

Montana Mesonet



Resilience – Adaptation – Prediction

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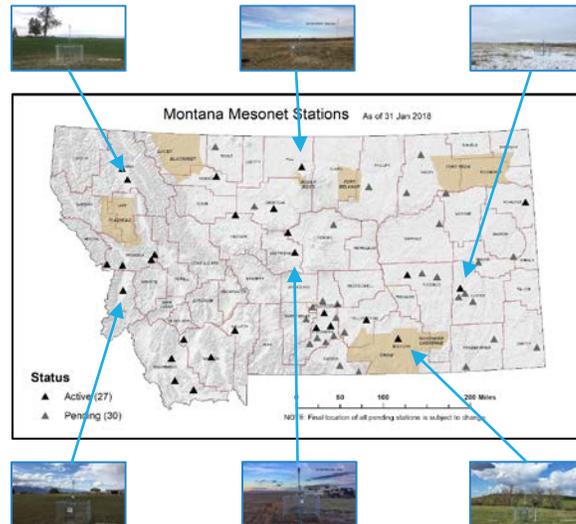
Montana Mesonet

Cooperative, partner-driven, climate observation system

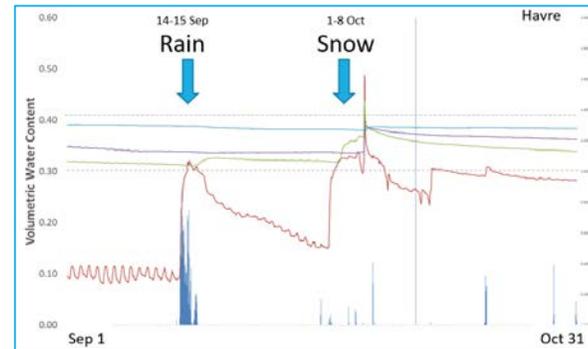
Stations



Network

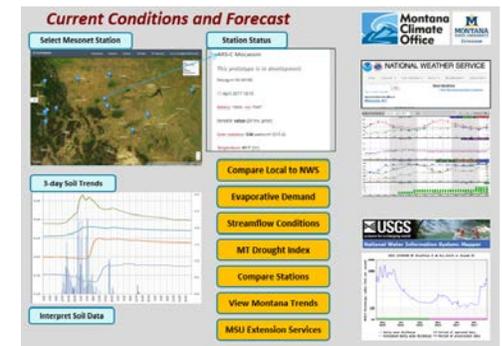


Data



Derivatives
Integration
Analysis

Tools



Weather reports
Crop water demand
Irrigation management

*Education: Co-development to meet partner needs
Local solutions for Montana's needs*

Montana Mesonet



High Density Monitoring: *Because climate in Montana varies widely*



Montana Mesonet

Mesonet Status

- 27 Active
- 30+ Funded

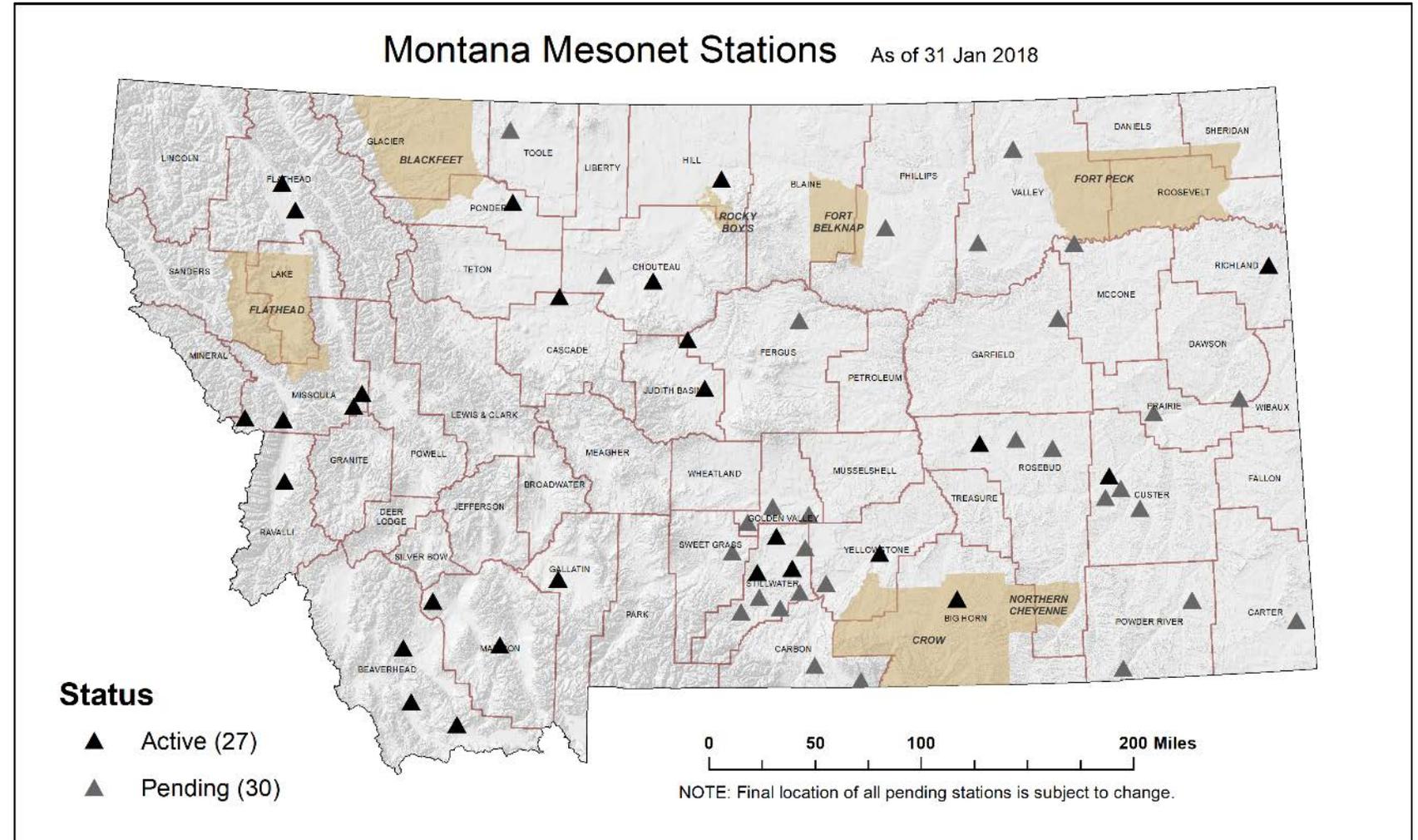
2016 – 12

2017 – 26

2018 – 56

2019

Goal: 150+
each Landtype
each County
each Reservation
each Watershed



Climate – Soil – Vegetation



Atmosphere

- *Rainfall*
- *Solar intensity*
- *Wind*
- *Temperature*
- *Relative humidity*
- *Barometric Pressure*
- *Lightening strikes*

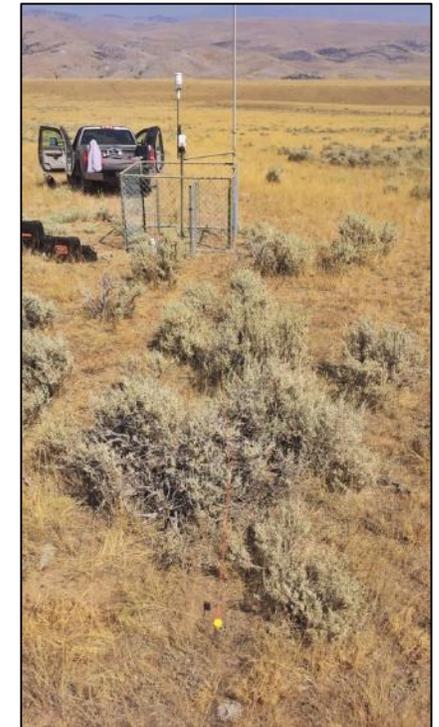


Soil

- *Water content*
- *Temperature*
- *Electrical conductivity*
- *Four depths*
 - *2" 8" 20" 36"*
 - *NRCS Standards*

Vegetation

- *NDVI: Relative greenness*



Near Real-time 30-min Reporting

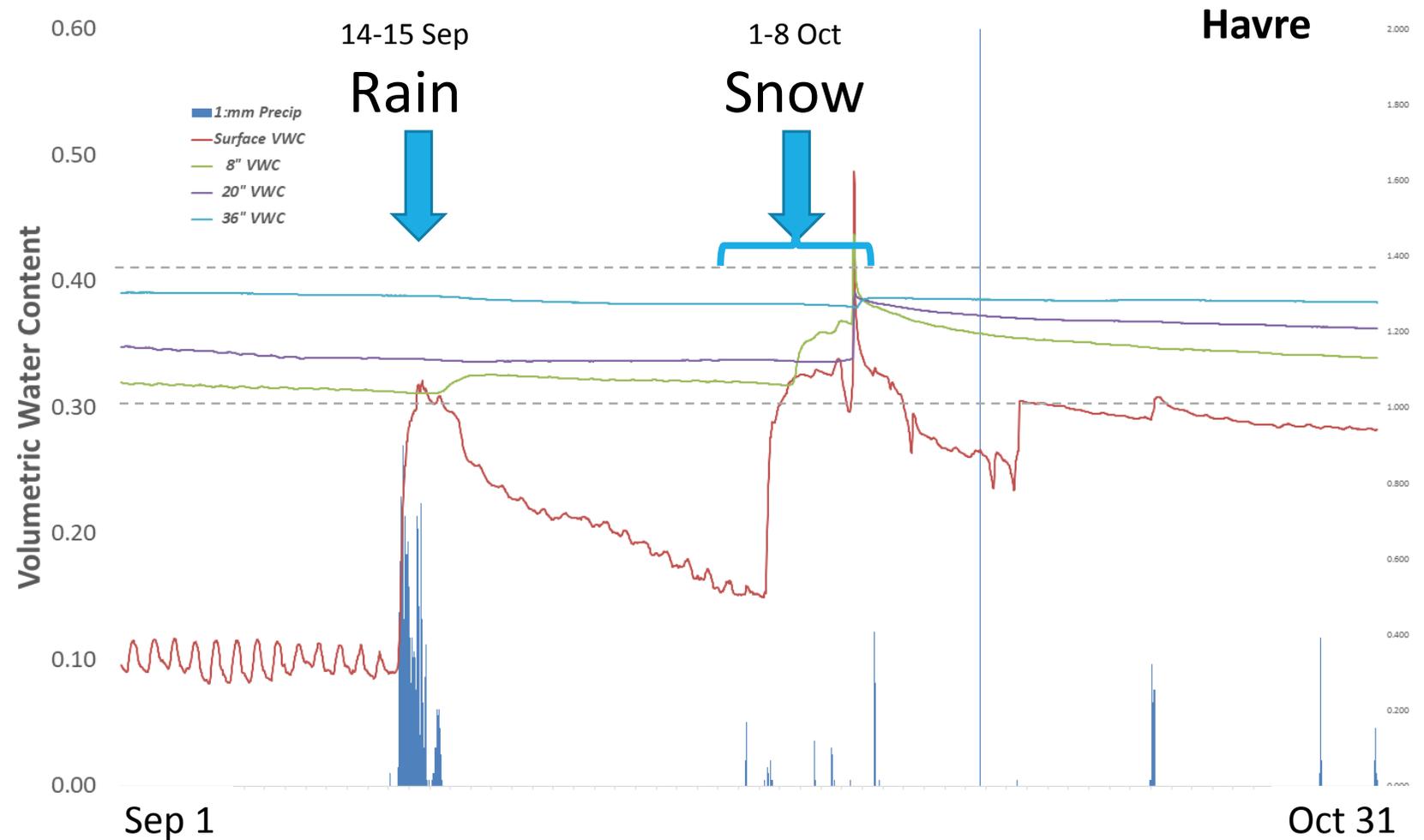
Data Analysis Soil Water Response

Did fall precipitation relieve soil drought?

Surface layer wetted
+0.18 VWC

~ No change in deeper soil
water storage

***How to interpret and
use soil moisture data***



Applications

Co-development – Build to Partner Needs

Current Weather:

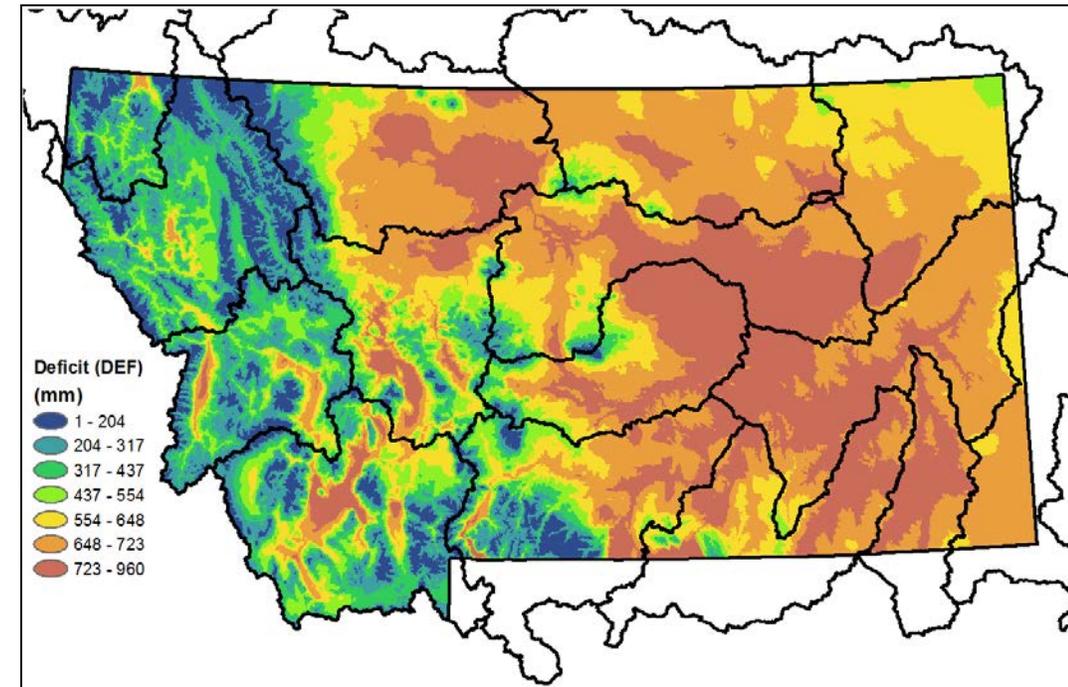
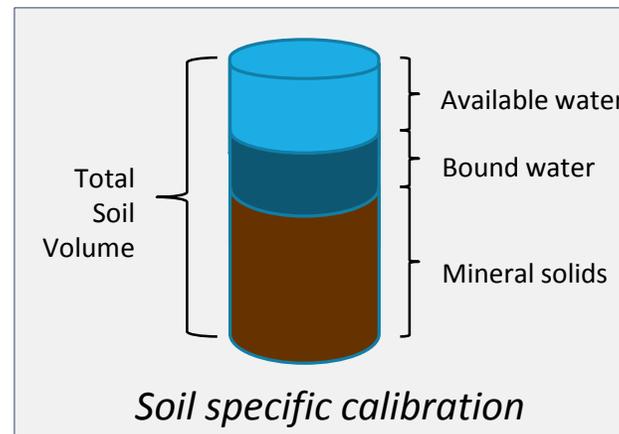
- Temp, wind, RH...
- Wind chill
- Dew/Frost point
- Cumulative rainfall
- Soil moisture/Temp
- Incoming solar

Derivatives Tools

- Wilting point
- Cattle comfort index
- Crop specific water needs
- Irrigation management
- Forage production
- Drought Early Warning

Weather/Soil Derivatives:

- Evapotranspiration (ET)
- Reference ET
- Water demand deficit
- Plant available water



Statewide data → Local decisions

Web-based Tools

How to best deliver data?

Current web interface

ARS-C Mocassin

This prototype is in development.

Decagon 06-00186

11 April 2017 10:15

Battery: 100% *mv:* 7047

Variable: *value* (24 hrs. prior)

Solar radiation: 538 watts/m² (515.0)

Temperature: 41°F (31)

Dew Point: 22°F (11)

Relative Humidity: 39% (95)

Wind Speed: 9.7 mph (8.7)

Wind Direction: 280° (165)

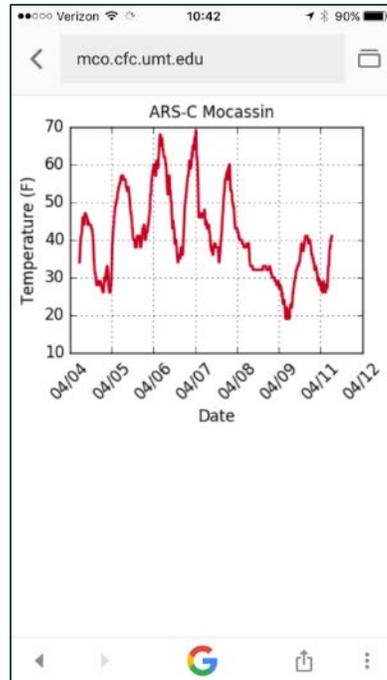
Wind Gust: 16.9 mph (15.0)

Precipitation: 0.0 in. (0.0)

Precipitation (24-hour total): NA in.

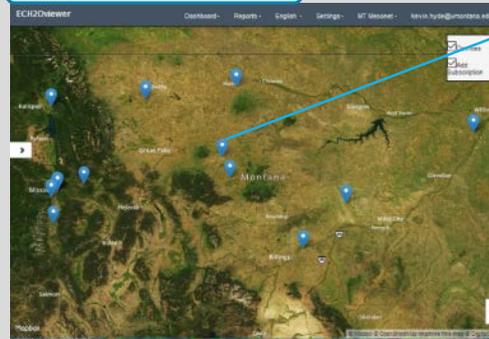
Barometric Pressure: 25.76 in. (25.72)

Lightening strikes: 0 (0) *distance:* 0 km (0)



Current Conditions and Forecast

Select Mesonet Station



Station Status

ARS-C Mocassin

This prototype is in development.

Decagon 06-00186

11 April 2017 10:15

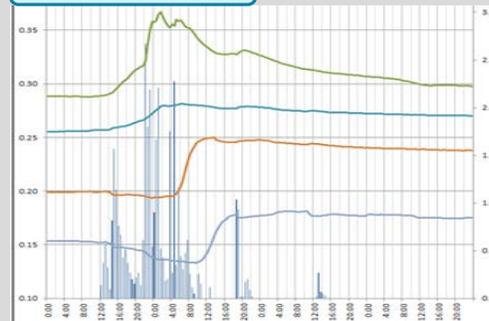
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3-day Soil Trends



Interpret Soil Data

Compare Local to NWS

Evaporative Demand

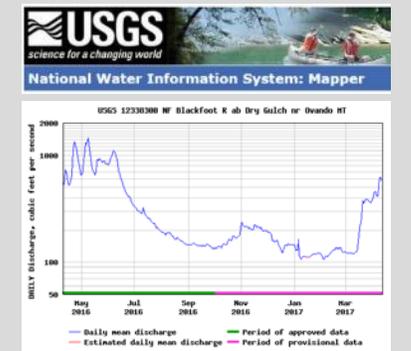
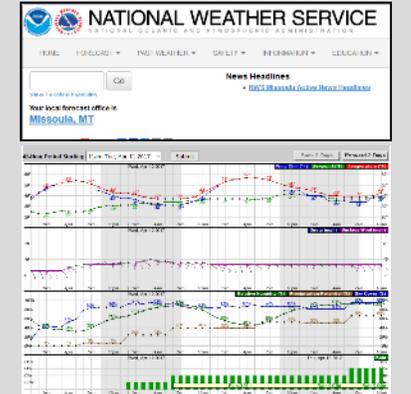
Streamflow Conditions

MT Drought Index

Compare Stations

View Montana Trends

MSU Extension Services



Growing with Partnerships

Active Partnerships

- Bureau of Land Management
- Montana Institute on Ecosystems
- Private Ranches and Farms through MSU
- MSU Agricultural Extension Service
- MT Dept. Natural Resources & Conservation
- The Blackfoot Challenge
- National Weather Service
- Crow Tribe of Montana
- NOAA: National Mesonet System
- National Forest Service
- Stillwater County
- Governor's Drought Committee
- Montana Bureau of Mines and Geology
- Montana Space Grant Consortium
- National Integrated Drought Information System
- MSU Agricultural Research Centers
- USDA Agricultural Research Service

Building and Sustaining a Shared Resource



Upcoming Outreach

Rising Voices

**Collaborative Science with
Indigenous Knowledge for Climate Solutions**

11-13 APRIL, 2018
Duluth, MN

MSU Extension Annual Update Meeting

Climate Adaptation Outreach and Education

22-24 MAY, 2018
Hamilton, MT

MOISST Workshop 2018: National Soil Moisture Network

From Soil Moisture Observations to Actionable Decisions

4-7 JUNE, 2018
Duluth, MN

Measurement, Interpretation, and Application of Soil Moisture Data

Integrating Technologies from Field to Space

NOVEMBER 2018
Lubrecht State Forest and Columbus, MT





Montana Climate Office

climate.umt.edu