

220 stations

climate.umt.edu/mesonet

Federal, Tribal State, and Private Partnerships

- **Private landowners**
- **Tribal Nations** – Blackfeet, CSKT, Crow, Northern Cheyenne, Assiniboine and Sioux - Fort Peck, A'aninin Nakoda Fort Belknap, Little Shell Chippewa
- National Oceanographic and Atmospheric Administration (NOAA)
- United States Army Corps of Engineers
- DOI Bureau of Land Management
- USDA Forest Service
- MT Department of Agriculture
- Montana Department of Natural Resources and Conservation
- MSU Ag Research Centers
- Montana Assoc. Conservation Districts
- Montana Assoc. of Counties
- Montana Bureau of Mines and Geology
- Lolo Watershed Group
- Blackfoot Challenge
- Trout Unlimited
- National Drought Resilience Partnership

Expansion & Improvements to Drought Infrastructure

TOM BAUER, MISSOULIAN

Carly Andlauer, a University of Montana senior finishing up a bachelor's degree in ecology restoration, processes soil samples Thursday from across the state for a climate monitoring project. UM researchers recently received a $21 million government contract for the project to better monitor soil moisture, snowpack, weather hazards and climate conditions.

UM awarded $21M contract

Researchers given Army Corps contract to expand climate monitoring network

LAURA SCHEER
laura.scheer@missoulian.com

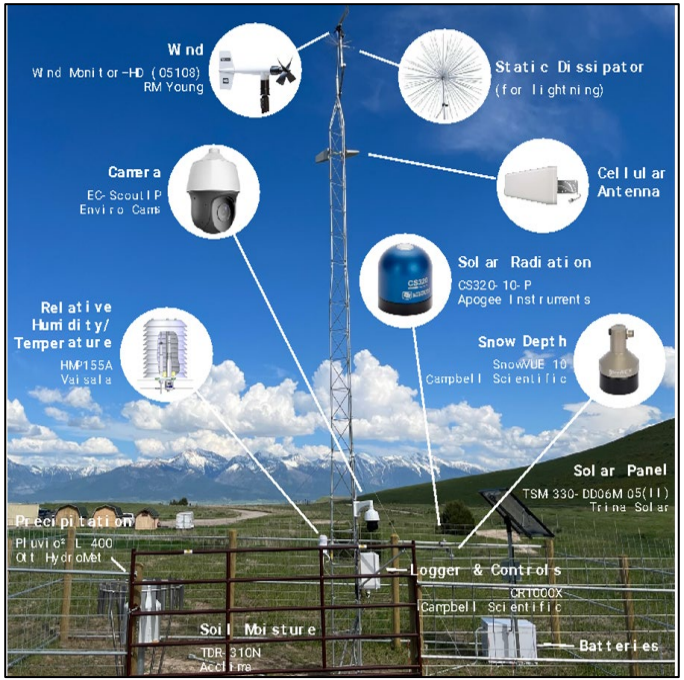
University of Montana researchers recently received a $21 million government contract, bringing more support and longevity to what has been a grassroots effort to build a better climate monitoring network across the state.

The funding from the U.S. Army Corps of Engineers will pay to expand and enhance a collaborative project spearheaded by UM's Montana Climate Office in 2016 that aims to fill in gaps in weather and soil moisture data throughout the state.

"This project is very unique," said Kelsey Jencso, a lead researcher and associate professor of watershed hydrology at UM. "This is a very applied project. It has a particular goal, which is to better monitor soil moisture, snowpack, weather hazards and climate conditions."

Through partnerships with government agencies, including the Montana Department of Agriculture and Bureau of Land Management, Montana State University, watershed groups, and private farmers and ranchers, the Montana Climate Office, part of the W.A. Franke College of Forestry and Conservation, has installed 80 weather stations

Please see CONTRACT, Page A3

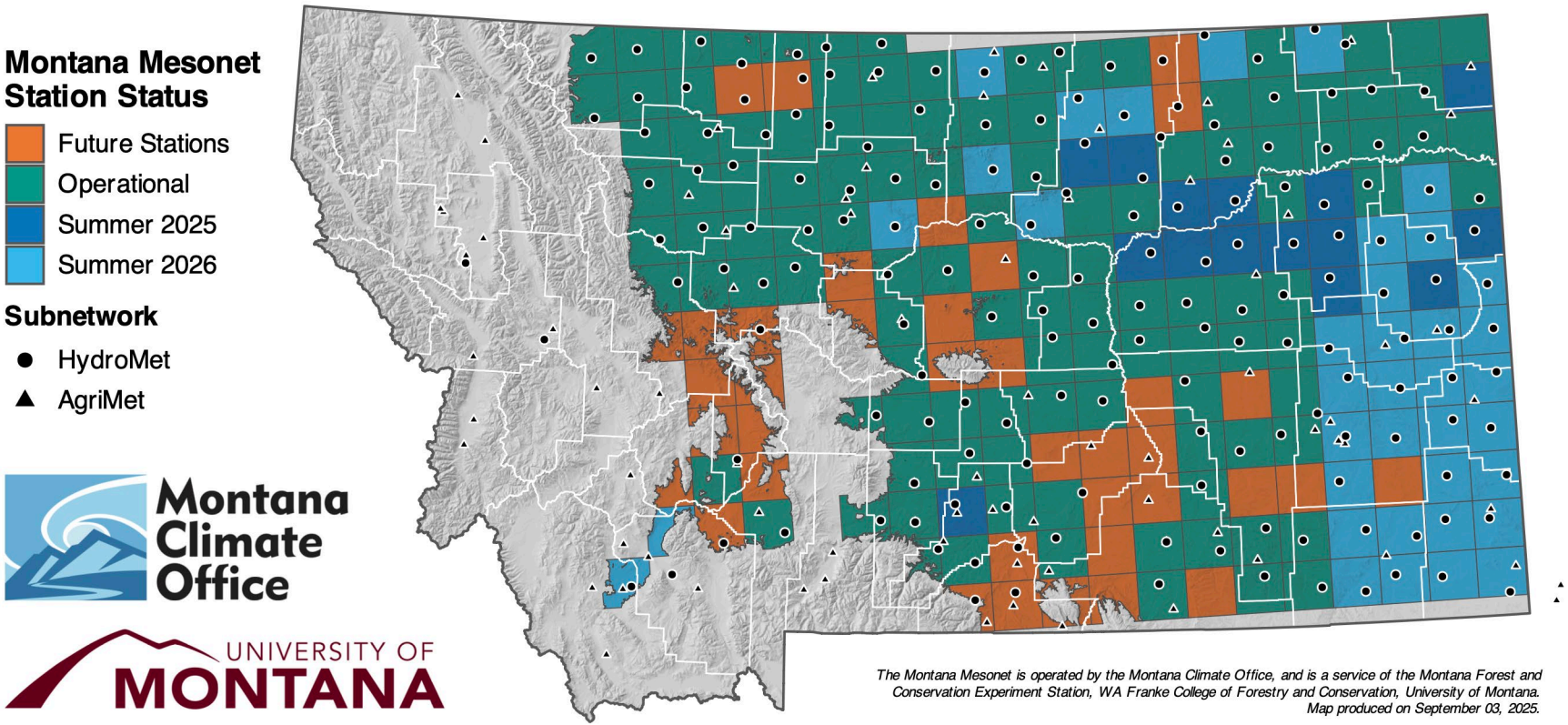


CSKT Bison Range Station

U.S. Army Corps

- S.4444 - Missouri River Basin Drought and Snowpack Monitoring Act
- Introduced by Senator Thune (SD) with bi-partisan support
- Upper Missouri River Basin and elevations below 5,500 feet
- 205 more stations in MT and 500 total across the five-state region.

This Year's Mesonet Construction

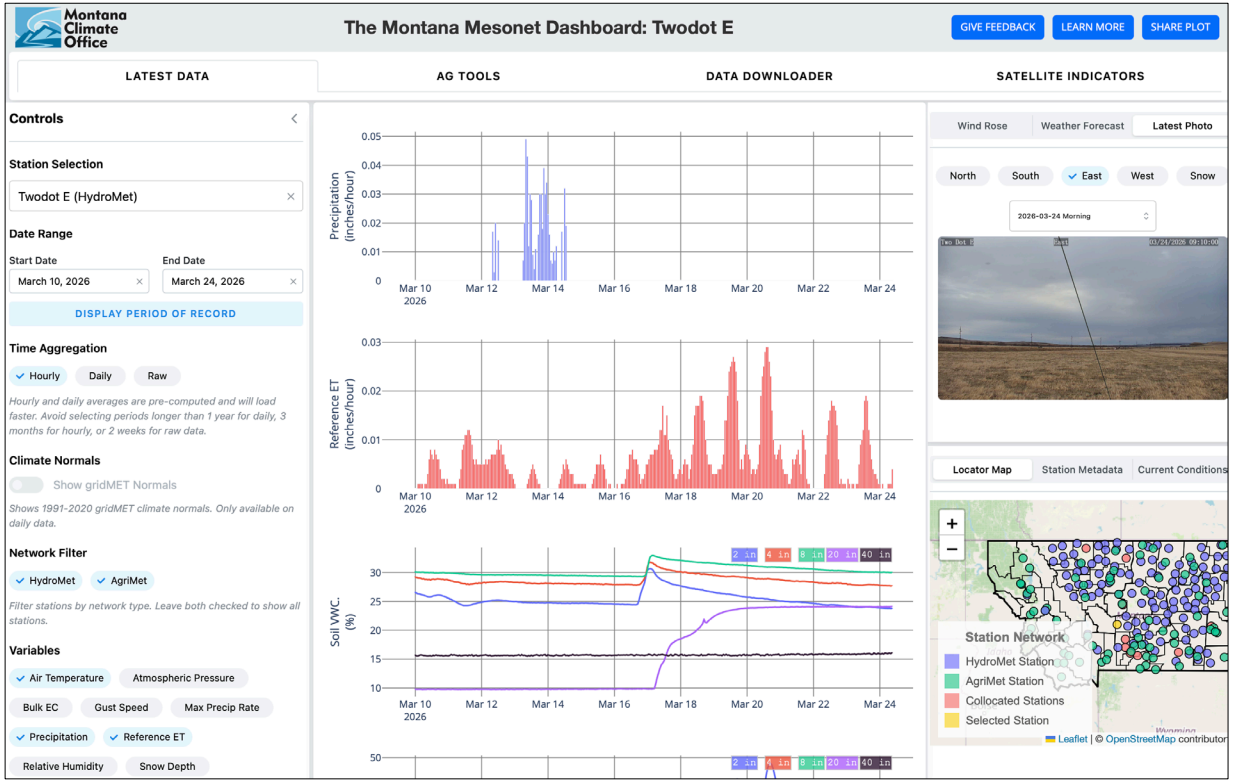


Montana Climate Office

UNIVERSITY OF MONTANA

The Montana Mesonet is operated by the Montana Climate Office, and is a service of the Montana Forest and Conservation Experiment Station, WA Franke College of Forestry and Conservation, University of Montana.
Map produced on September 03, 2025.

Mesonet Data Availability

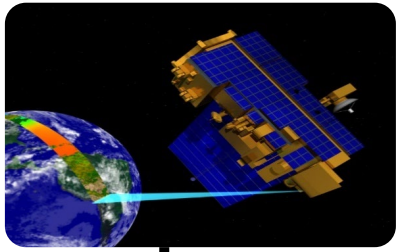


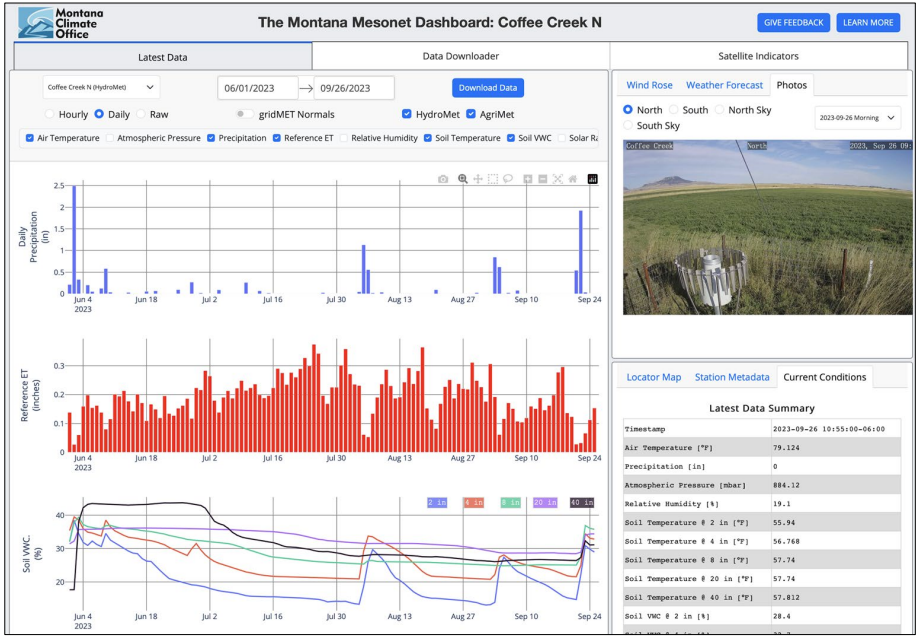
- Publicly available
- Map based and graphical summaries
- Updated every 5 minutes
- **Data used by NOAA WFOs, River Forecast Centers, and USACE for operational weather forecasting, flood prediction, and reservoir management**

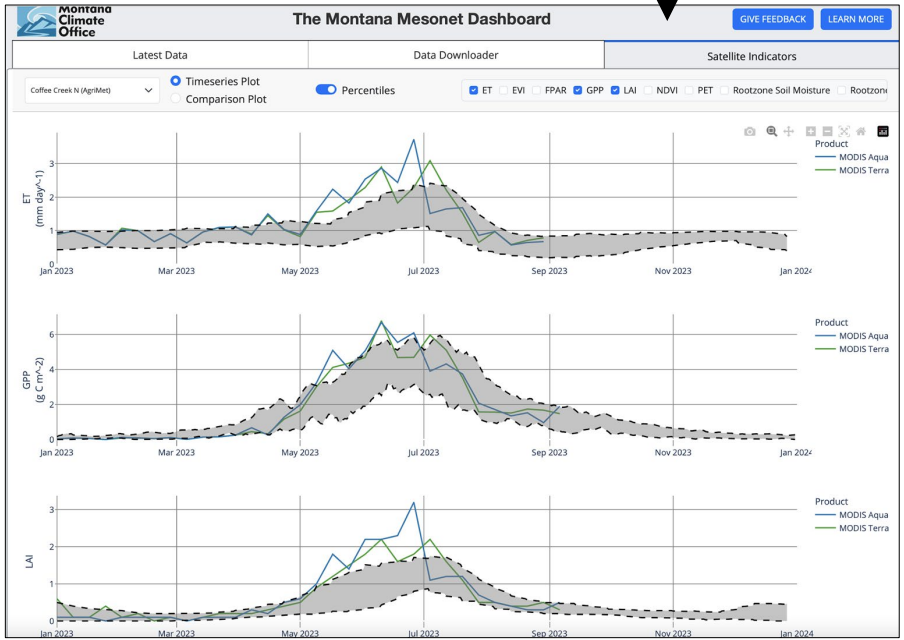
Colin Brust
mesonet.climate.umt.edu/dash

NATIONAL MESONET Program Partner

Mesonet Data – Operational Agriculture & Rangeland Tools to Enhance On Farm Savings

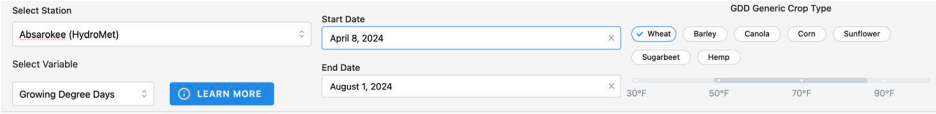




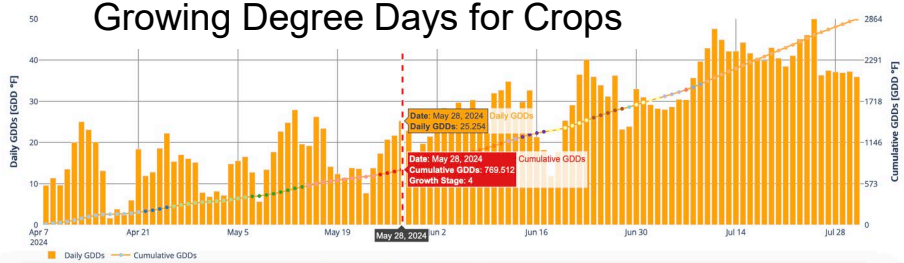


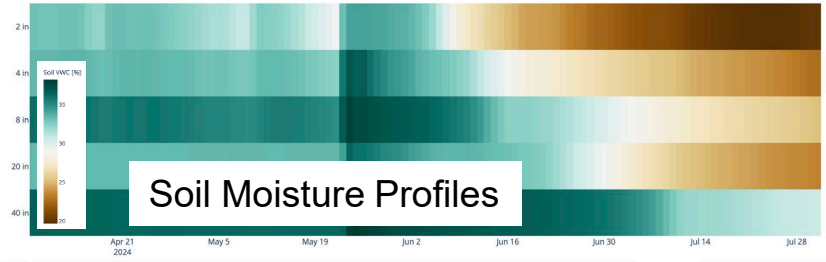
Tureck Ranch – Denton, MT

Mesonet Data – Precision Agriculture & Rangeland Tools to Enhance on Farm Savings



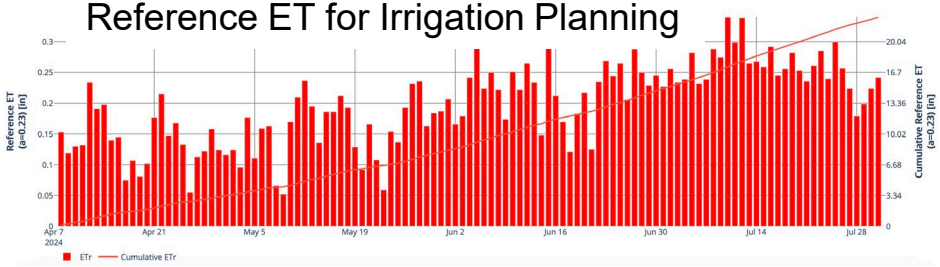
Growing Degree Days for Crops



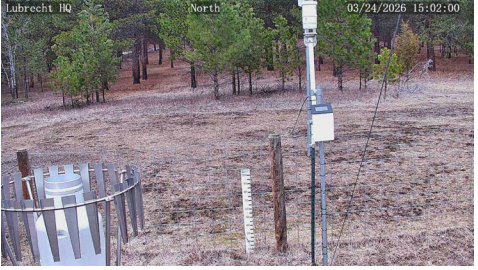


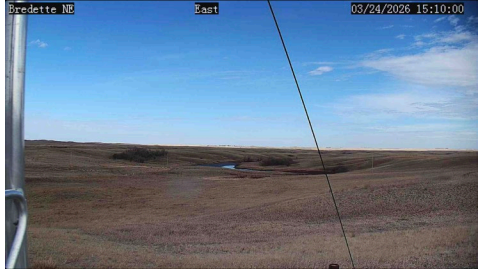
Soil Moisture Profiles

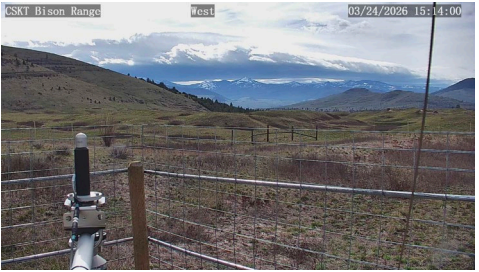
Reference ET for Irrigation Planning

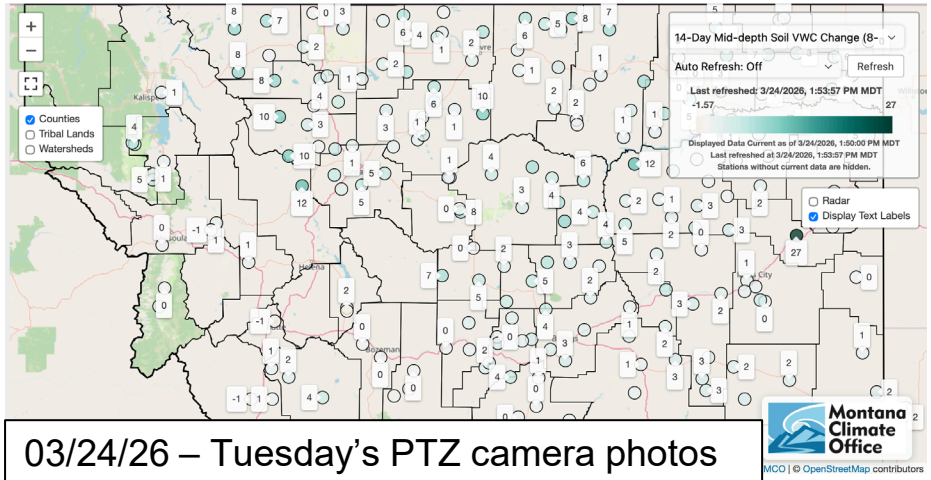


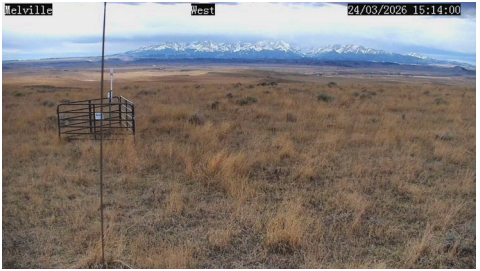
Plant Available Water







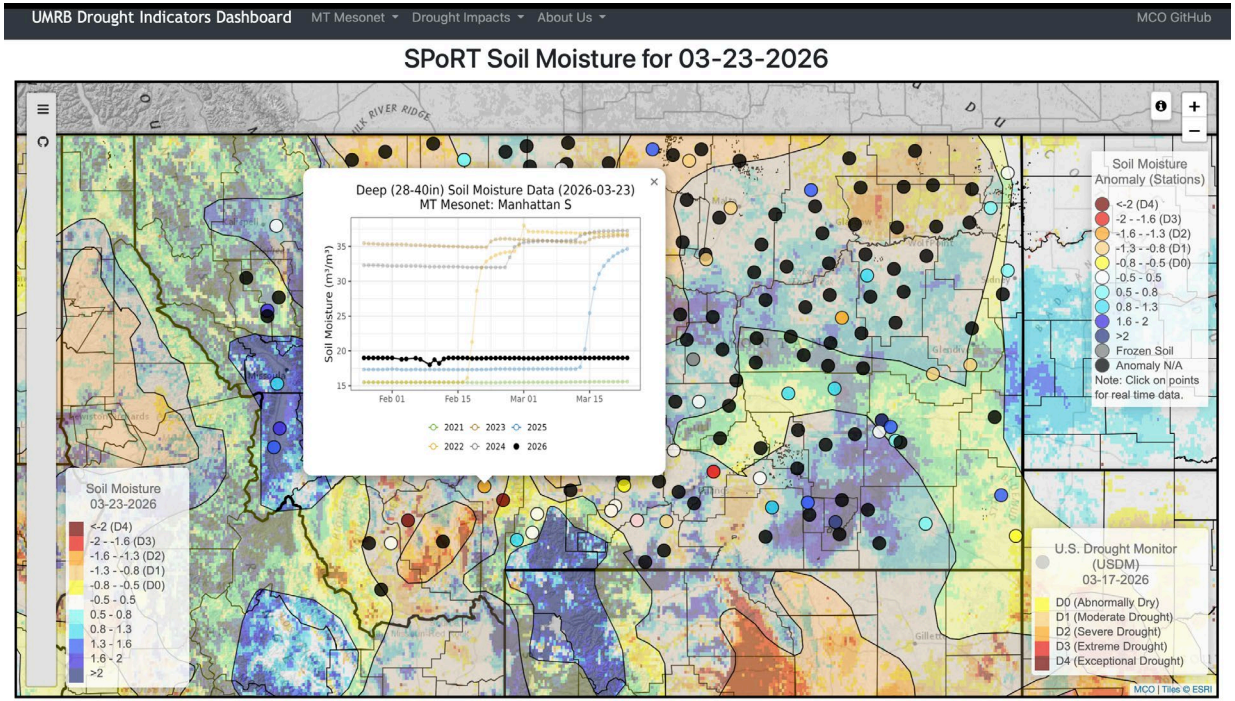




03/24/26 – Tuesday's PTZ camera photos
https://mesonet.climate.umt.edu/photos

How does the state **look** in terms of drought or weather?

Better characterizations of drought & water supply conditions

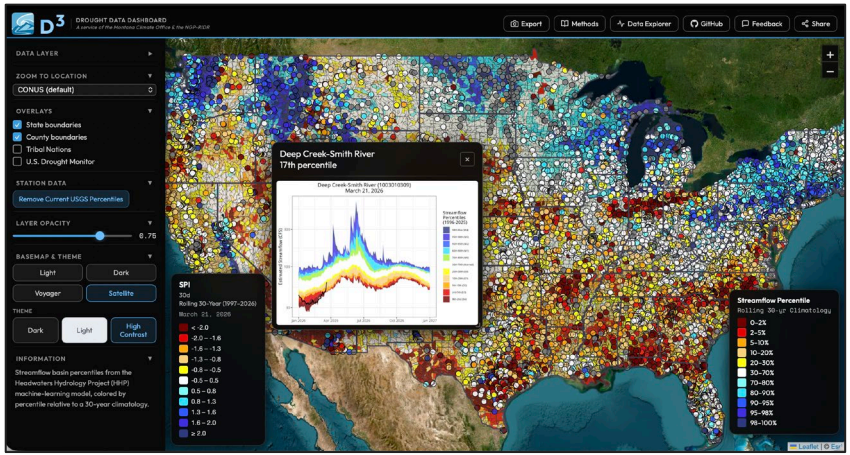


drought.climate.umt.edu

The Montana Drought Dashboard

- Daily modeling of precipitation, temperature, snow, soil moisture, evapotranspiration and drought models across Montana
- Science based tool for drought mapping by the state of Montana and for weekly evidence-based reporting to the USDM
- **Recommended as priority for funding in the 2023 Drought Management Plan ~$90,000 per year**

Montana as an Incubator for the Nation – NSF Regional Incubator in Drought Resiliency (RIDR)



Article | Open access | Published: 17 May 2022

Drought assessment has been outpaced by climate change: empirical arguments for a paradigm shift

Zachary H. Hoylman ✉, R. Kyle Bocinsky & Kelsey G. Jencso

Nature Communications **13**, Article number: 2715 (2022) | Cite this article

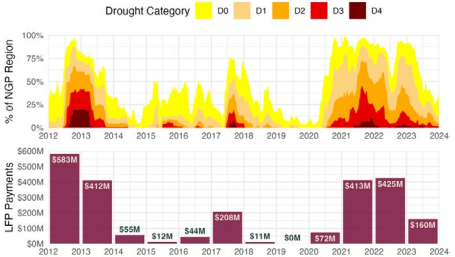
- Expand the MT Dashboard across the nation to provide a more unified ‘total water’ monitoring platform
- Operationalize ML- driven soil moisture, groundwater, snowpack and streamflow predictions (Senator Sheehy – CJS)
- Integrate observations from federal networks (e.g., NOAA, SNOTEL, USGS)
- Create flexible cyber infrastructure for other states, tribes, and private sector to add valued local information (e.g., Mesonets) in partnership with NOAA NIDIS

U.S. National Science Foundation
Award 2519681

Mesonet Investments and Funding Gaps

Summary

1. Our unique geography contributes to spatial differences in where, how often and how fast weather events impact livelihoods and our economy – and it's a big state
2. Accurate monitoring is critical to informing our daily to seasonal responses
3. The maintenance of the Mesonet and Drought Dashboard are critical to the accurate allocation of hundreds of millions of dollars for food system security, protection of livelihoods, and infrastructure security.



Activation of Federal Programs


Drought Early Warning


Fire Weather


Flood Prediction & Water Management

Questions?

Montana Climate Office

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Web Resources:

MCO Web Page: https://climate.umt.edu

Drought Tracker: https://drought.climate.umt.edu

Montana Mesonet: https://climate.umt.edu/mesonet

Climate Data Explorer: https://mco.cfc.umt.edu/datasets