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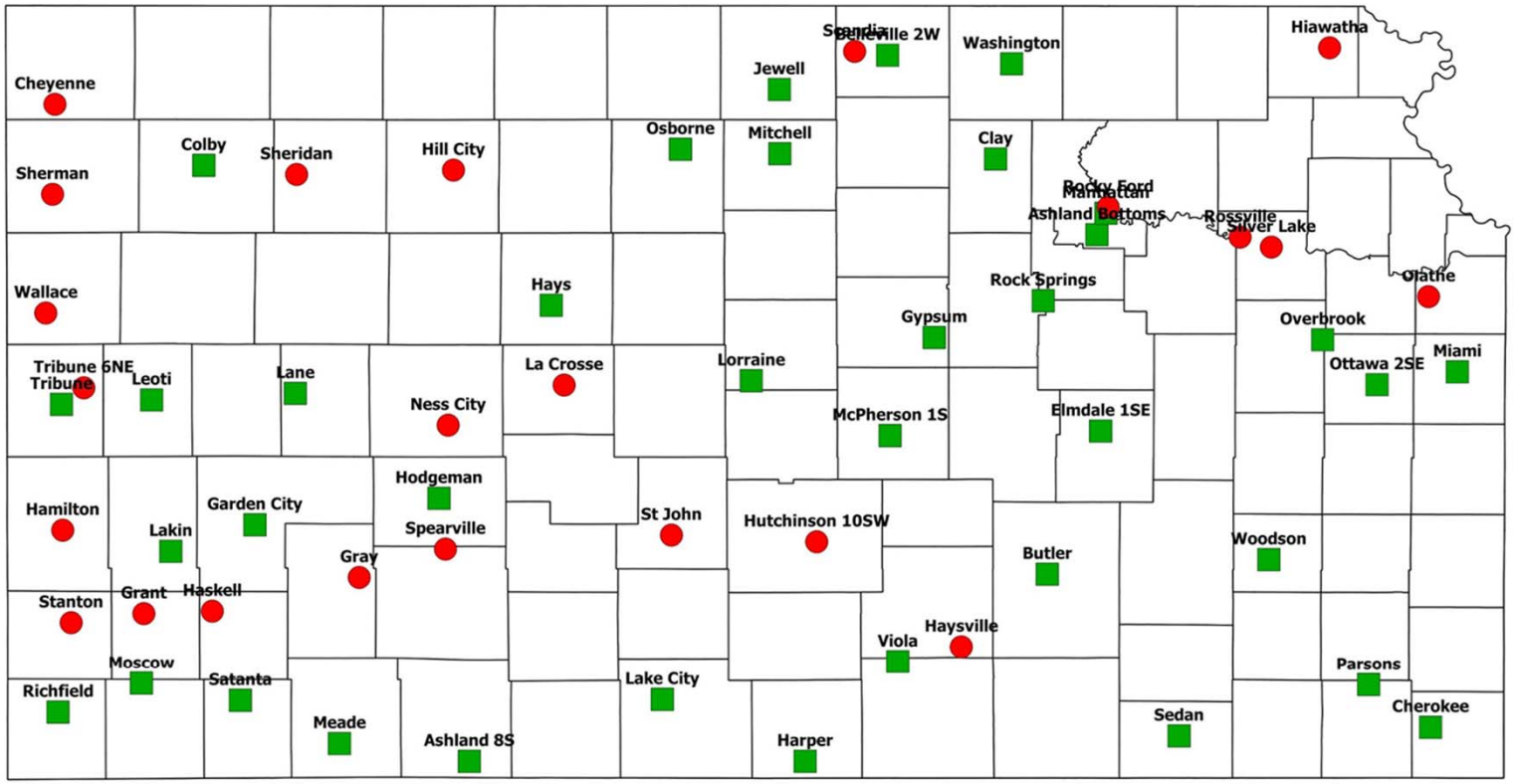
Drought monitoring with soil moisture

11/14/18

Chip Redmond - Mesonet Manager
Andres Patrignani - Assistant Professor
Mary Knapp - Assistant Climatologist

2018 K-State Kansas Mesonet (8/8/2018)



Station Type
- 10ft Tripod
- 30' Tower

0 50 100 miles

North

Kansas State University Weather Data Llibrary (WDL) Weather Station Mesonet
As of: 8/8/2018
Created by: Christopher Redmond - WDL Manager
christopherredmond@k-state.edu
785-532-3029/785-477-6204
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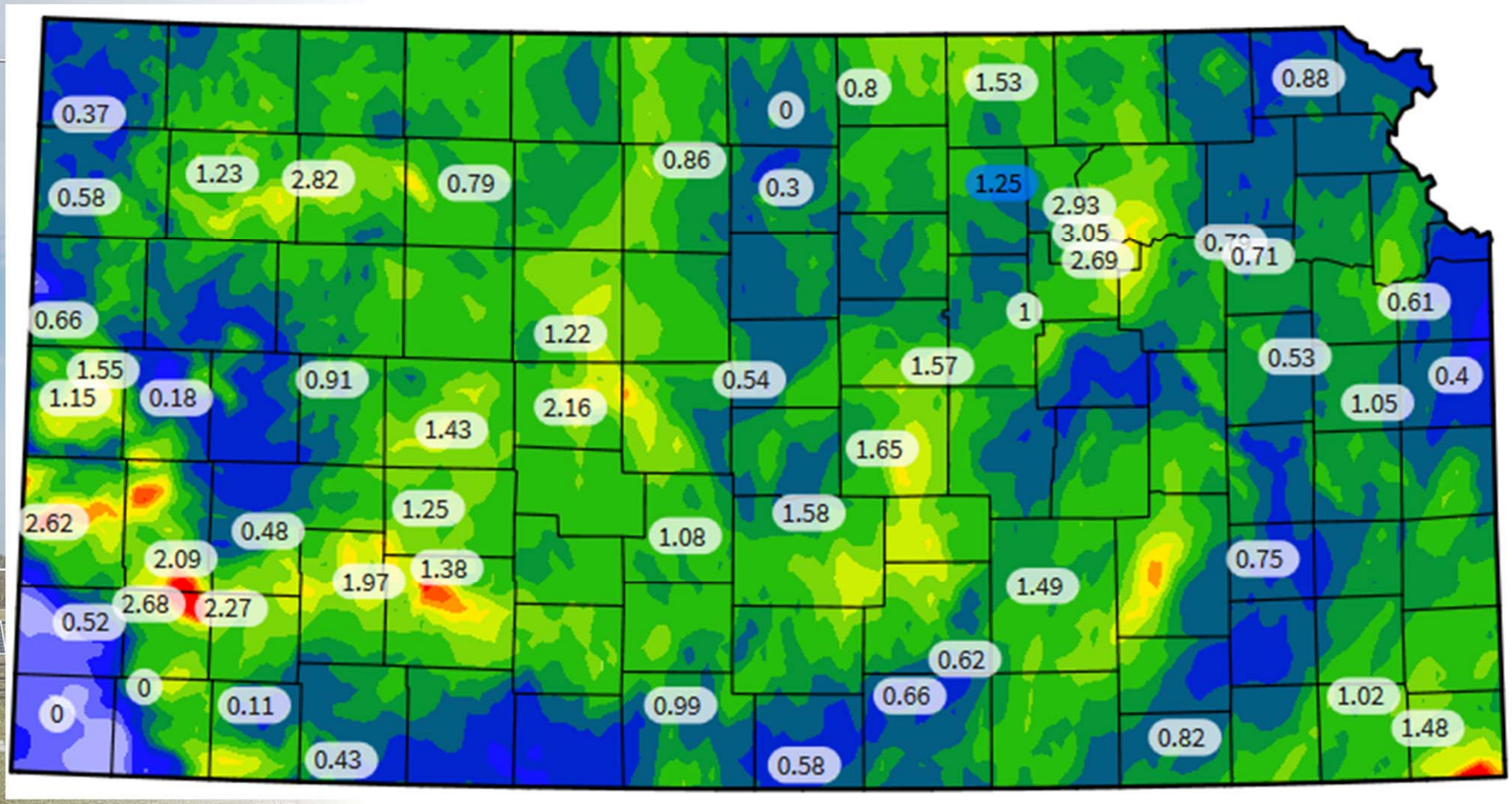

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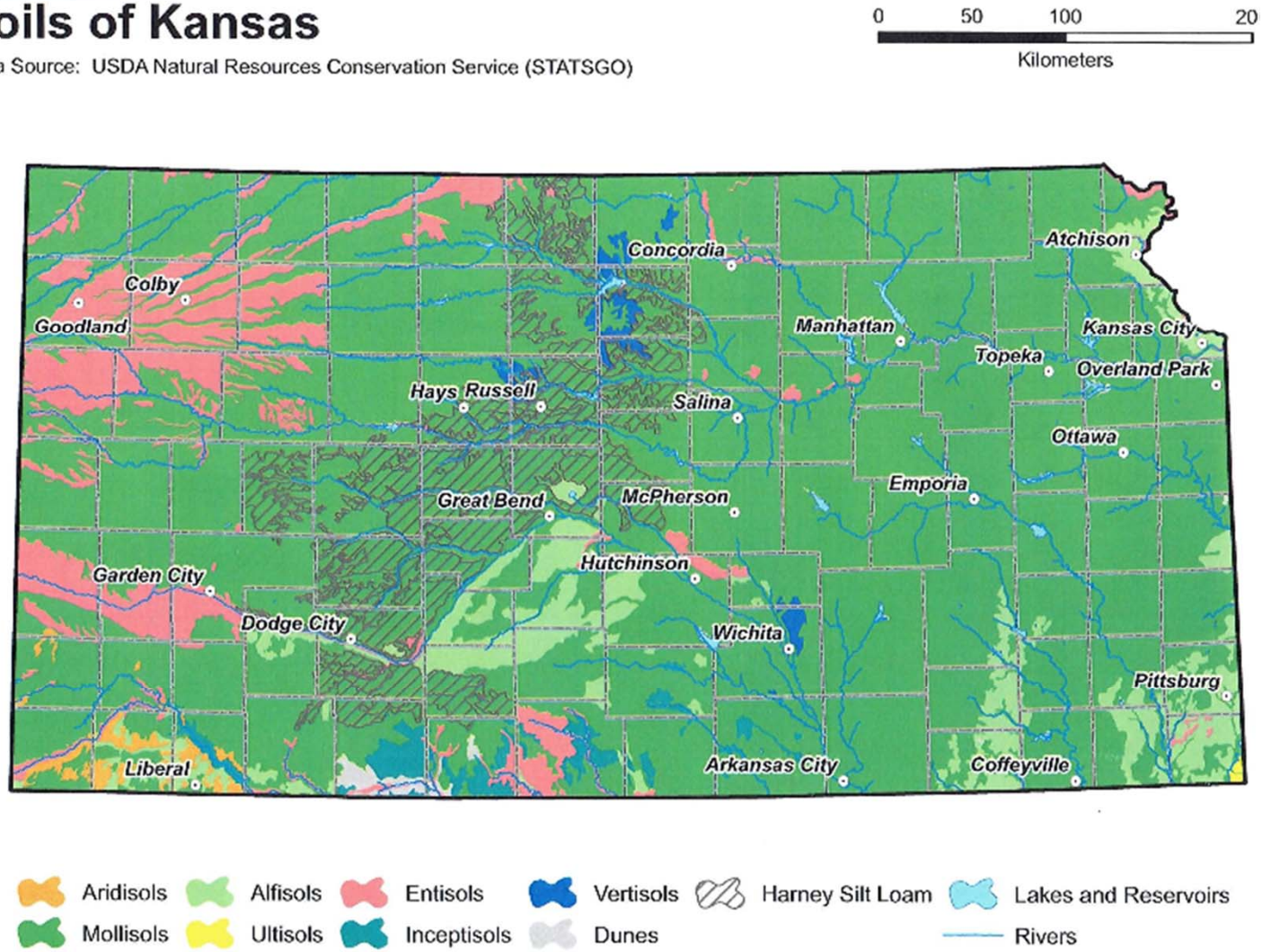
Soils of Kansas

Data Source: USDA Natural Resources Conservation Service (STATSGO)



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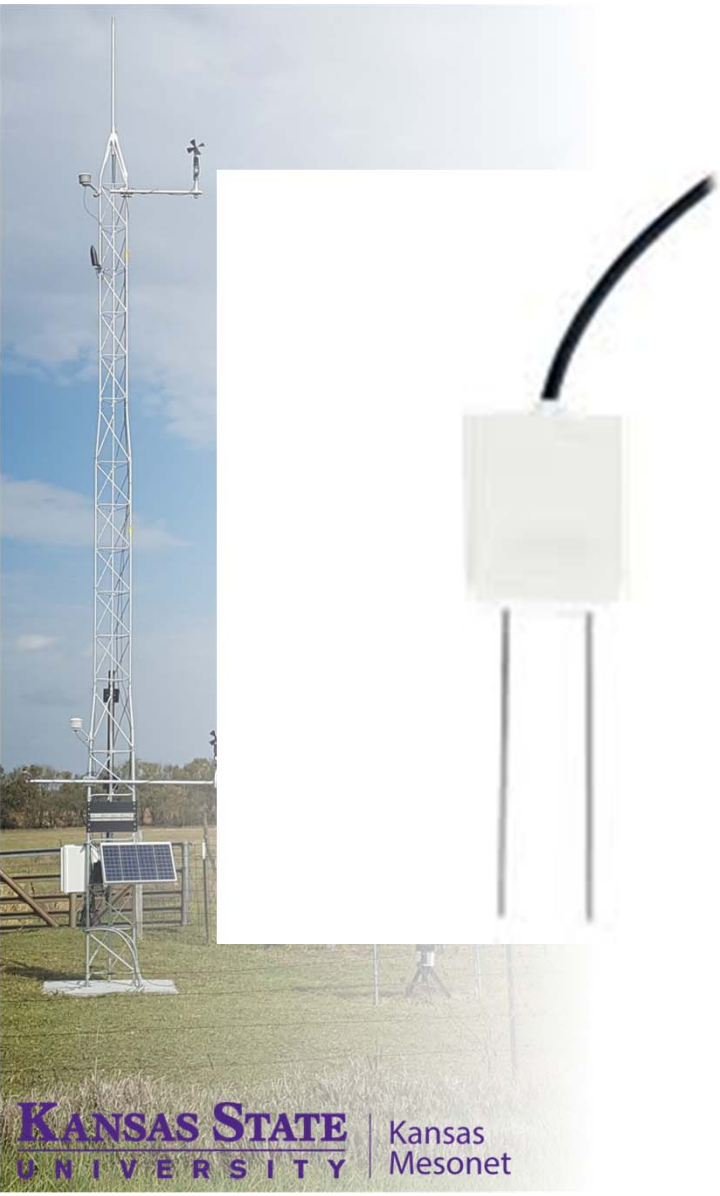

CS655 TDR

Depths

- 5 cm (2 inches)
- 10 cm (4 inches)
- 20 cm (8 inches)
- 50 cm (20 inches)

Measures:

- Soil electrical conductivity
- Relative dielectric permittivity
- Volumetric water content
- Soil temperature

Standardization

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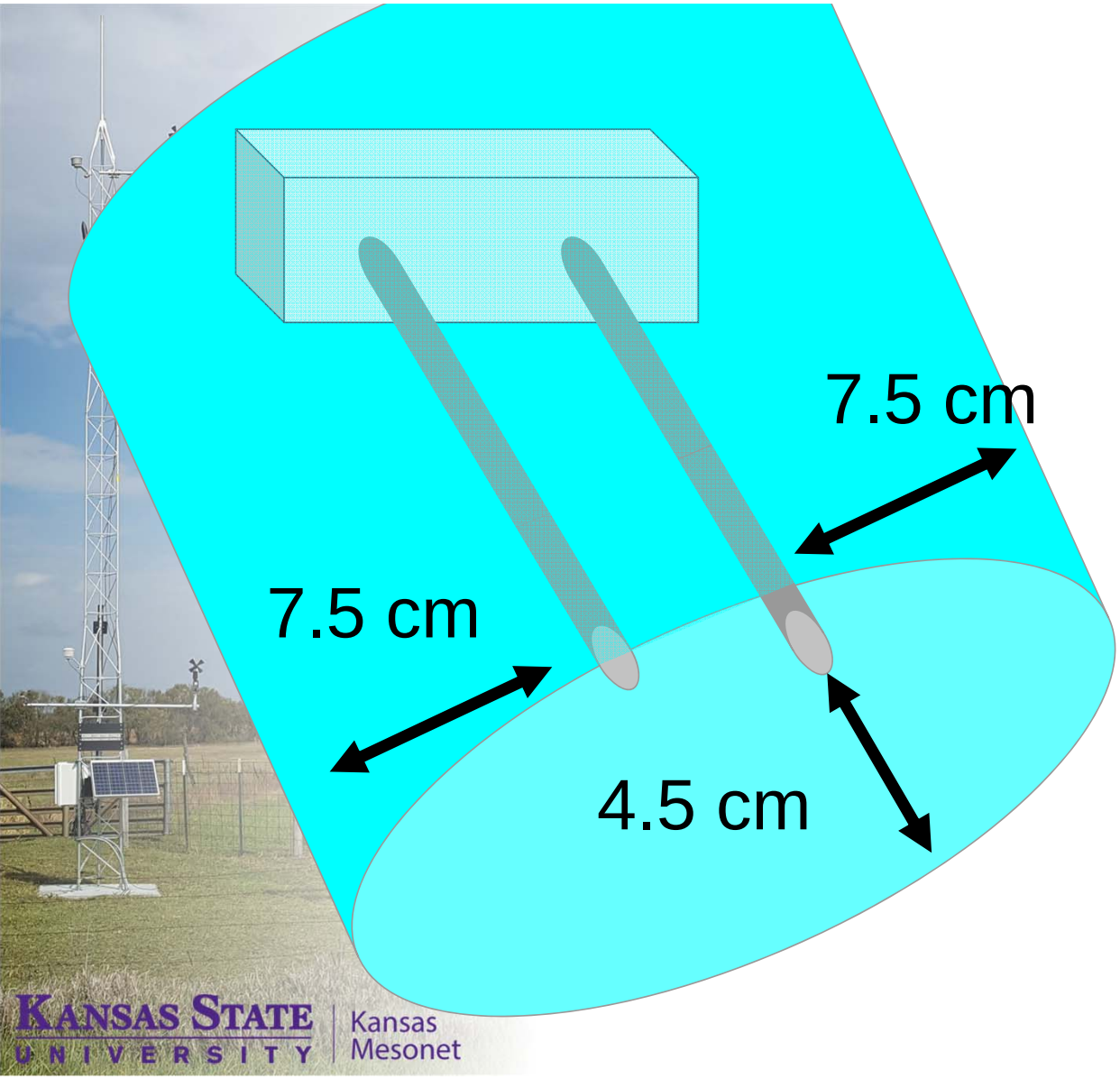
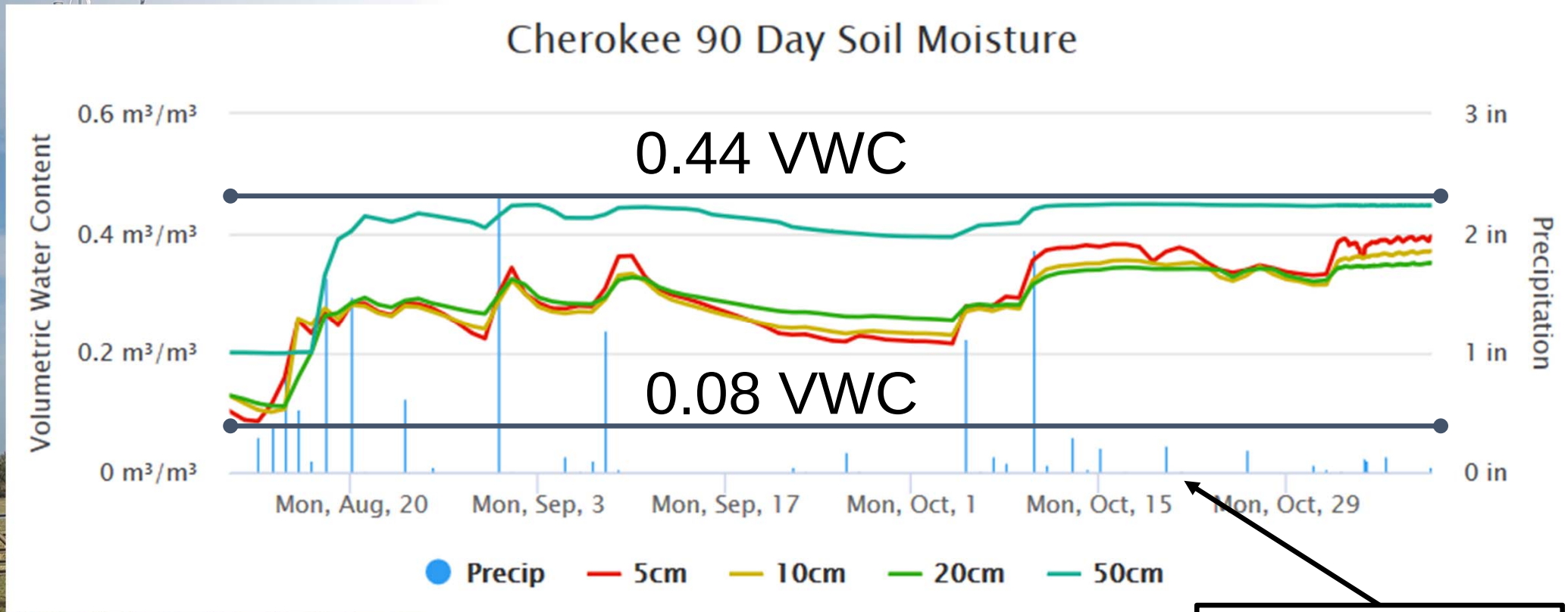


Approximate Volume Measured:

$3600\ cm^3$

$220\ inches^3$



Precipitation

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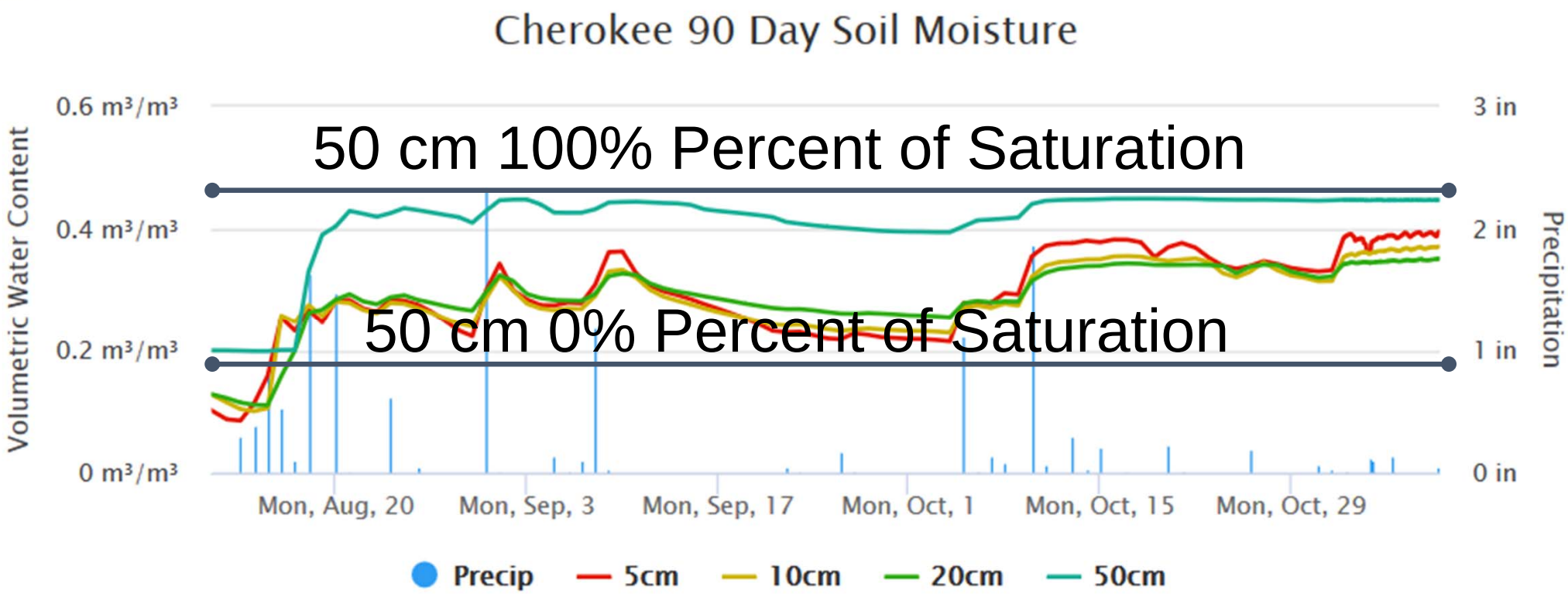

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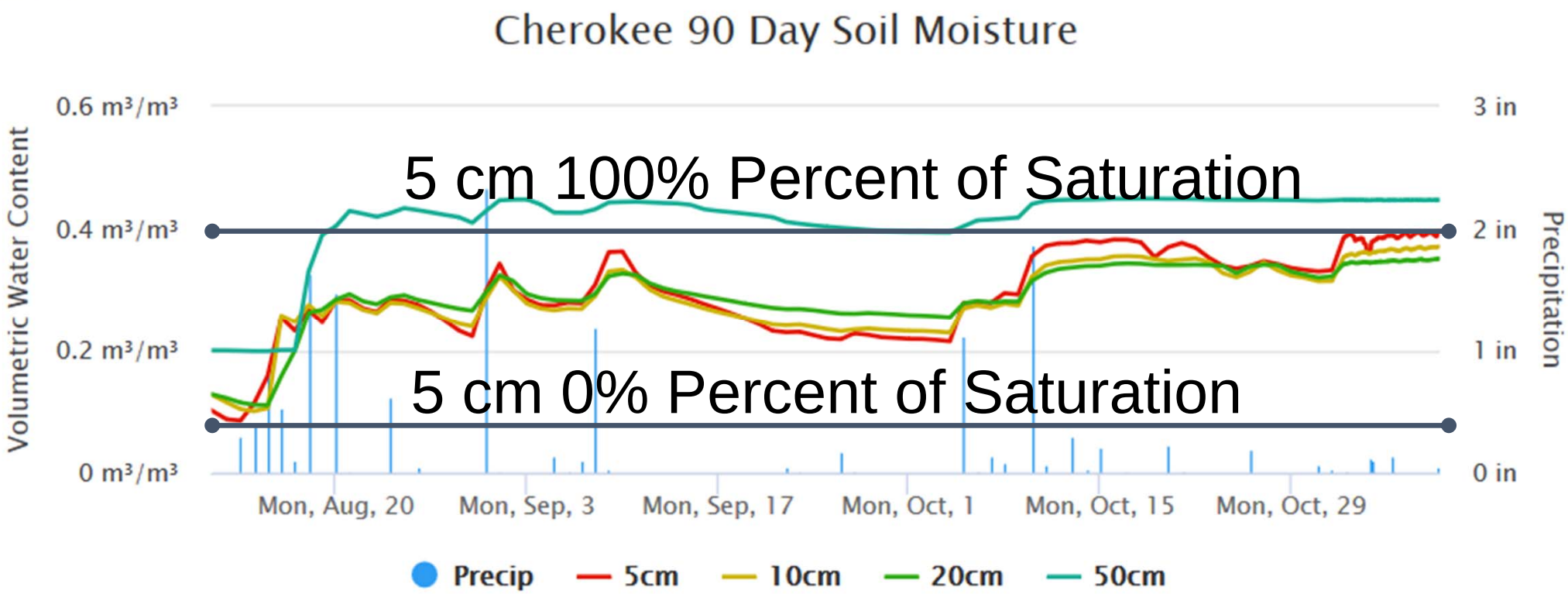

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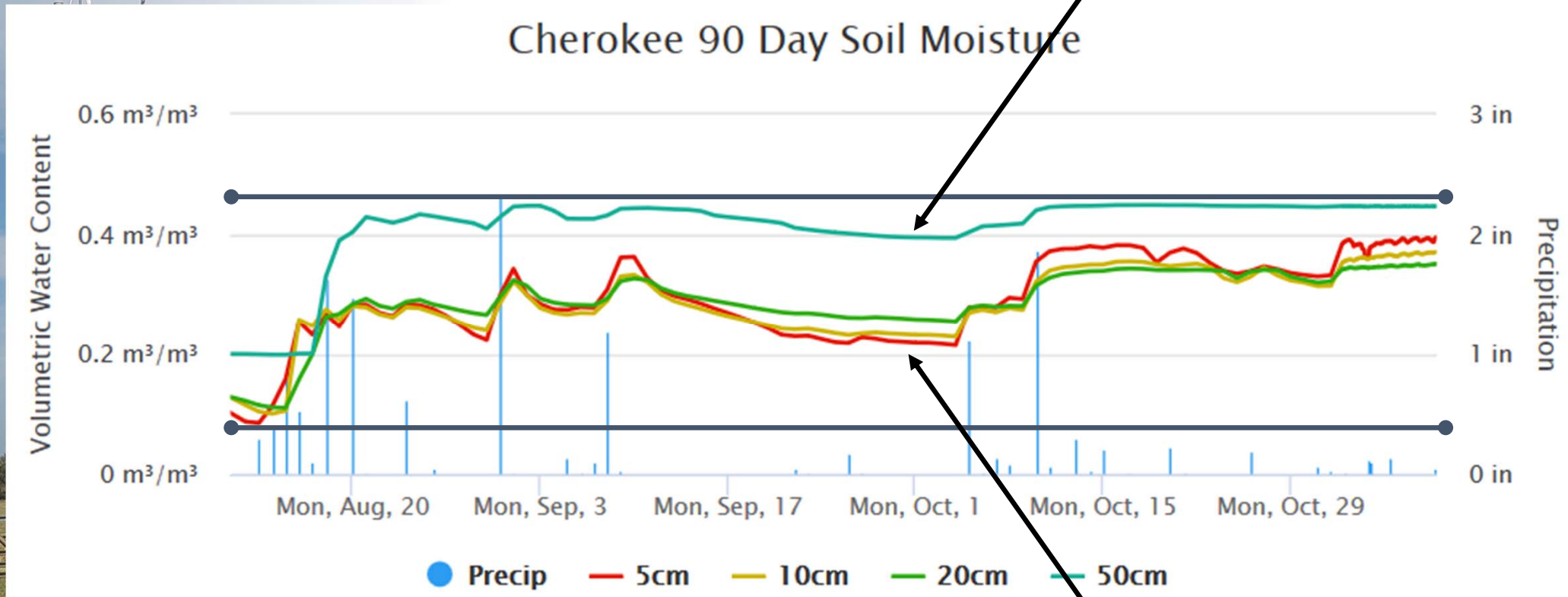
50 cm is 80% Percent of Saturation



5 cm is 40% Percent of Saturation

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Hodgeman

Station Metadata

5 cm Wet

Percent of Saturation 69%

Vol. Water Content 0.22 m^3/m^3

10 cm Wet, getting drier

Percent of Saturation 72%

Vol. Water Content 0.26 m^3/m^3

20 cm Wet

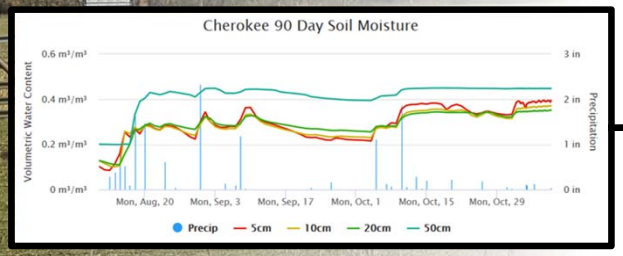
Percent of Saturation 78%

Vol. Water Content 0.32 m^3/m^3

50 cm Wet

Percent of Saturation 90%

Vol. Water Content 0.43 m^3/m^3



mesonet.k-state.edu/agriculture/soilmoist/ 90% 20 cm to inche

Soil Moisture

Manhattan

Station Metadata

5 cm Wet

Percent of Saturation 84%

Vol. Water Content 0.31 m^3/m^3

10 cm Wet

Percent of Saturation 92%

Vol. Water Content 0.33 m^3/m^3

20 cm Wet

Percent of Saturation 92%

Vol. Water Content 0.34 m^3/m^3

50 cm Wet

Percent of Saturation 94%

Vol. Water Content 0.45 m^3/m^3

Change Station

Change Map

Page Tour

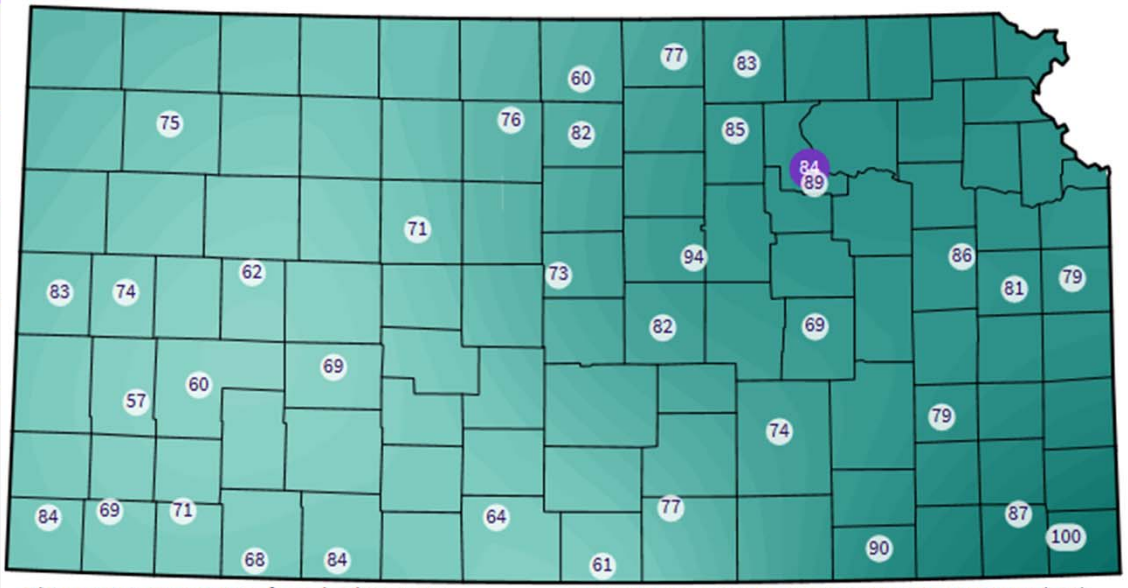
Table

Chart

Download

Resources

Percent of Saturation at 5 cm



This map is representative of grassland vegetation

Mesonet Data - 5 cm % Saturation at Nov 08 2018 19:55 (CST)

Data as of Thu Nov 08 2018 19:55 (CST) -- Click column headers to sort data

Station	Volumetric Water Content (m^3/m^3)				Percent of Saturation (%)			
	5 cm	10 cm	20 cm	50 cm	5 cm	10 cm	20 cm	50 cm
Ashland 8S	0.32	0.35	0.39	0.24	84	83	91	96
Ashland Bottoms	0.34	0.34	0.35	0.43	89	85	83	90
Belleville 2W	0.3	0.33	0.34	0.49	77	79	85	94
Butler	0.34	0.37	0.36	0.48	74	90	90	98

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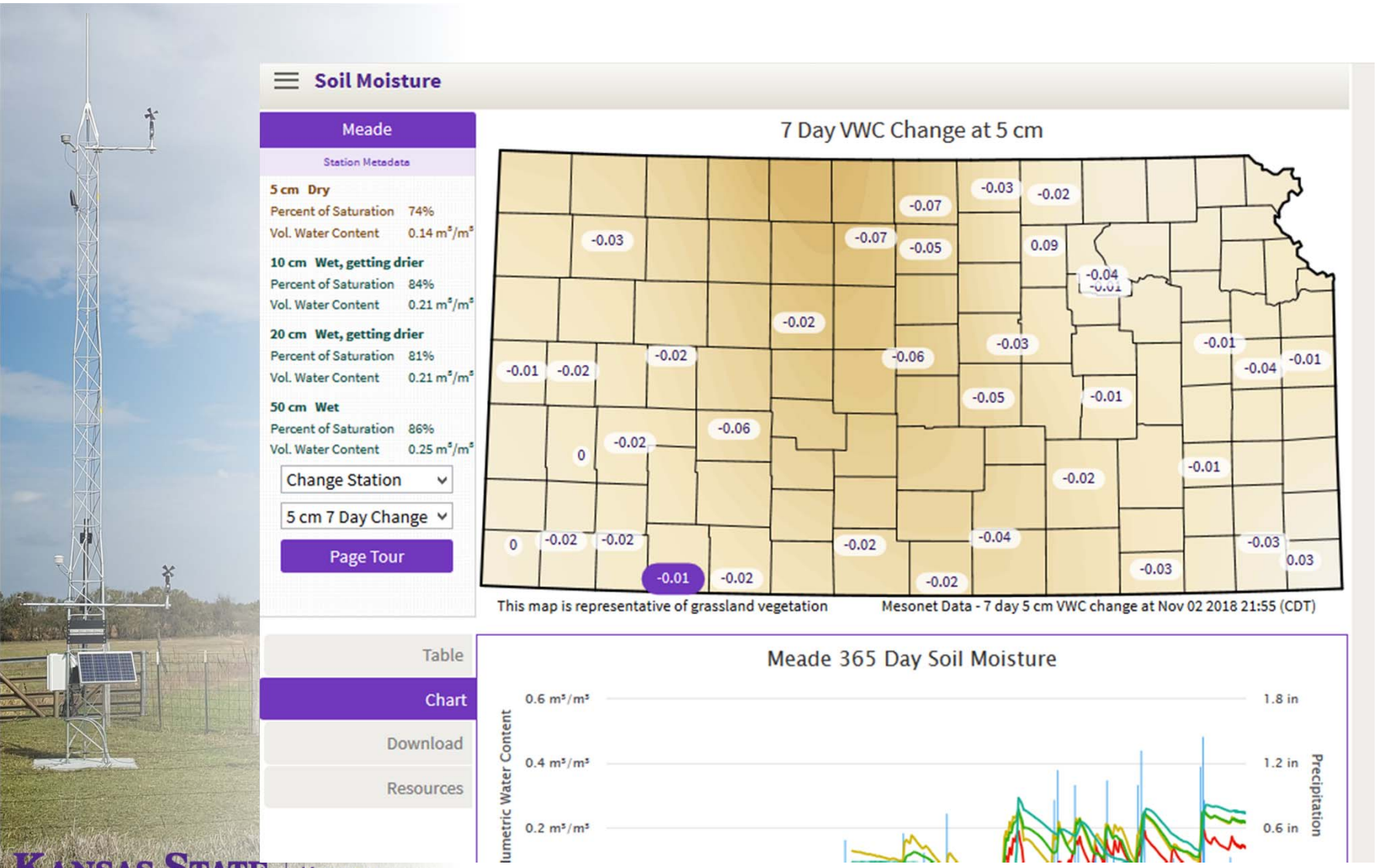

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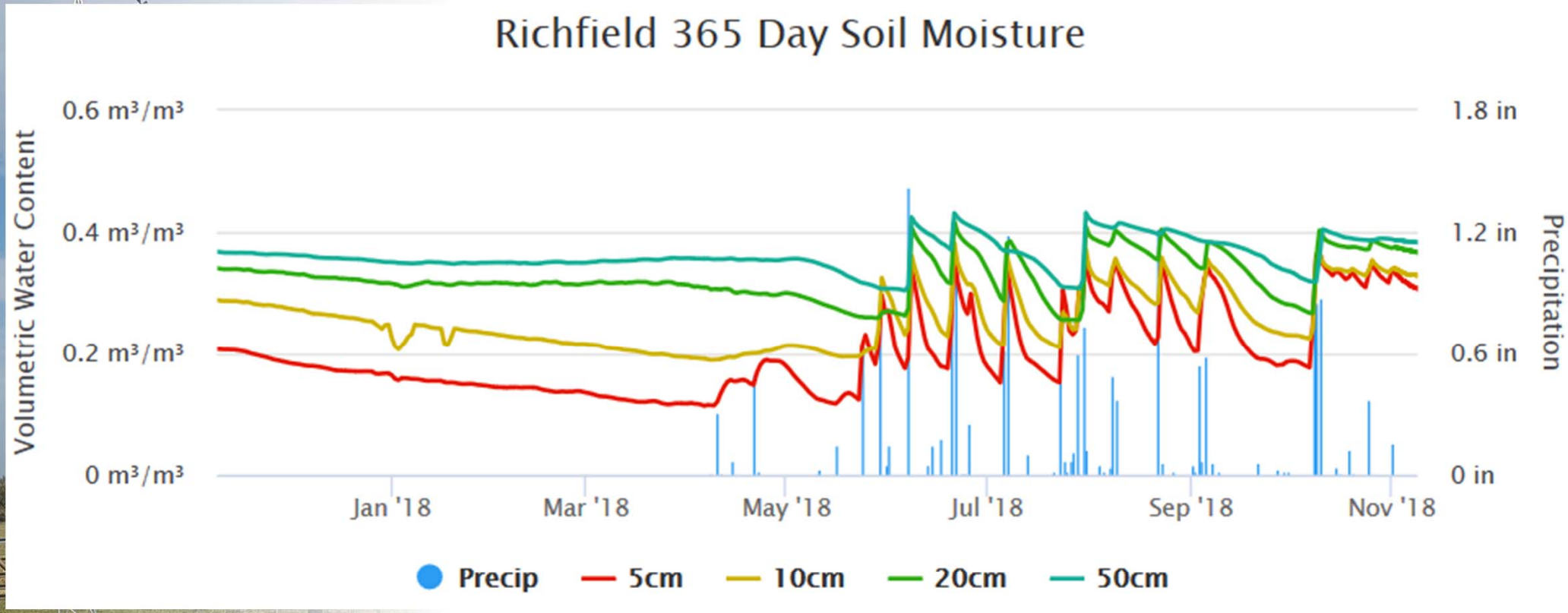
link



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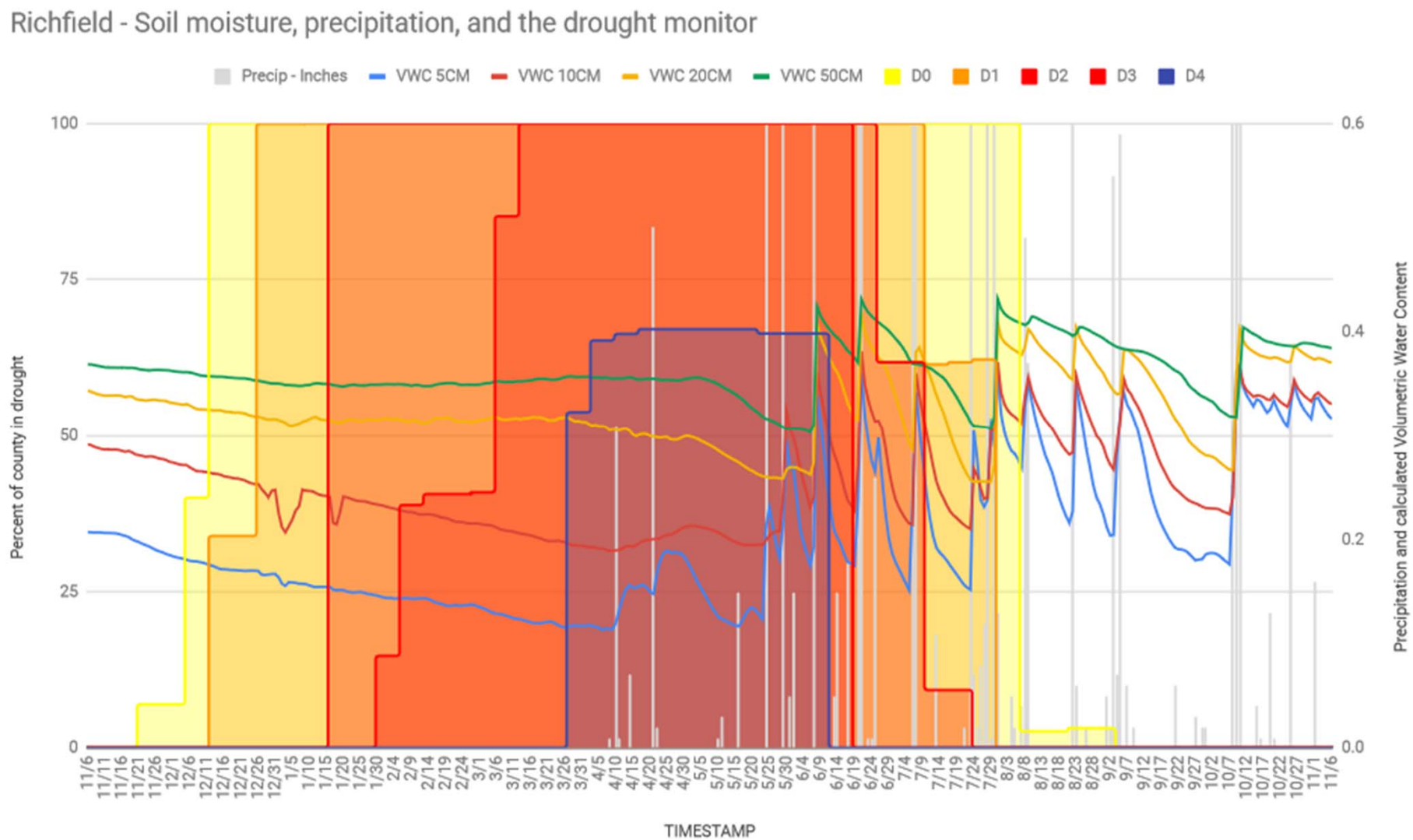
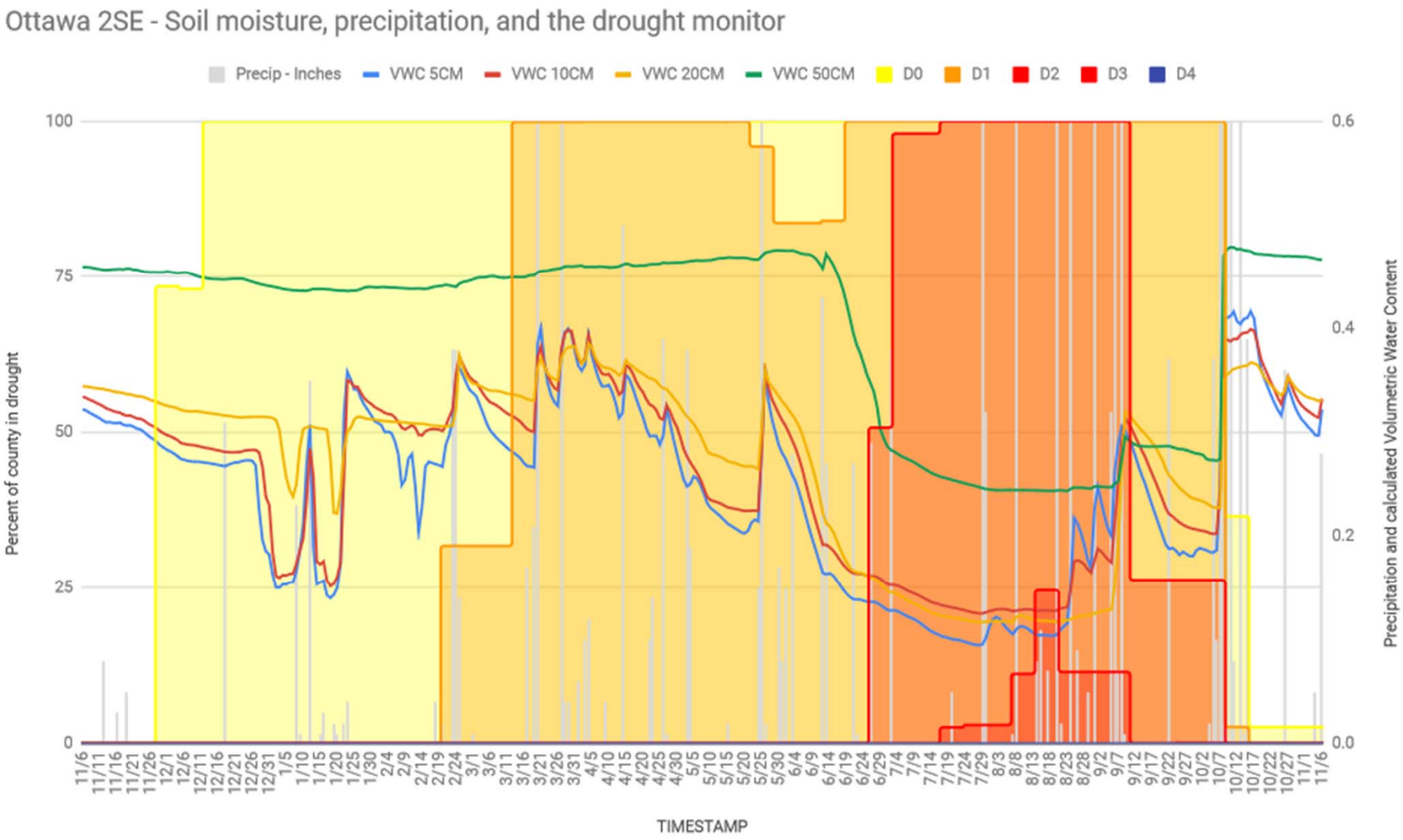
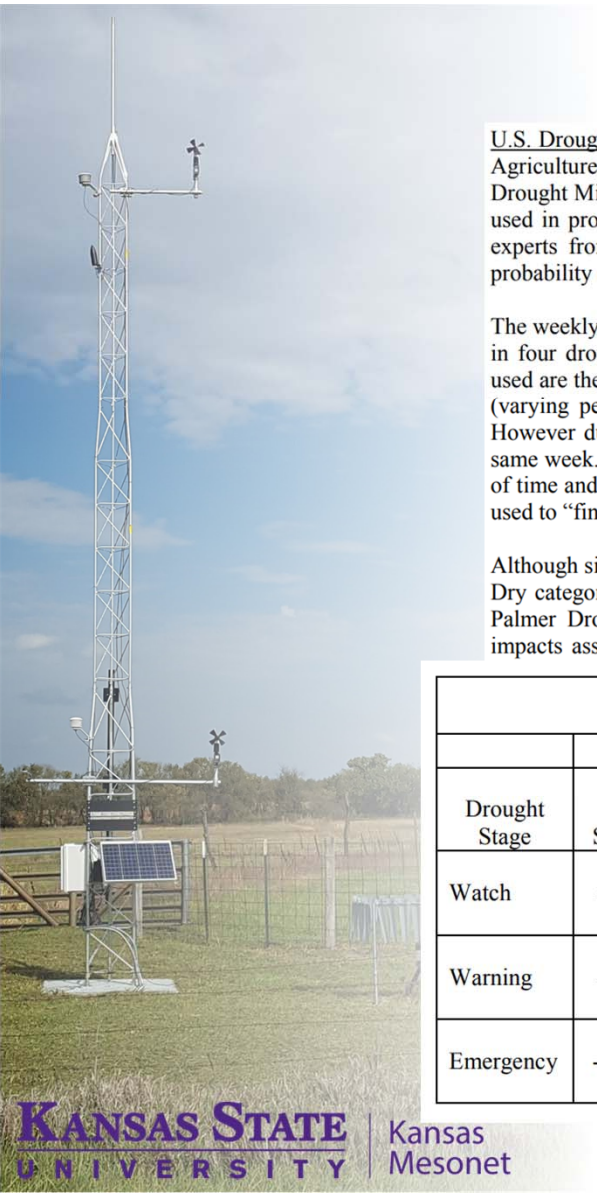

Richfield - Soil moisture, precipitation, and the drought monitor
Precip - Inches
VWC 5CM
VWC 10CM
VWC 20CM
VWC 50CM
D0
D1
D2
D3
D4
Percent of county in drought
Precipitation and calculated Volumetric Water Content
TIMESTAMP


Ottawa 2SE - Soil moisture, precipitation, and the drought monitor
Precip - Inches
VWC 5CM
VWC 10CM
VWC 20CM
VWC 50CM
D0
D1
D2
D3
D4
Percent of county in drought
Precipitation and calculated Volumetric Water Content
TIMESTAMP



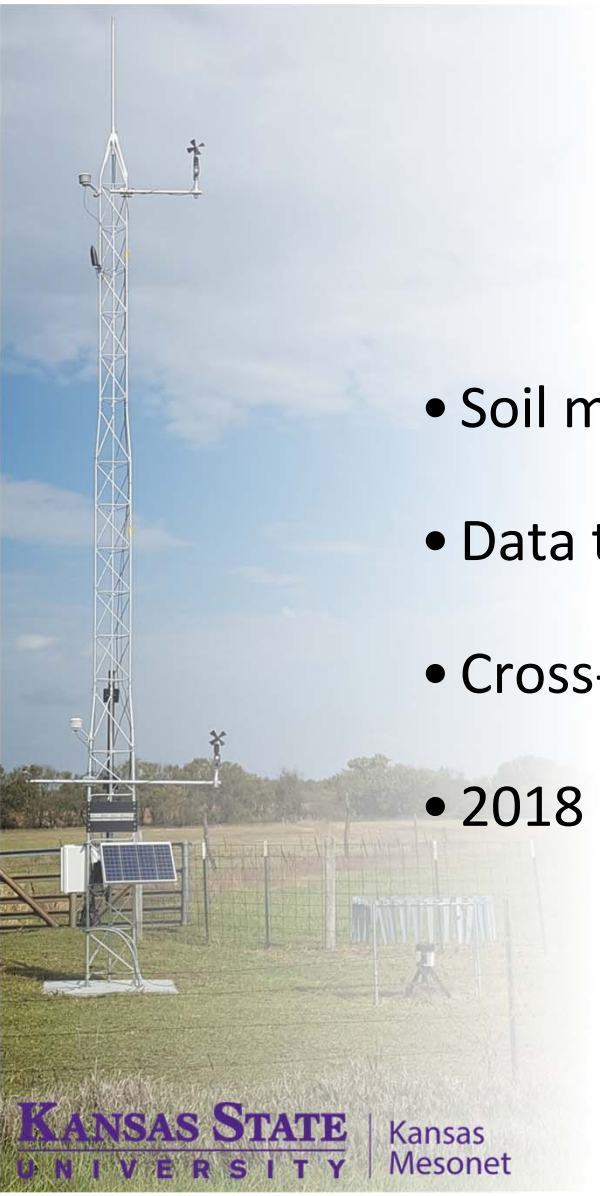
U.S. Drought Monitor – The U.S. Drought Monitor is produced weekly through a joint effort of the U.S. Department of Agriculture, The U.S. Department of Commerce – National Oceanic and Atmospheric Administration and the National Drought Mitigation Center. Advice from local experts throughout the nation, including the Kansas State Climatologist, is used in producing the Monitor. This composite drought map incorporates information and products from hundreds of experts from many entities and levels of government in an effort to represent the extent, magnitude, impacts and probability of occurrence.

The weekly summary Monitor map shows general drought conditions, including abnormally dry areas and areas included in four drought intensity categories: moderate, severe, extreme and exceptional drought (D0-D4). The key indicators used are the Palmer Drought Severity Index, soil moisture, weekly streamflow percentile, percent of normal precipitation (varying periods), the Standardized Precipitation Index (varying periods) and the Satellite Vegetation Health Index. However due to the evaluation on a weekly basis, precipitation is primarily compared to normal precipitation for that same week. Although utilizing several drought indicators used in the Monitor, Kansas prefers to consider longer periods of time and consecutive week's conditions in defining drought conditions within the state. Additional indicators are also used to "fine-tune" the Monitor to more precisely reflect Kansas conditions.

Although similar, there are some differences in the Kansas and Monitor categories. The Monitor includes an Abnormally Dry category that is not included as a Kansas drought stage. Abnormally Dry is analogous to mild drought under the Palmer Drought Severity Index classification (PDSI -1.00 to -1.99). This category occurs quite frequently and the impacts associated with it are generally well within the capability for individual or local response. Nevertheless, this

TABLE 2
DROUGHT STAGE INDICATOR VALUES

	Indicator						
Drought Stage	Palmer Drought Severity Index	Standardized Precipitation Index	Percent Normal Precipitation	Soil Moisture Percentile	Crop Moisture Index	Satellite Vegetative Health Index	7-Day Median Flow Percentile
Watch	-2.00 to -2.99	-0.80 to -1.29 (3 months)	70 % or below (3 months)	11 to 20	-2.0 to -2.99	26 to 35	11 to 20
Warning	-3.00 to -3.99	-1.30 to -1.59 (6 months)	65 % or below (6 months)	6 to 10	-3.0 to -3.99	16 to 25	6 to 10
Emergency	-4.00 or below	-1.60 or below (6 months)	60 % or below (6 months)	5 or below	-4.0 and below	15 or below	5 or below



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- Soil moisture now available statewide
- Data trends provide insight to drought conditions
- Cross-comparison to personal measurements expands use
- 2018 was a dynamic year and provided unique thresholds

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@wx_chip

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