Mapping Oklahoma Mesonet Sensor Datastreams

Betsy Van der Veer Martens, University of Oklahoma
School of Library & Information Studies

Christopher A. Fiebrich and Bradley Illston,
University of Oklahoma Climatological Survey

Mesonet

Oklahoma Droughts

http://www.huffingtonpost.com/2011/04/06/2011-drought-oklahoma_n_845419.html

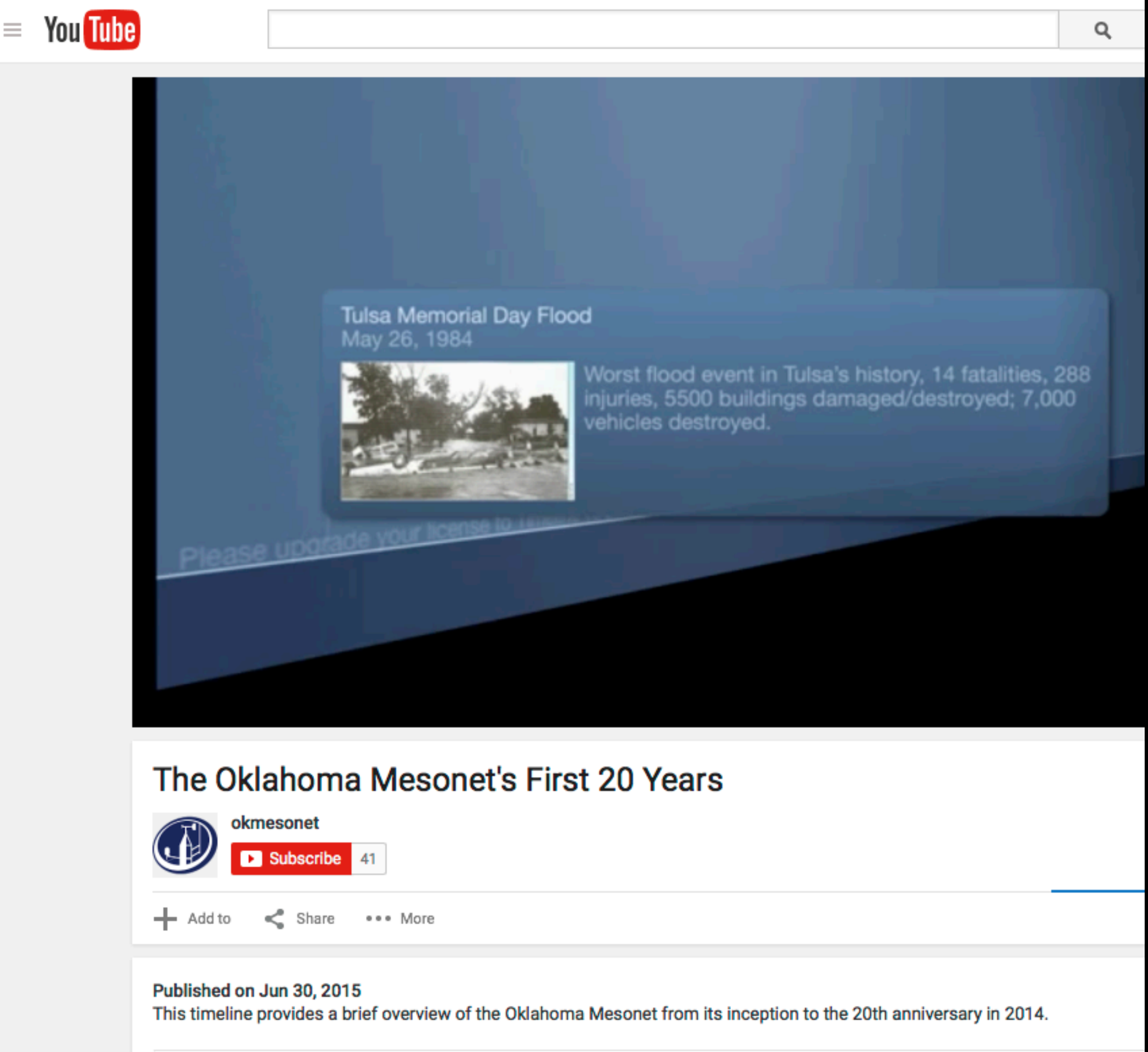
Oklahoma Floods

http://hyperlocal-blog-what-about-tulsas-levees/


Nowata Mesonet station experiencing
-31°F on February 10th, 2011

Oklahoma Datastreams

Over 5 billion observations recorded and transmitted during the 20 years of Oklahoma Mesonet operations



Tulsa Memorial Day Flood
May 26, 1984

Worst flood event in Tulsa's history, 14 fatalities, 288 injuries, 5500 buildings damaged/destroyed; 7,000 vehicles destroyed.

The Oklahoma Mesonet's First 20 Years

okmesonet

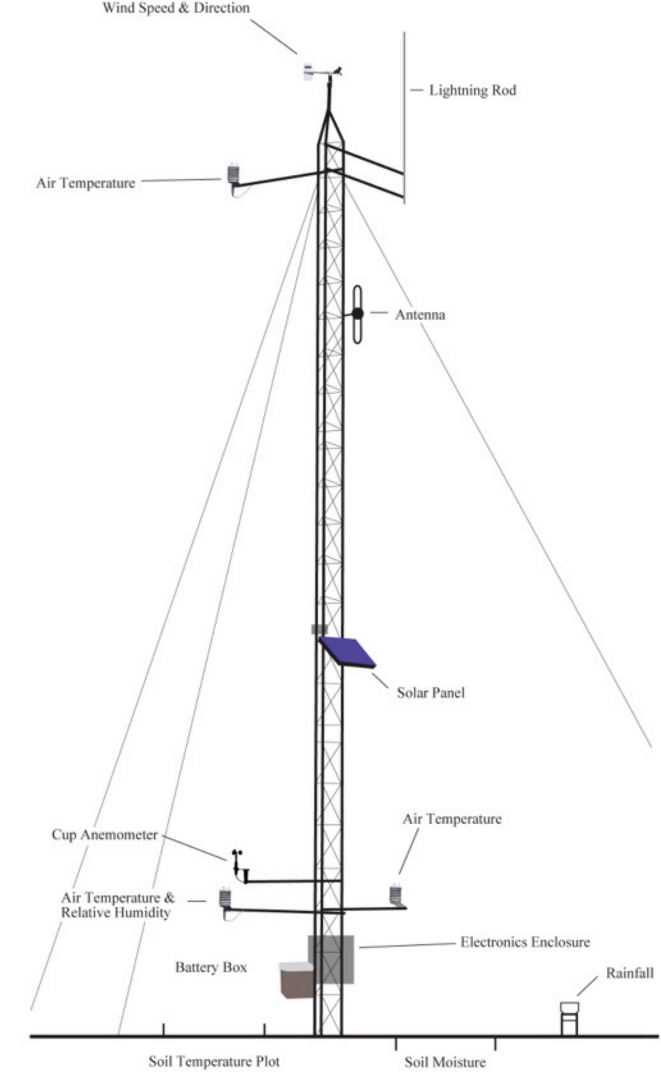
Published on Jun 30, 2015
This timeline provides a brief overview of the Oklahoma Mesonet from its inception to the 20th anniversary in 2014.

Initial discussions between meteorologist Ken Crawford of the University of Oklahoma and agricultural scientist Ron Elliott of Oklahoma State University about a statewide mesonet began in 1984.

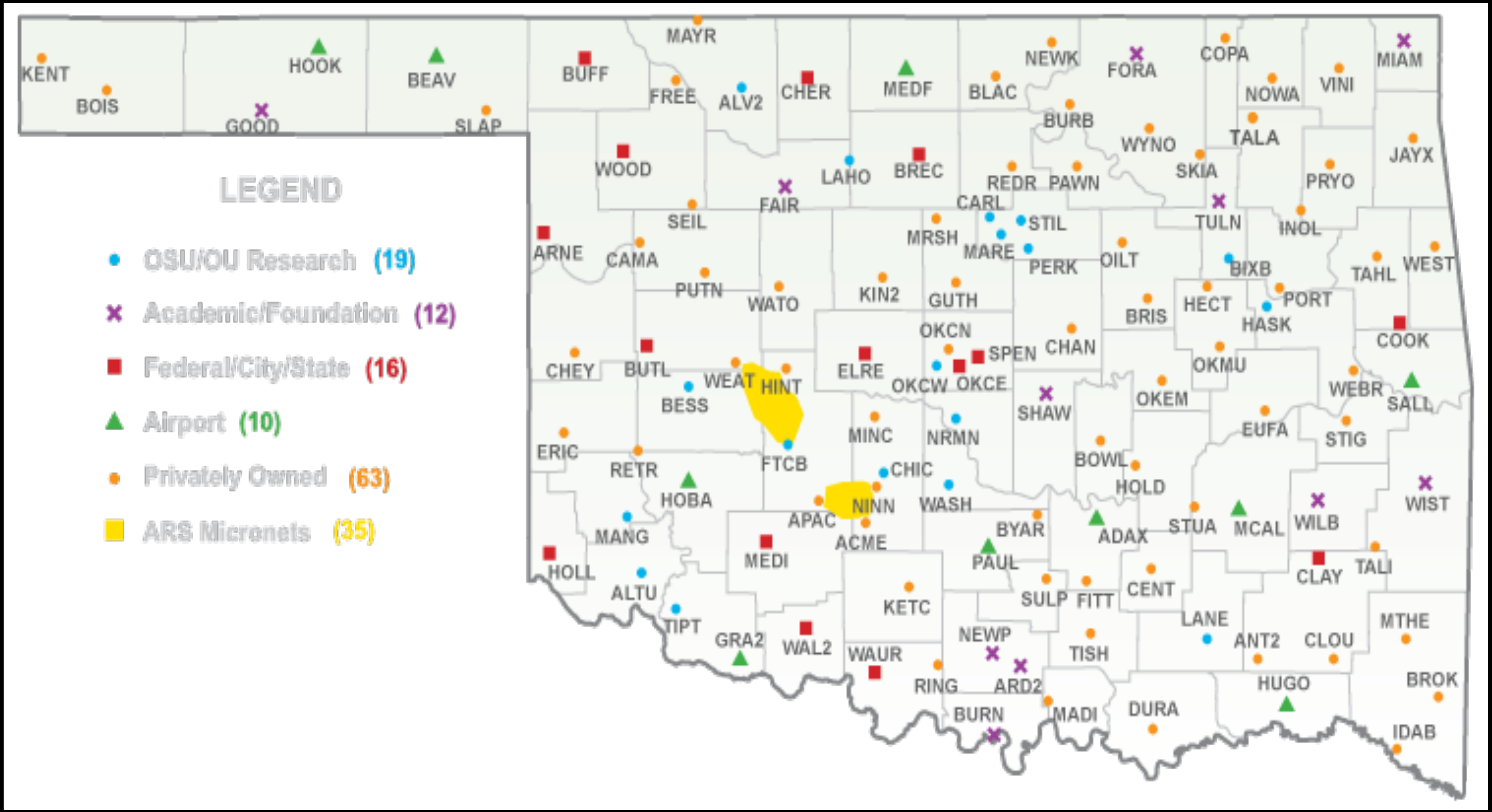
Initial state funding for the Mesonet was allocated in 1989, and the first Mesonet towers were installed in 1991, with 108 sites operational by 1993. There are currently 120 OK Mesonet installations across the state.

OK Mesonet Historical Background

- 120 remote weather stations
- 3300 sensors and 250 computers linked
- About 700,000 observations ingested each day
- 2-way communications
- Solar powered
- 30-day storage in on-site dataloggers
- Produce ~63,000 products and files for users



OK Mesonet Technical Background



Oklahoma Mesonet Geography

120 OK Mesonet Sites: Average Spacing is ~30 km (19 miles)

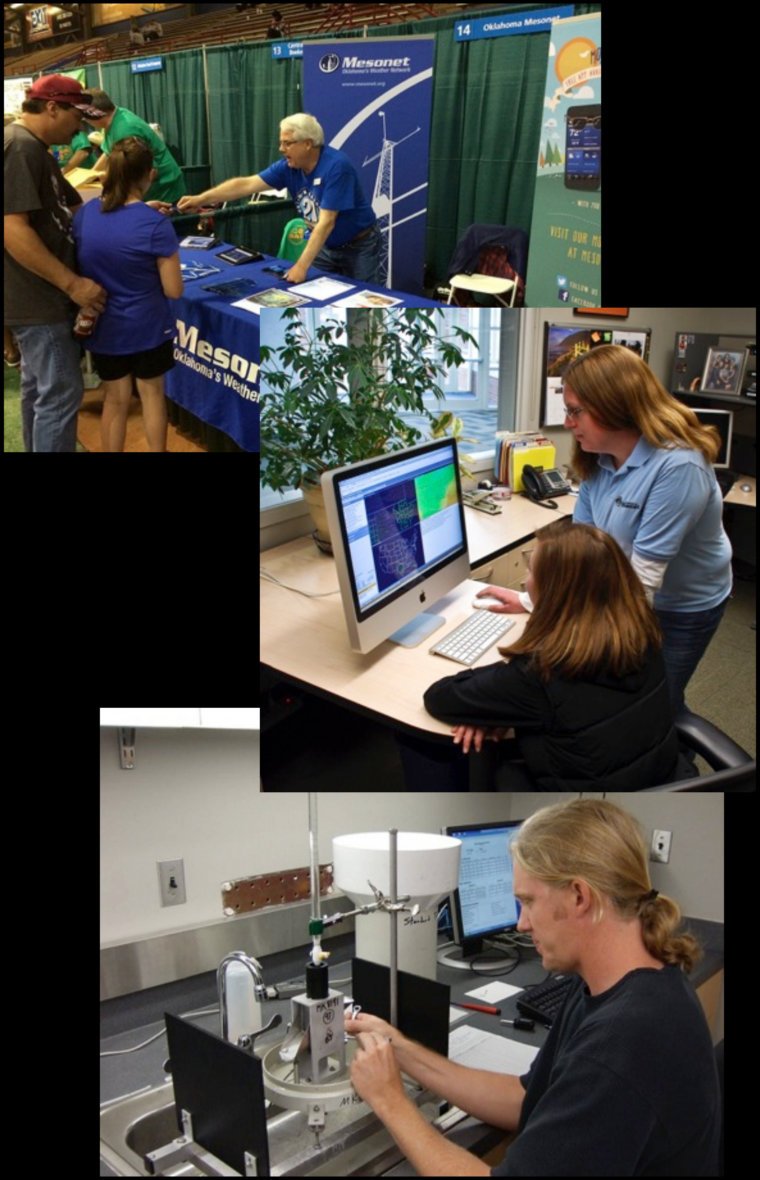
Measurements at an OK Mesonet Site

- Every Five Minutes:
  - Air Temperature — 1.5 m and 9 m
  - Relative Humidity — 1.5 m
  - Rainfall (tipping bucket)
  - Barometric Pressure
  - Solar Radiation — 1.8 m
  - Wind Speed/Direction — 10 m
  - Wind Speed – 2 m

- Every Fifteen Minutes:
  - 5 cm soil temperature —native sod
  - 10 cm soil temperature — bare soil/native sod
  - 25 cm soil temperature — native sod
  - 60 cm soil temperature — native sod

- Every Thirty Minutes:
  - 5 cm soil moisture
  - 25 cm soil moisture
  - 60 cm soil moisture

- 11 full-time staff for site installations and maintenance, lab calibrations, and manual quality assurance
- 10 full-time staff for computer system maintenance/operations, software and web development, and technical support
- 5 full-time staff for climate services, education, formal outreach, and research
- 4 full-time staff for administrative support



OK Mesonet Technical Support

OK Mesonet Communication Support

OLETS
Oklahoma Law Enforcement Telecommunications System

- Home
- Compliance Services
- Network Center
- Management Services Unit
- Training Services
- Contact Us

Welcome to OLETS

The Oklahoma Law Enforcement Telecommunications System (OLETS) provides a computerized message switching system created for and dedicated to the criminal justice community. The sole purpose is to provide for the interstate, intrastate and interagency exchange of criminal justice related information. OLETS is operations 24 hours a day, 7 days a week.

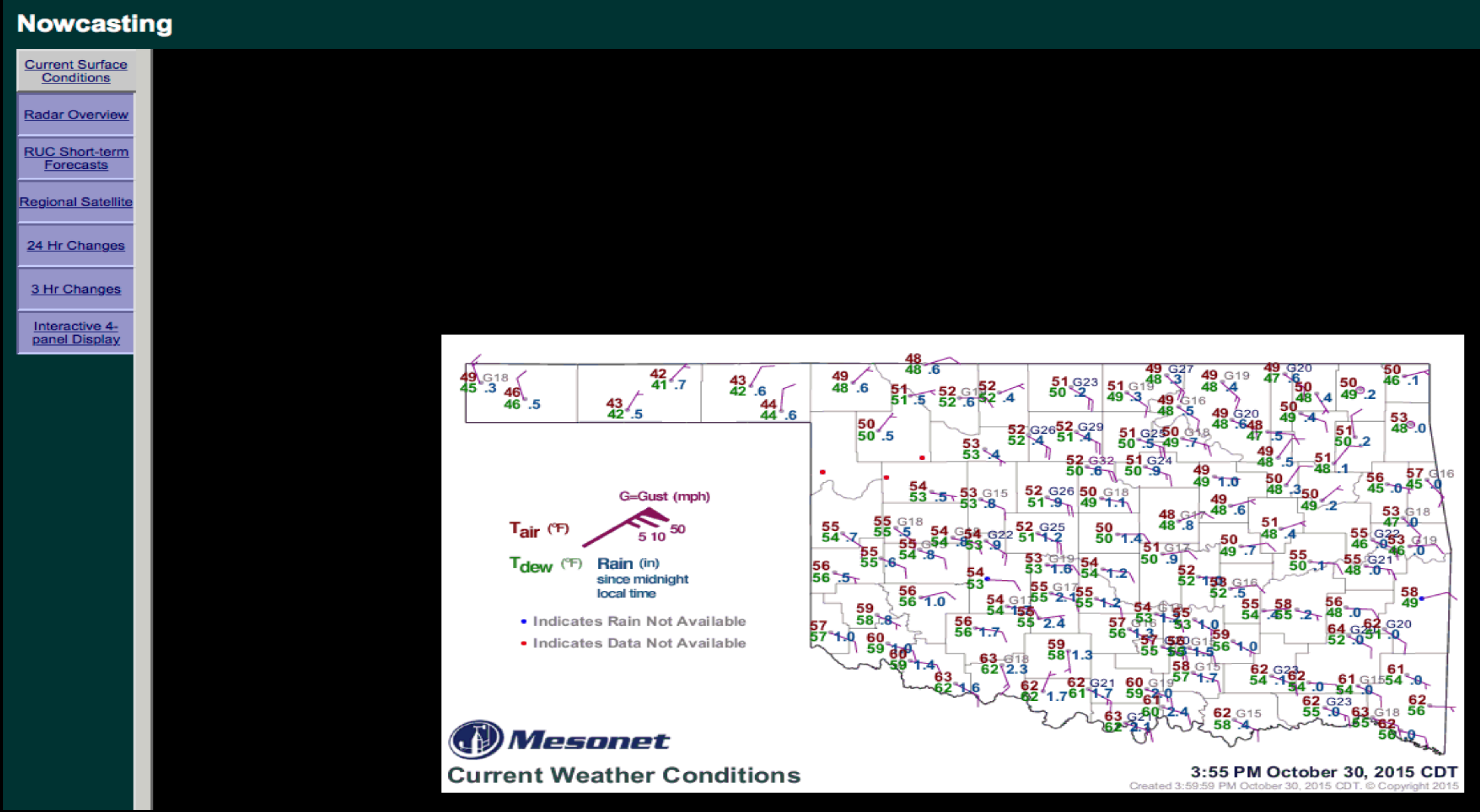
The OLETS system is suported by a redundant computerized message switcher located at the Oklahoma Department of Public Safety in Oklahoma City. Two computers have the ability to receive, store and forward message traffic to and from all user agencies. Message traffic includes free form administrative messages from one point to one or more points on the network.

In addition, OLETS supports computer to computer interfaces with computer systems at the Oklahoma Department of Public Safety, Oklahoma Tax Commission, Oklahoma Bureau of Investigation, Office of Juvenile Affairs, National Crime Information Center, National Law Enforcement Telecommunications System, National Oceanic and Atmospheric Administrations' National Weather Service and computer aided dispatch systems in various agencies within Oklahoma.

OLETS users are local, state and federal law enforcement and criminal justice agencies throughout the State of Oklahoma.

©2012 Oklahoma Law Enforcement Telecommunications System - OLETS

- OK Mesonet sensor measurements are made available to users within 5 minutes of collection



OK Mesonet Data for Real-Time Weather

NWS Norman @NWSNorman

707pm - Basically, if it's raining. it's flooding. Stay off the roads. Map shows rainfall since midnight. @okmesonet

Indicates Data Not Available

Frozen precipitation, including snow, ice, and hail, is recorded as it melts.

NWS River Forecast Center Rainfall Estimate valid 6:00 PM May 23, 2015 CDT.

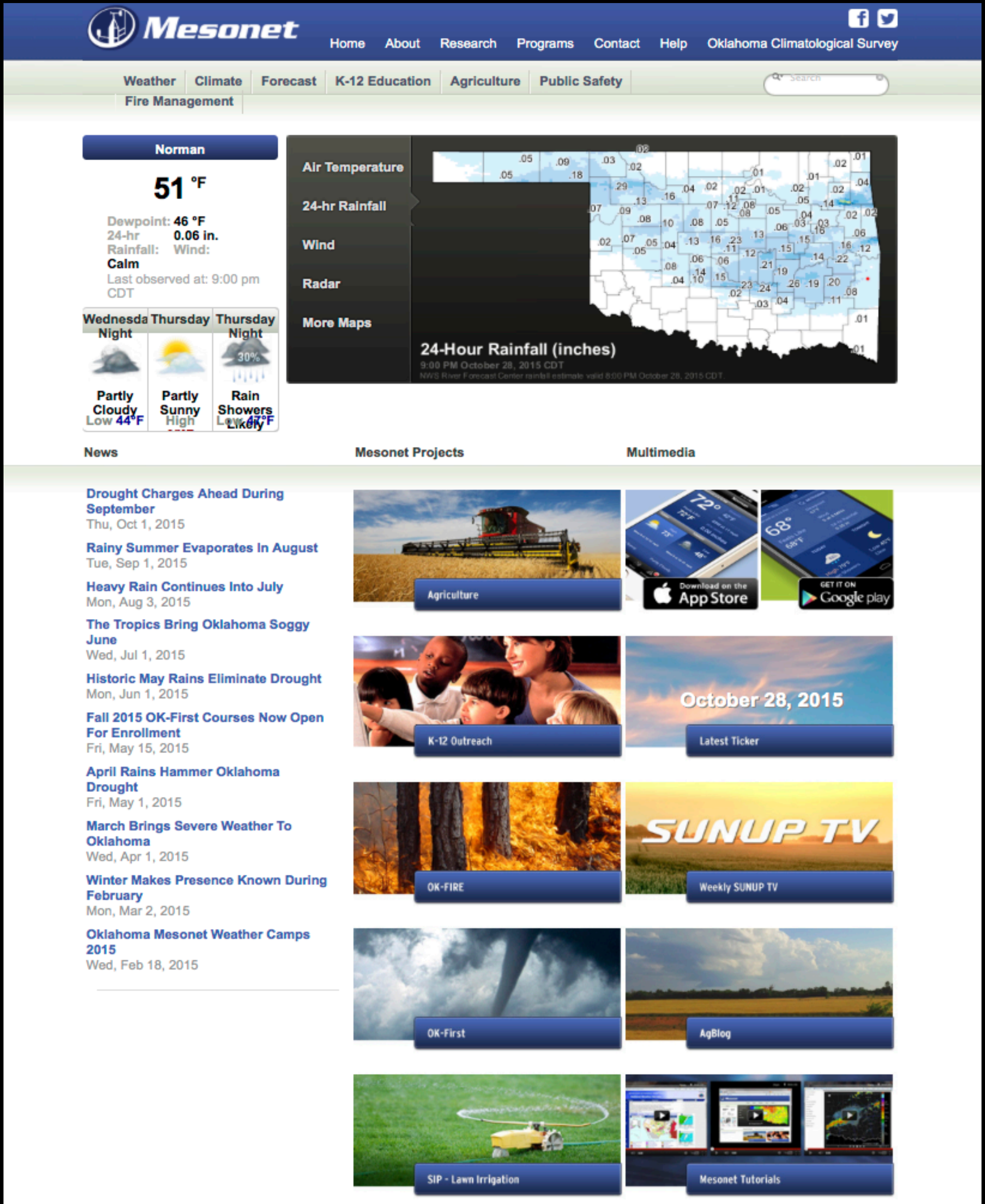
Observed Rainfall Since Midnight (inches)

7:00 PM May 23, 2015 CDT

RETWEETS 19 LIKES 11

5:10 PM - 23 May 2015

OK Mesonet Data for Real-Time Weather



Norman

51 °F

Dewpoint: 46 °F
24-hr Rainfall: 0.06 in.
Wind: Calm
Last observed at: 9:00 pm CDT

Wednesday Night	Thursday	Thursday Night
Partly Cloudy	Partly Sunny	Rain Showers Likely
Low 44°F	High	Low 47°F

24-Hour Rainfall (inches)
9:00 PM October 28, 2015 CDT
NWS River Forecast Center rainfall estimate valid 8:00 PM October 28, 2015 CDT

News

Drought Charges Ahead During September
Thu, Oct 1, 2015

Rainy Summer Evaporates In August
Tue, Sep 1, 2015

Heavy Rain Continues Into July
Mon, Aug 3, 2015

The Tropics Bring Oklahoma Soggy June
Wed, Jul 1, 2015

Historic May Rains Eliminate Drought
Mon, Jun 1, 2015

Fall 2015 OK-First Courses Now Open For Enrollment
Fri, May 15, 2015

April Rains Hammer Oklahoma Drought
Fri, May 1, 2015

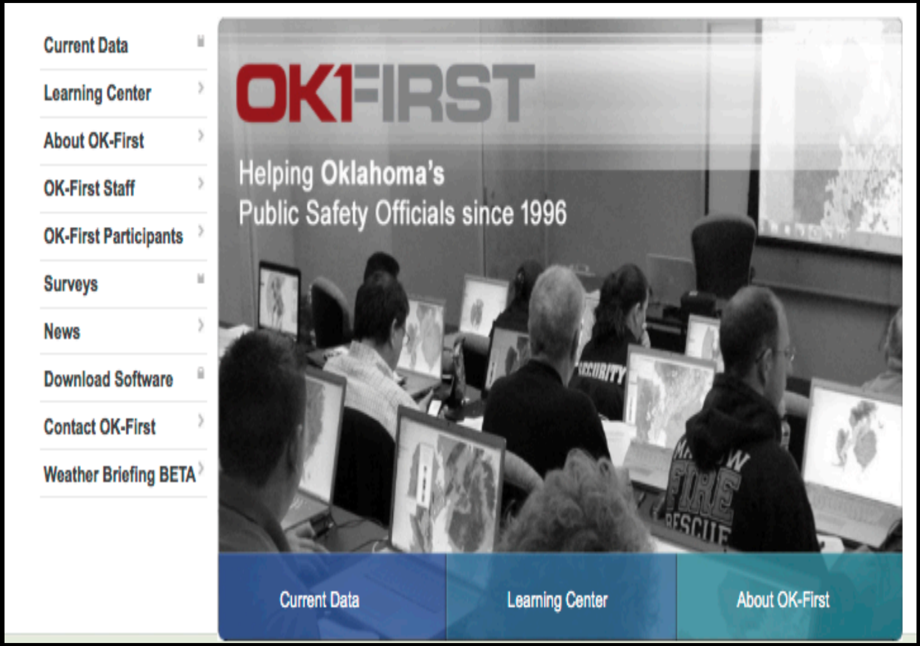
March Brings Severe Weather To Oklahoma
Wed, Apr 1, 2015

Winter Makes Presence Known During February
Mon, Mar 2, 2015

Oklahoma Mesonet Weather Camps 2015
Wed, Feb 18, 2015

Mesonet Projects

Multimedia



Helping Oklahoma's Public Safety Officials since 1996

Stillwater Wed 11/04/15

Weather 9:45 pm CST

Temperature: 65°F
Relative Humidity: 78%
10-m Wind: SSE 12 mph
24-h Rainfall: 0.00"
Dispersion: Moderately Good

Fire Danger 9:00 pm CST

Current Fire Danger: LOW

Burning Index: 1
Spread Component: 1
Ignition Component: 1%
NFDRS Fuel Model: T
1-hr Fuel Moisture: 14%
10-hr Fuel Moisture: 17%
KBDI: 207
Relative Greenness: 57%

Sunrise: 6:54 am Sunset: 5:30 pm

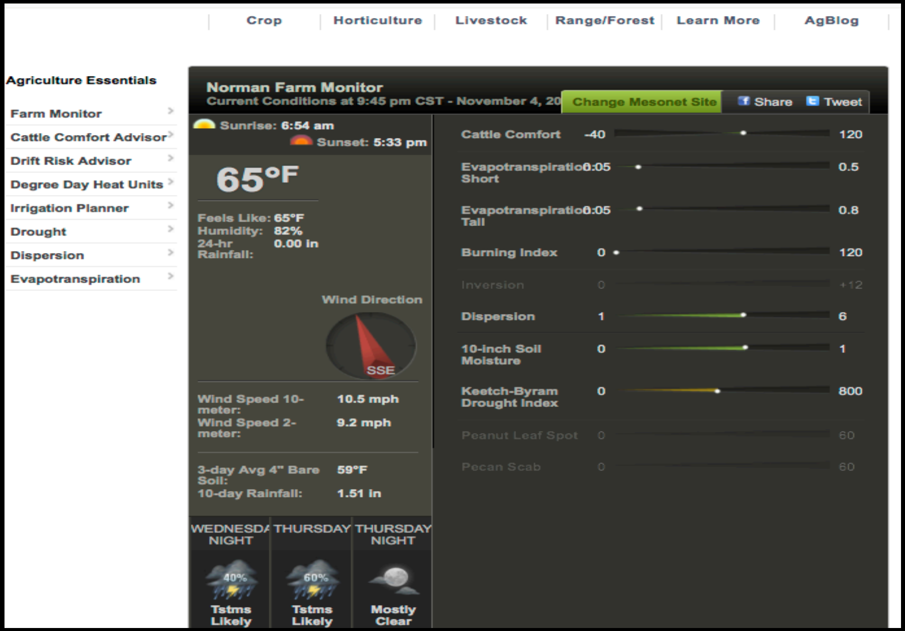
Weather-Based Decision Support Products for Wildland Fire Management in Oklahoma

WeatherScope required

The interactive features of this web site require the free WeatherScope software.

Click Here to download WeatherScope.

Fire Prescription Planner



Norman Farm Monitor

Current Conditions at 9:45 pm CST - November 4, 20

Sunrise: 6:54 am
Sunset: 5:33 pm

65°F

Feels Like: 65°F
Humidity: 82%
24-hr Rainfall: 0.00 in

Wind Speed 10-meter: 10.5 mph
Wind Speed 2-meter: 9.2 mph

3-day Avg 4" Bare Soil: 59°F
10-day Rainfall: 1.51 in

WEDNESDAY NIGHT	THURSDAY	THURSDAY NIGHT
40% Tstms Likely	60% Tstms Likely	Mostly Clear

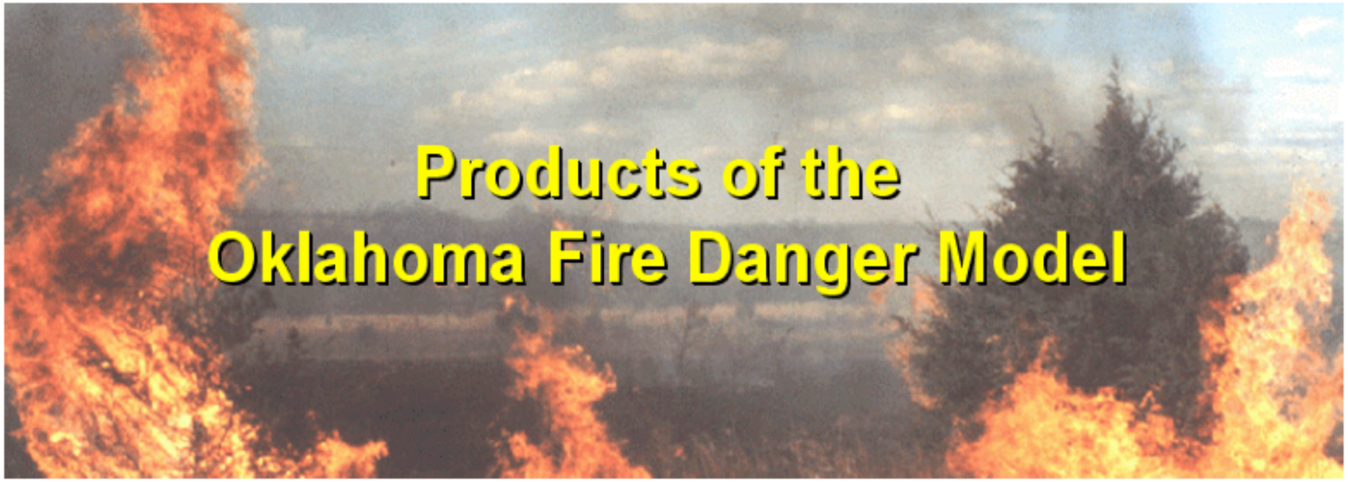
Cattle Comfort	-40	120
Evapotranspiration Short	0.05	0.5
Evapotranspiration Tall	0.05	0.8
Burning Index	0	120
Inversion	0	+12
Dispersion	1	6
10-inch Soil Moisture	0	1
Keetch-Byram Drought Index	0	800
Peanut Leaf Spot	0	60
Pecan Scab	0	60

K-12 Resources

Weather and climate impact us every day - from what to wear, how we drive, to where we choose to live. The Mesonet, "Oklahoma's Weather Network", has partnered with teachers since 1992 via the EarthStorm program to increase the use of weather and climate in classroom science curriculum. Scientists and teachers developed classroom materials using data from the Oklahoma Mesonet and the National Weather Service. We invite you to use these materials in your own classroom.

Wed, Feb 18, 2015 - Fri, Apr 17, 2015

Oklahoma Mesonet Weather Camps 2015

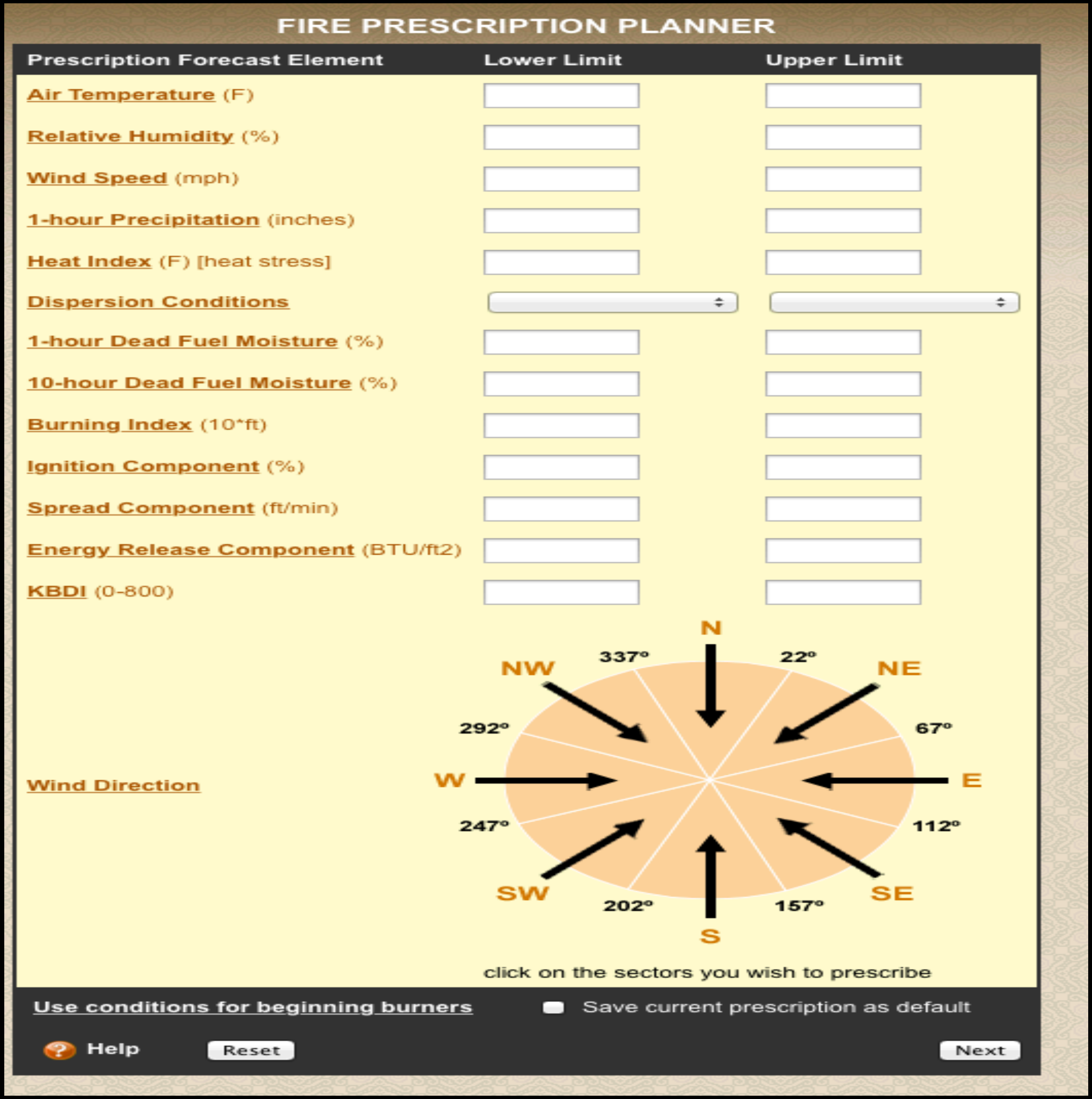


Products of the Oklahoma Fire Danger Model

The Oklahoma Fire Danger Model is run hourly using weather data from the Oklahoma Mesonet of 120 stations and weekly satellite imagery for assessment of live fuel moisture and loads. In addition, 84-hour weather forecasts from the National Weather Service's NAM model are integrated into the model. Model output can be assessed via the OK-FIRE web site at:

http://okfire.mesonet.org

In the FIRE section of the web site, click on "CURRENT Fire Danger" or "RECENT Fire Danger" for model output based on the Oklahoma Mesonet (for current and past fire danger conditions up to 30 days ago). There are a variety of products available, including dynamic maps, site-specific charts, and site-specific tables. For model output based on the 84-h NAM forecast, click on "FORECAST Fire Danger". Here as well, dynamic maps, site-specific charts, and site-specific tables are available. Consult *The Oklahoma Fire Danger Model* for more details on the model and its limitations.



FIRE PRESCRIPTION PLANNER

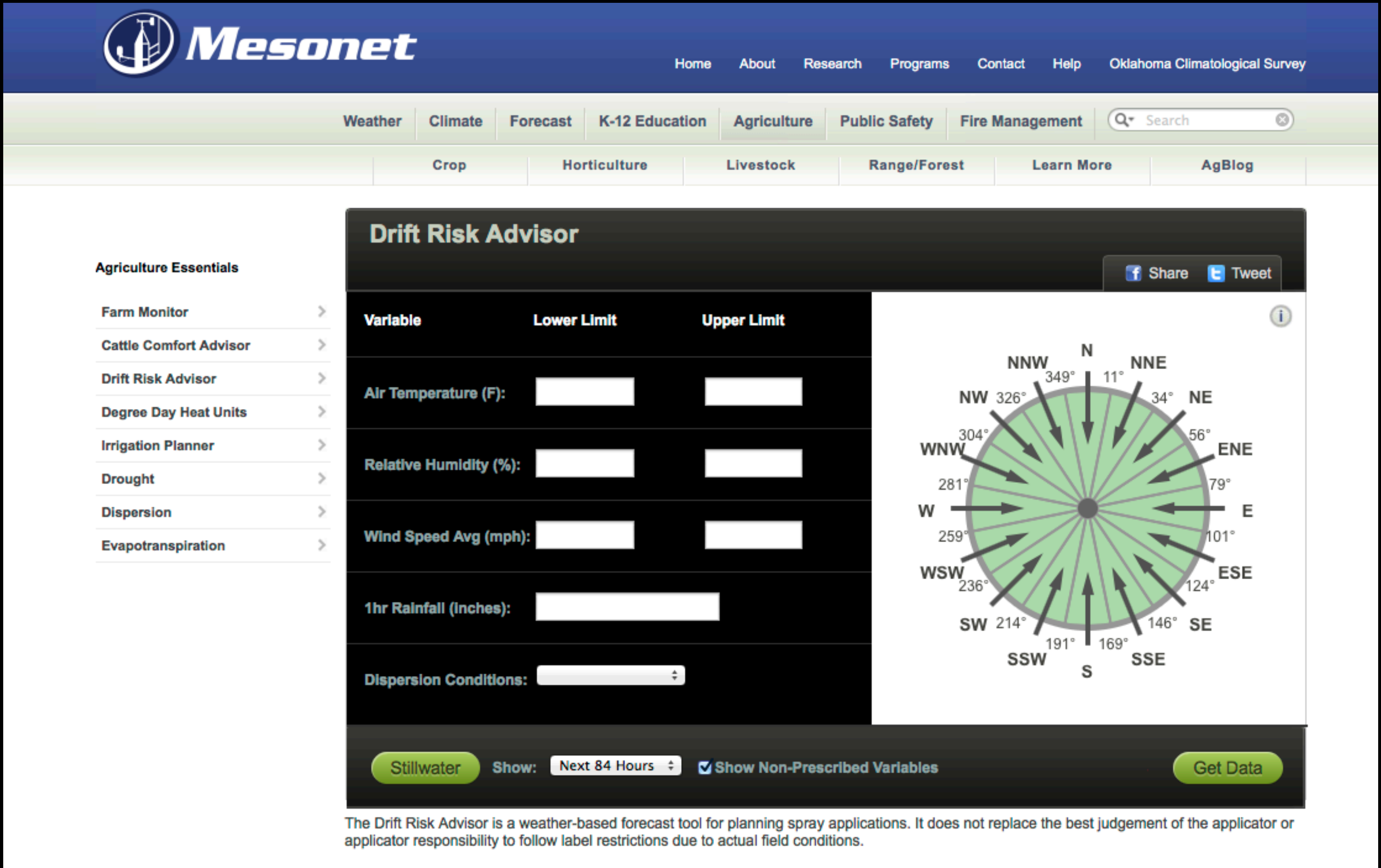
Prescription Forecast Element	Lower Limit	Upper Limit
Air Temperature (F)		
Relative Humidity (%)		
Wind Speed (mph)		
1-hour Precipitation (inches)		
Heat Index (F) [heat stress]		
Dispersion Conditions		
1-hour Dead Fuel Moisture (%)		
10-hour Dead Fuel Moisture (%)		
Burning Index (10*ft)		
Ignition Component (%)		
Spread Component (ft/min)		
Energy Release Component (BTU/ft2)		
KBDI (0-800)		
Wind Direction		

click on the sectors you wish to prescribe

Use conditions for beginning burners

☐ Save current prescription as default

OK Mesonet Burn Planner



Drift Risk Advisor

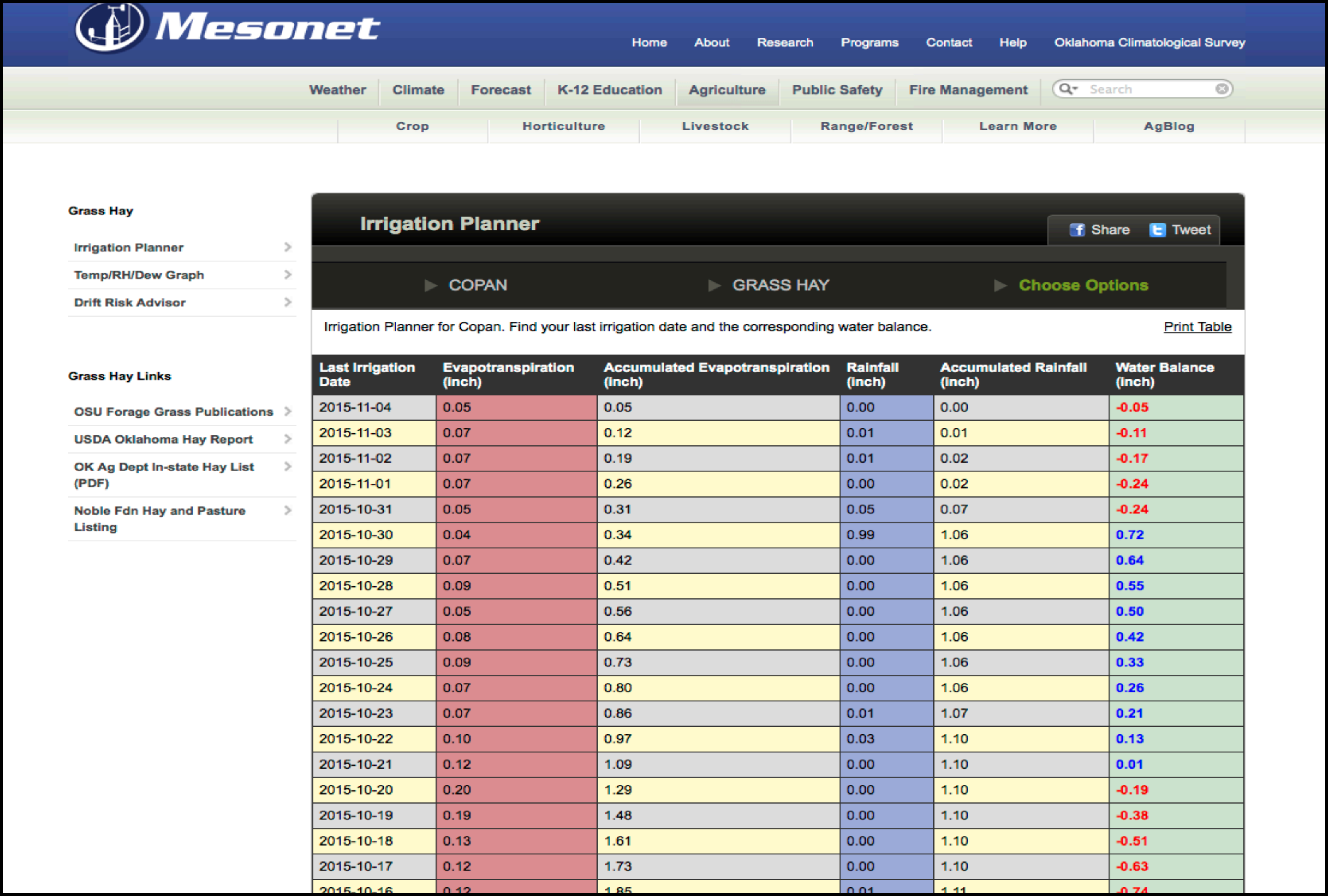
Variable	Lower Limit	Upper Limit
Air Temperature (F):		
Relative Humidity (%):		
Wind Speed Avg (mph):		
1hr Rainfall (inches):		
Dispersion Conditions:		

Show: Next 84 Hours

☑ Show Non-Prescribed Variables

The Drift Risk Advisor is a weather-based forecast tool for planning spray applications. It does not replace the best judgement of the applicator or applicator responsibility to follow label restrictions due to actual field conditions.

OK Mesonet Drift Risk Advisor

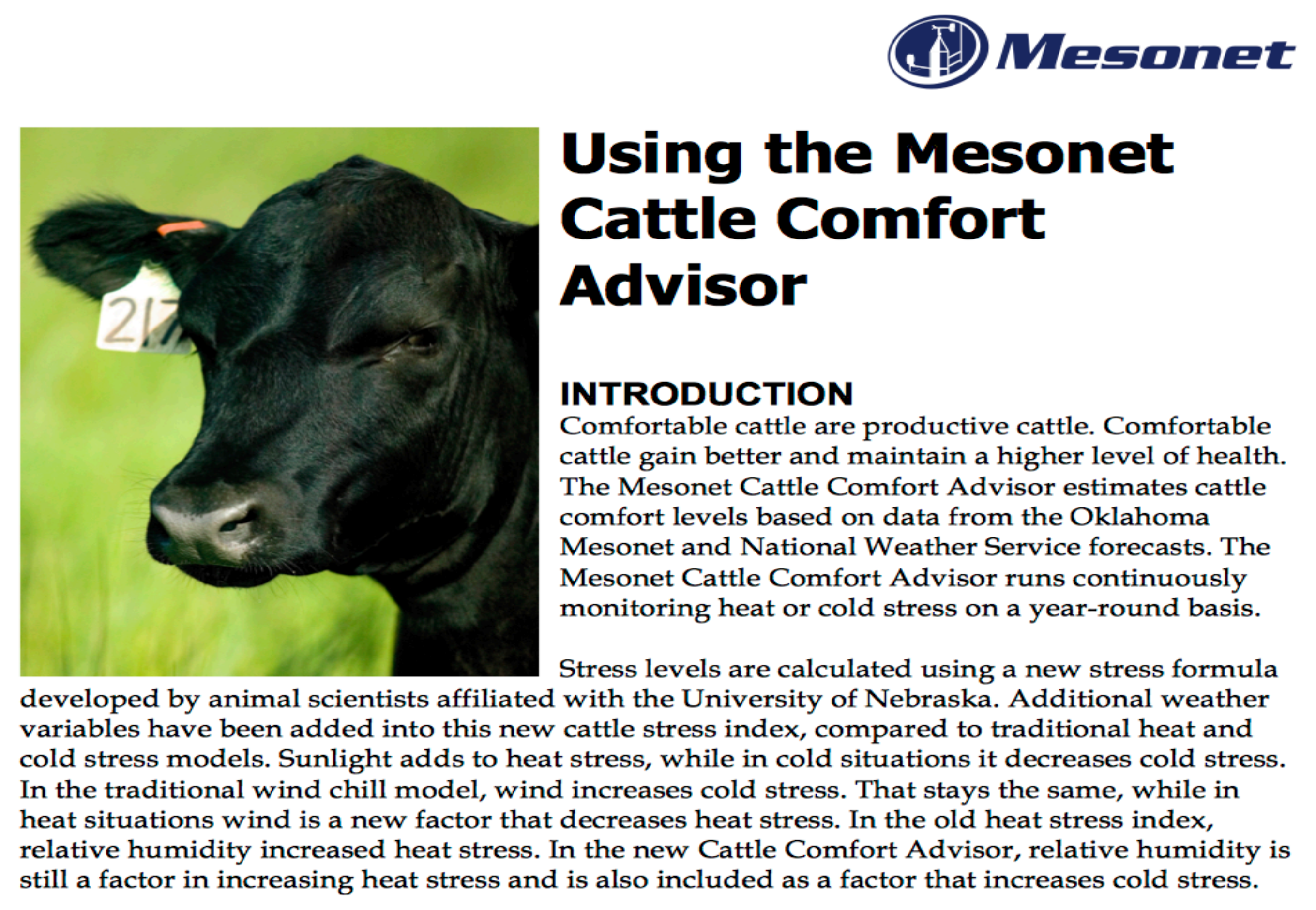


Irrigation Planner

Irrigation Planner for Copan. Find your last irrigation date and the corresponding water balance.

Last Irrigation Date	Evapotranspiration (inch)	Accumulated Evapotranspiration (inch)	Rainfall (inch)	Accumulated Rainfall (inch)	Water Balance (inch)
2015-11-04	0.05	0.05	0.00	0.00	-0.05
2015-11-03	0.07	0.12	0.01	0.01	-0.11
2015-11-02	0.07	0.19	0.01	0.02	-0.17
2015-11-01	0.07	0.26	0.00	0.02	-0.24
2015-10-31	0.05	0.31	0.05	0.07	-0.24
2015-10-30	0.04	0.34	0.99	1.06	0.72
2015-10-29	0.07	0.42	0.00	1.06	0.64
2015-10-28	0.09	0.51	0.00	1.06	0.55
2015-10-27	0.05	0.56	0.00	1.06	0.50
2015-10-26	0.08	0.64	0.00	1.06	0.42
2015-10-25	0.09	0.73	0.00	1.06	0.33
2015-10-24	0.07	0.80	0.00	1.06	0.26
2015-10-23	0.07	0.86	0.01	1.07	0.21
2015-10-22	0.10	0.97	0.03	1.10	0.13
2015-10-21	0.12	1.09	0.00	1.10	0.01
2015-10-20	0.20	1.29	0.00	1.10	-0.19
2015-10-19	0.19	1.48	0.00	1.10	-0.38
2015-10-18	0.13	1.61	0.00	1.10	-0.51
2015-10-17	0.12	1.73	0.00	1.10	-0.63
2015-10-16	0.12	1.85	0.01	1.11	-0.74

OK Mesonet Irrigation Planner



Mesonet

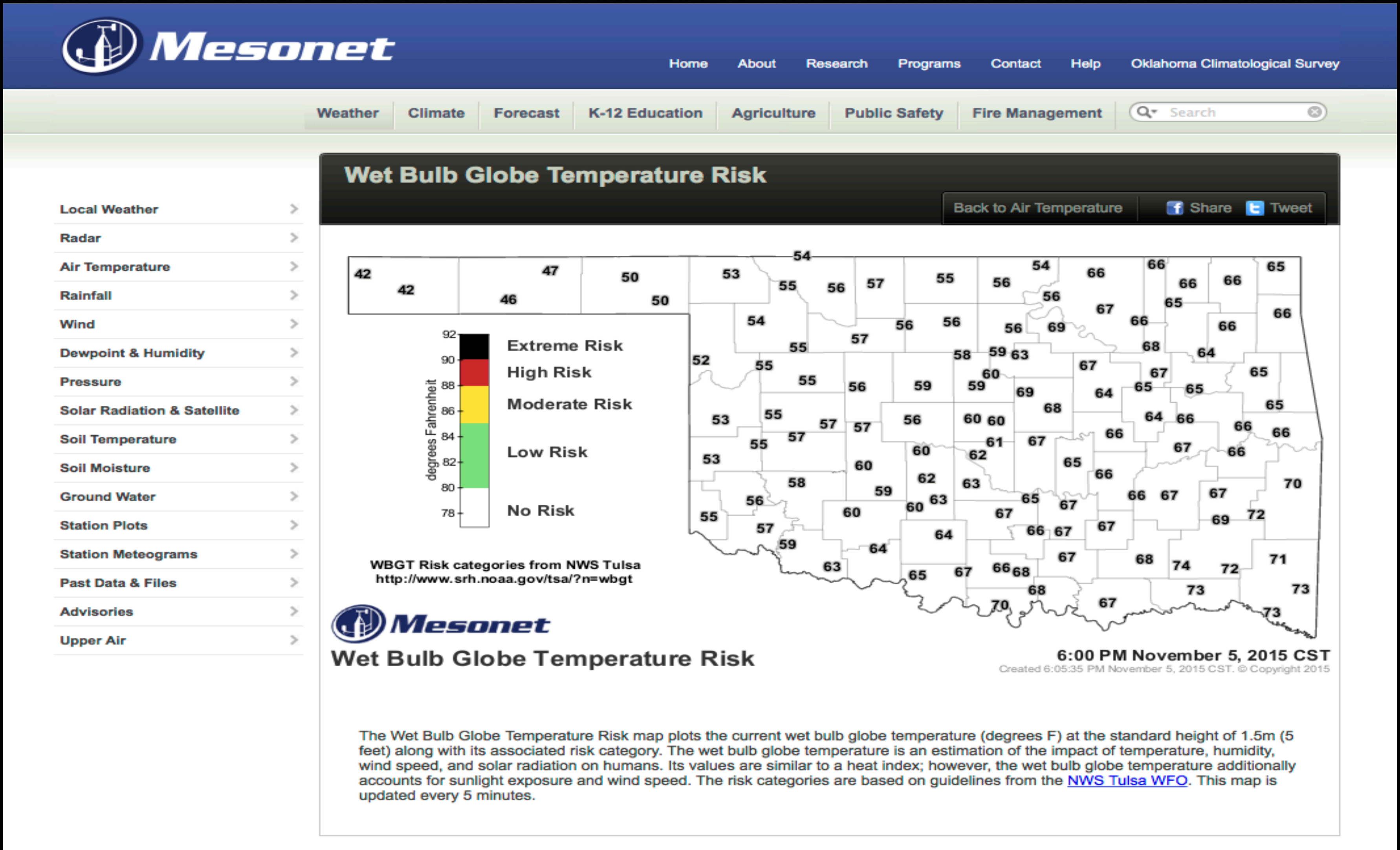
Using the Mesonet Cattle Comfort Advisor

INTRODUCTION

Comfortable cattle are productive cattle. Comfortable cattle gain better and maintain a higher level of health. The Mesonet Cattle Comfort Advisor estimates cattle comfort levels based on data from the Oklahoma Mesonet and National Weather Service forecasts. The Mesonet Cattle Comfort Advisor runs continuously monitoring heat or cold stress on a year-round basis.

Stress levels are calculated using a new stress formula developed by animal scientists affiliated with the University of Nebraska. Additional weather variables have been added into this new cattle stress index, compared to traditional heat and cold stress models. Sunlight adds to heat stress, while in cold situations it decreases cold stress. In the traditional wind chill model, wind increases cold stress. That stays the same, while in heat situations wind is a new factor that decreases heat stress. In the old heat stress index, relative humidity increased heat stress. In the new Cattle Comfort Advisor, relative humidity is still a factor in increasing heat stress and is also included as a factor that increases cold stress.

OK Mesonet Cattle Comfort Advisor



Wet Bulb Globe Temperature Risk

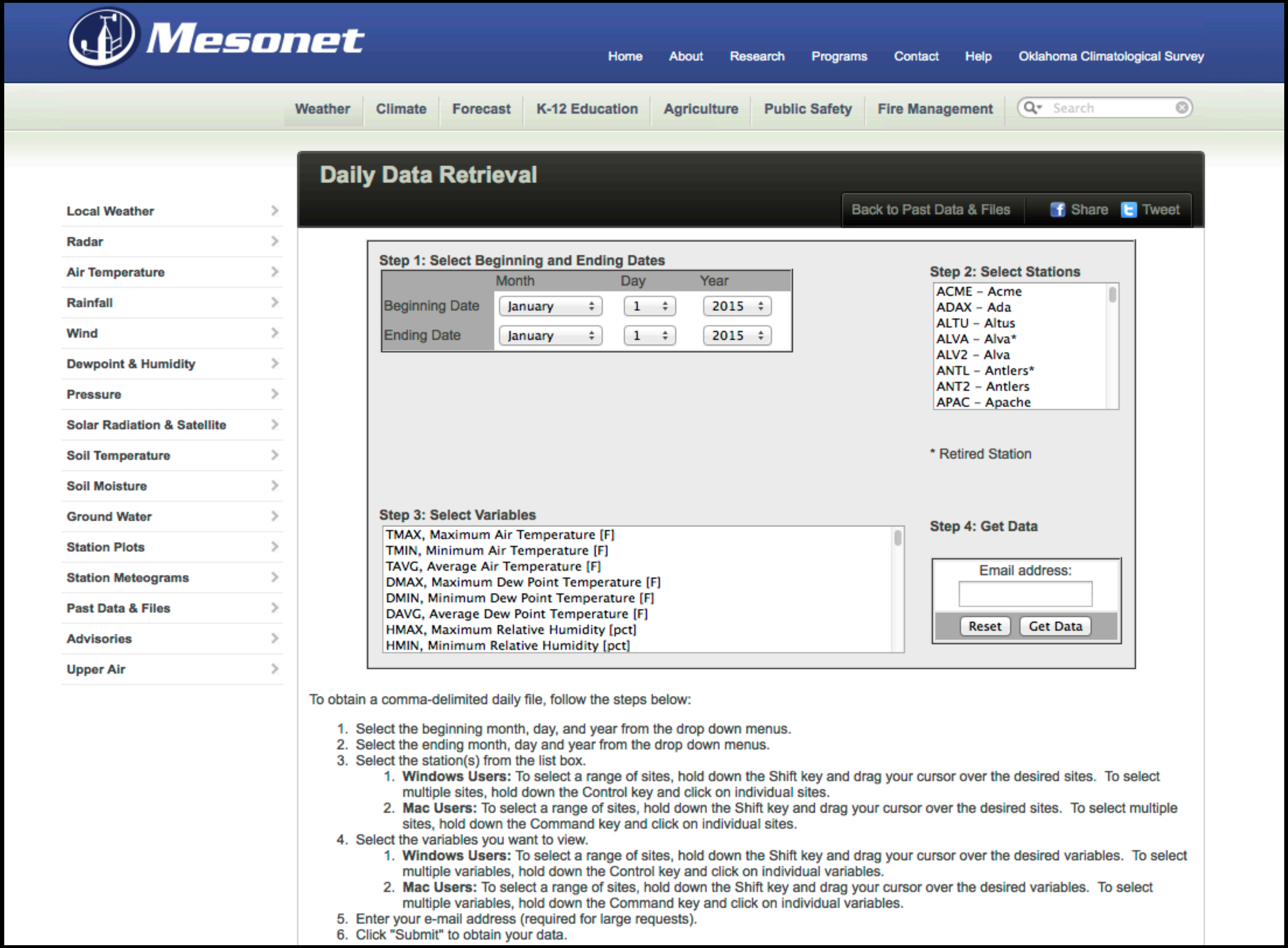
WBGT Risk categories from NWS Tulsa
http://www.srh.noaa.gov/tsa/?n=wbgt

Wet Bulb Globe Temperature Risk

6:00 PM November 5, 2015 CST
Created 6:05:35 PM November 5, 2015 CST. © Copyright 2015

The Wet Bulb Globe Temperature Risk map plots the current wet bulb globe temperature (degrees F) at the standard height of 1.5m (5 feet) along with its associated risk category. The wet bulb globe temperature is an estimation of the impact of temperature, humidity, wind speed, and solar radiation on humans. Its values are similar to a heat index; however, the wet bulb globe temperature additionally accounts for sunlight exposure and wind speed. The risk categories are based on guidelines from the NWS Tulsa WFO. This map is updated every 5 minutes.

OK Mesonet Wet Bulb Globe Temperature Risk



Daily Data Retrieval

Step 1: Select Beginning and Ending Dates

	Month	Day	Year
Beginning Date	January	1	2015
Ending Date	January	1	2015

Step 2: Select Stations

ACME – Acme
ADAX – Ada
ALTU – Altus
ALVA – Alva*
ALV2 – Alva
ANTL – Antlers*
ANT2 – Antlers
APAC – Apache

* Retired Station

Step 3: Select Variables

TMAX, Maximum Air Temperature [F]
TMIN, Minimum Air Temperature [F]
TAVG, Average Air Temperature [F]
DMAX, Maximum Dew Point Temperature [F]
DMIN, Minimum Dew Point Temperature [F]
DAVG, Average Dew Point Temperature [F]
HMAX, Maximum Relative Humidity [pct]
HMIN, Minimum Relative Humidity [pct]

Step 4: Get Data

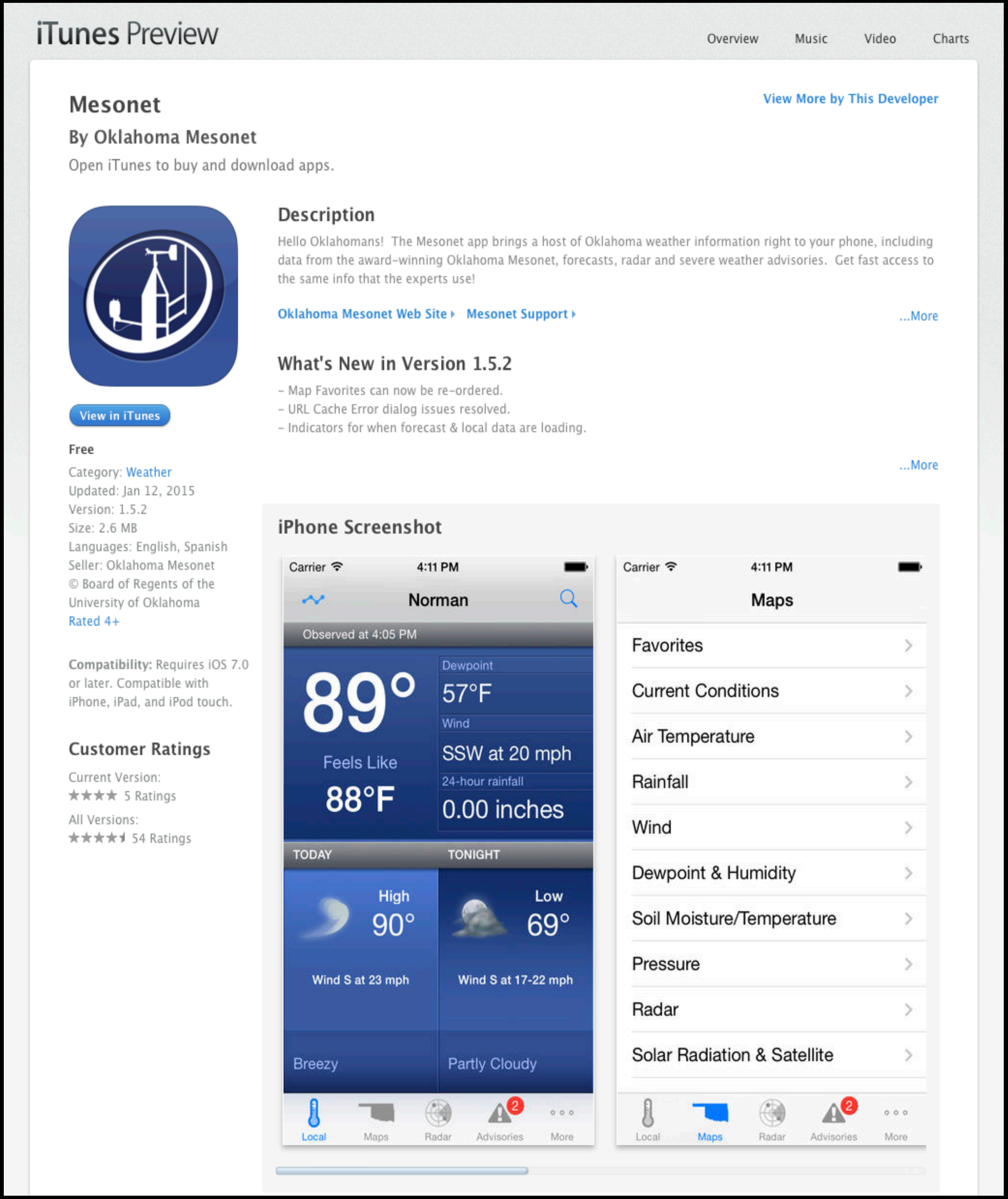
Email address:

To obtain a comma-delimited daily file, follow the steps below:

1. Select the beginning month, day, and year from the drop down menus.
2. Select the ending month, day and year from the drop down menus.
3. Select the station(s) from the list box.
    1. **Windows Users:** To select a range of sites, hold down the Shift key and drag your cursor over the desired sites. To select multiple sites, hold down the Control key and click on individual sites.
    2. **Mac Users:** To select a range of sites, hold down the Shift key and drag your cursor over the desired sites. To select multiple sites, hold down the Command key and click on individual sites.
4. Select the variables you want to view.
    1. **Windows Users:** To select a range of sites, hold down the Shift key and drag your cursor over the desired variables. To select multiple variables, hold down the Control key and click on individual variables.
    2. **Mac Users:** To select a range of sites, hold down the Shift key and drag your cursor over the desired variables. To select multiple variables, hold down the Command key and click on individual variables.
5. Enter your e-mail address (required for large requests).
6. Click "Submit" to obtain your data.

OK Mesonet Data Available on the Web

. . . and
as an App.



iTunes Preview

Mesonet

By Oklahoma Mesonet

Open iTunes to buy and download apps.

View More by This Developer

Free

Category: Weather
Updated: Jan 12, 2015
Version: 1.5.2
Size: 2.6 MB
Languages: English, Spanish
Seller: Oklahoma Mesonet
© Board of Regents of the University of Oklahoma
Rated 4+

Compatibility: Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

Current Version:
★★★★ 5 Ratings

All Versions:
★★★★½ 54 Ratings

Description

Hello Oklahomans! The Mesonet app brings a host of Oklahoma weather information right to your phone, including data from the award-winning Oklahoma Mesonet, forecasts, radar and severe weather advisories. Get fast access to the same info that the experts use!

Oklahoma Mesonet Web Site ▸ Mesonet Support ▸

...More

What's New in Version 1.5.2

- Map Favorites can now be re-ordered.
- URL Cache Error dialog issues resolved.
- Indicators for when forecast & local data are loading.

...More

iPhone Screenshot

Policy and OK Mesonet

Low oil prices, lower water reserves challenge Oklahoma

By Joel Dean The Duncan Banner | Posted: Thursday, February 19, 2015 3:45 am

With water woes and falling gas prices, Oklahoma is facing economic and natural hardships. State Rep. Tom Cole sat down with The Duncan Banner staff and went over some of the federal and state responses to these trying situations.

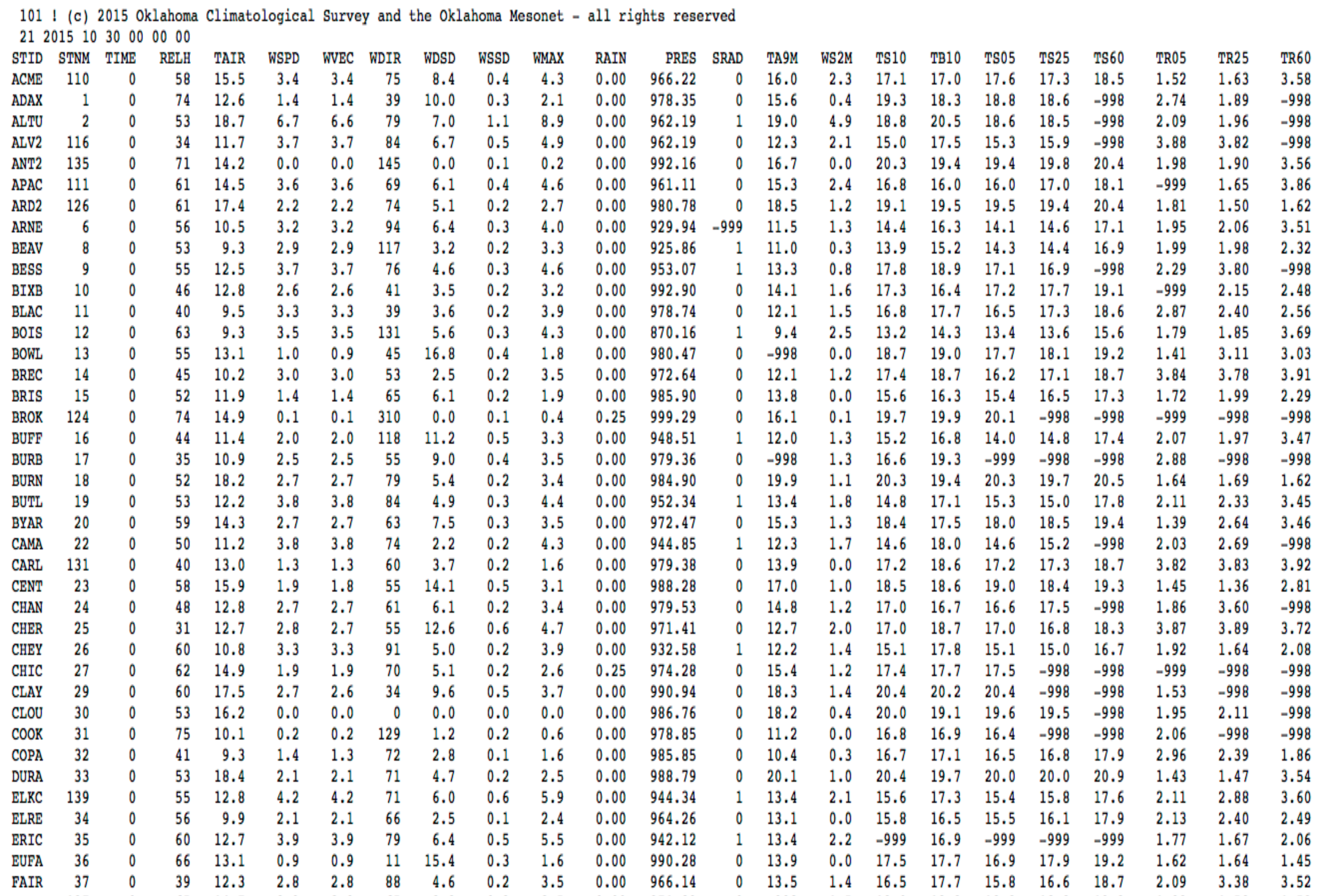
Cole said that one of the big things the federal government is doing to help is the science that must precede any solution.

“In Oklahoma, looking at a $600 million budget shortfall, the idea of investing in water infrastructure is pretty tough,” Cole said. “One area I think we are doing some pretty good work is in research.

“There is everything from groundwater research through the geological society, the use of Mesonet data on water flows and things like that. We are trying to get a much better understanding on things that are available. I think we are trying, at least through pilot programs, to

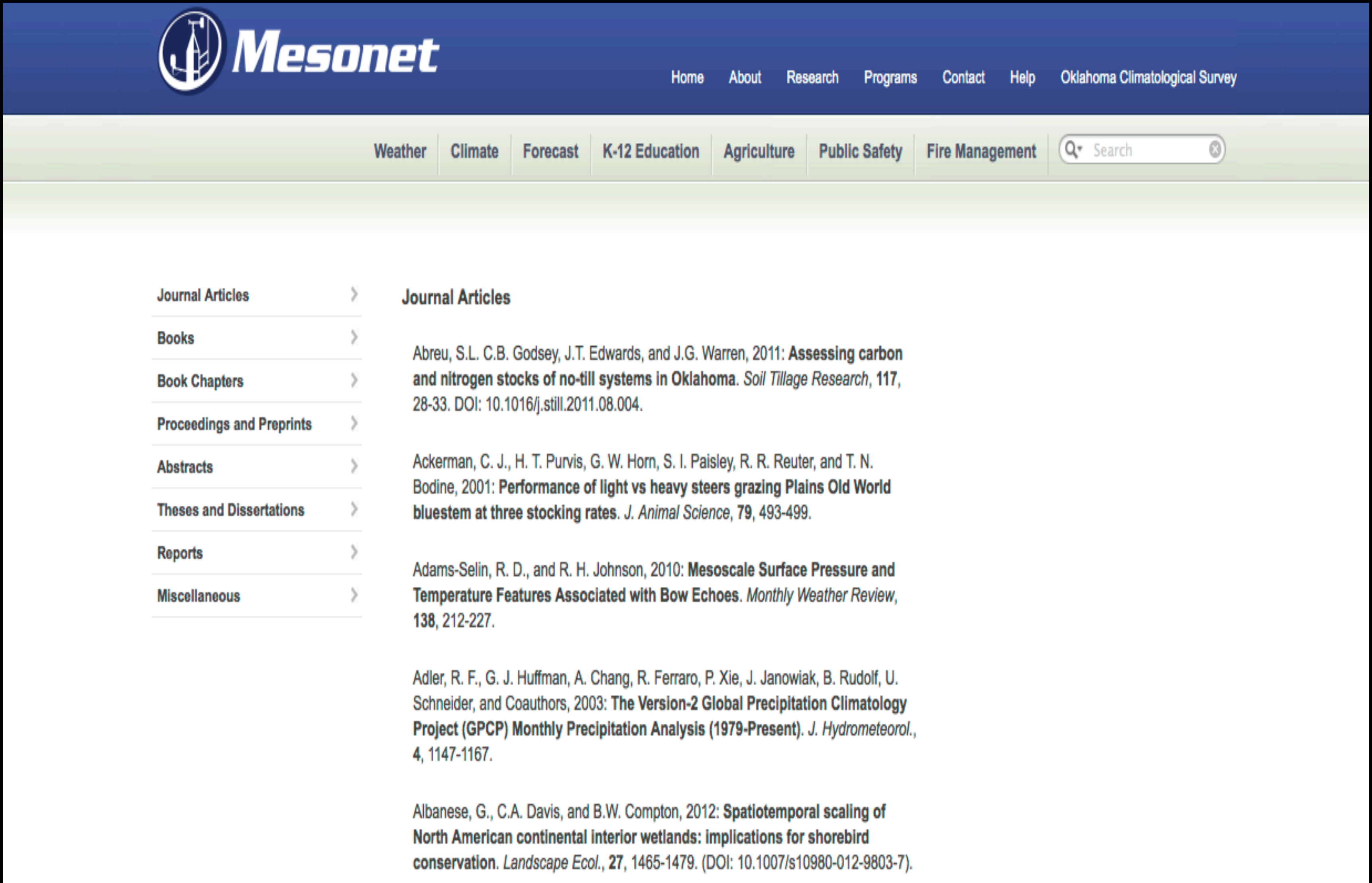
Tom Cole

Tom Cole



```
 101 ! (c) 2015 Oklahoma Climatological Survey and the Oklahoma Mesonet - all rights reserved
 21 2015 10 30 00 00 00
STID STNM TIME  RELH  TAIR  WSPD  WVEC WDIR  WDSD  WSSD  WMAX  RAIN   PRES SRAD  TA9M  WS2M  TS10  TB10  TS05  TS25  TS60   TR05  TR25  TR60
ACME  110    0    58  15.5   3.4   3.4   75   8.4   0.4   4.3  0.00 966.22    0  16.0   2.3  17.1  17.0  17.6  17.3  18.5   1.52  1.63  3.58
ADAX    1    0    74  12.6   1.4   1.4   39  10.0   0.3   2.1  0.00 978.35    0  15.6   0.4  19.3  18.3  18.8  18.6  -998   2.74  1.89  -998
ALTU    2    0    53  18.7   6.7   6.6   79   7.0   1.1   8.9  0.00 962.19    1  19.0   4.9  18.8  20.5  18.6  18.5  -998   2.09  1.96  -998
ALV2  116    0    34  11.7   3.7   3.7   84   6.7   0.5   4.9  0.00 962.19    0  12.3   2.1  15.0  17.5  15.3  15.9  -998   3.88  3.82  -998
ANT2  135    0    71  14.2   0.0   0.0  145   0.0   0.1   0.2  0.00 992.16    0  16.7   0.0  20.3  19.4  19.4  19.8  20.4   1.98  1.90  3.56
APAC  111    0    61  14.5   3.6   3.6   69   6.1   0.4   4.6  0.00 961.11    0  15.3   2.4  16.8  16.0  16.0  17.0  18.1   -999  1.65  3.86
ARD2  126    0    61  17.4   2.2   2.2   74   5.1   0.2   2.7  0.00 980.78    0  18.5   1.2  19.1  19.5  19.5  19.4  20.4   1.81  1.50  1.62
ARNE    6    0    56  10.5   3.2   3.2   94   6.4   0.3   4.0  0.00 929.94 -999  11.5   1.3  14.4  16.3  14.1  14.6  17.1   1.95  2.06  3.51
BEAV    8    0    53   9.3   2.9   2.9  117   3.2   0.2   3.3  0.00 925.86    1  11.0   0.3  13.9  15.2  14.3  14.4  16.9   1.99  1.98  2.32
BESS    9    0    55  12.5   3.7   3.7   76   4.6   0.3   4.6  0.00 953.07    1  13.3   0.8  17.8  18.9  17.1  16.9  -998   2.29  3.80  -998
BIXB   10    0    46  12.8   2.6   2.6   41   3.5   0.2   3.2  0.00 992.90    0  14.1   1.6  17.3  16.4  17.2  17.7  19.1   -999  2.15  2.48
BLAC   11    0    40   9.5   3.3   3.3   39   3.6   0.2   3.9  0.00 978.74    0  12.1   1.5  16.8  17.7  16.5  17.3  18.6   2.87  2.40  2.56
BOIS   12    0    63   9.3   3.5   3.5  131   5.6   0.3   4.3  0.00 870.16    1   9.4   2.5  13.2  14.3  13.4  13.6  15.6   1.79  1.85  3.69
BOWL   13    0    55  13.1   1.0   0.9   45  16.8   0.4   1.8  0.00 980.47    0  -998   0.0  18.7  19.0  17.7  18.1  19.2   1.41  3.11  3.03
BREC   14    0    45  10.2   3.0   3.0   53   2.5   0.2   3.5  0.00 972.64    0  12.1   1.2  17.4  18.7  16.2  17.1  18.7   3.84  3.78  3.91
BRIS   15    0    52  11.9   1.4   1.4   65   6.1   0.2   1.9  0.00 985.90    0  13.8   0.0  15.6  16.3  15.4  16.5  17.3   1.72  1.99  2.29
BROK  124    0    74  14.9   0.1   0.1  310   0.0   0.1   0.4  0.25 999.29    0  16.1   0.1  19.7  19.9  20.1  -998  -998   -999  -998  -998
BUFF   16    0    44  11.4   2.0   2.0  118  11.2   0.5   3.3  0.00 948.51    1  12.0   1.3  15.2  16.8  14.0  14.8  17.4   2.07  1.97  3.47
BURB   17    0    35  10.9   2.5   2.5   55   9.0   0.4   3.5  0.00 979.36    0  -998   1.3  16.6  19.3  -999  -998  -998   2.88  -998  -998
BURN   18    0    52  18.2   2.7   2.7   79   5.4   0.2   3.4  0.00 984.90    0  19.9   1.1  20.3  19.4  20.3  19.7  20.5   1.64  1.69  1.62
BUTL   19    0    53  12.2   3.8   3.8   84   4.9   0.3   4.4  0.00 952.34    1  13.4   1.8  14.8  17.1  15.3  15.0  17.8   2.11  2.33  3.45
BYAR   20    0    59  14.3   2.7   2.7   63   7.5   0.3   3.5  0.00 972.47    0  15.3   1.3  18.4  17.5  18.0  18.5  19.4   1.39  2.64  3.46
CAMA   22    0    50  11.2   3.8   3.8   74   2.2   0.2   4.3  0.00 944.85    1  12.3   1.7  14.6  18.0  14.6  15.2  -998   2.03  2.69  -998
CARL  131    0    40  13.0   1.3   1.3   60   3.7   0.2   1.6  0.00 979.38    0  13.9   0.0  17.2  18.6  17.2  17.3  18.7   3.82  3.83  3.92
CENT   23    0    58  15.9   1.9   1.8   55  14.1   0.5   3.1  0.00 988.28    0  17.0   1.0  18.5  18.6  19.0  18.4  19.3   1.45  1.36  2.81
CHAN   24    0    48  12.8   2.7   2.7   61   6.1   0.2   3.4  0.00 979.53    0  14.8   1.2  17.0  16.7  16.6  17.5  -998   1.86  3.60  -998
CHER   25    0    31  12.7   2.8   2.7   55  12.6   0.6   4.7  0.00 971.41    0  12.7   2.0  17.0  18.7  17.0  16.8  18.3   3.87  3.89  3.72
CHEY   26    0    60  10.8   3.3   3.3   91   5.0   0.2   3.9  0.00 932.58    1  12.2   1.4  15.1  17.8  15.1  15.0  16.7   1.92  1.64  2.08
CHIC   27    0    62  14.9   1.9   1.9   70   5.1   0.2   2.6  0.25 974.28    0  15.4   1.2  17.4  17.7  17.5  -998  -998   -999  -998  -998
CLAY   29    0    60  17.5   2.7   2.6   34   9.6   0.5   3.7  0.00 990.94    0  18.3   1.4  20.4  20.2  20.4  -998  -998   1.53  -998  -998
CLOU   30    0    53  16.2   0.0   0.0    0   0.0   0.0   0.0  0.00 986.76    0  18.2   0.4  20.0  19.1  19.6  19.5  -998   1.95  2.11  -998
COOK   31    0    75  10.1   0.2   0.2  129   1.2   0.2   0.6  0.00 978.85    0  11.2   0.0  16.8  16.9  16.4  -998  -998   2.06  -998  -998
COPA   32    0    41   9.3   1.4   1.3   72   2.8   0.1   1.6  0.00 985.85    0  10.4   0.3  16.7  17.1  16.5  16.8  17.9   2.96  2.39  1.86
DURA   33    0    53  18.4   2.1   2.1   71   4.7   0.2   2.5  0.00 988.79    0  20.1   1.0  20.4  19.7  20.0  20.0  20.9   1.43  1.47  3.54
ELKC  139    0    55  12.8   4.2   4.2   71   6.0   0.6   5.9  0.00 944.34    1  13.4   2.1  15.6  17.3  15.4  15.8  17.6   2.11  2.88  3.60
ELRE   34    0    56   9.9   2.1   2.1   66   2.5   0.1   2.4  0.00 964.26    0  13.1   0.0  15.8  16.5  15.5  16.1  17.9   2.13  2.40  2.49
ERIC   35    0    60  12.7   3.9   3.9   79   6.4   0.5   5.5  0.00 942.12    1  13.4   2.2  -999  16.9  -999  -999  -999   1.77  1.67  2.06
EUFA   36    0    66  13.1   0.9   0.9   11  15.4   0.3   1.6  0.00 990.28    0  13.9   0.0  17.5  17.7  16.9  17.9  19.2   1.62  1.64  1.45
FAIR   37    0    39  12.3   2.8   2.8   88   4.6   0.2   3.5  0.00 966.14    0  13.5   1.4  16.5  17.7  15.8  16.6  18.7   2.09  3.38  3.52
```

Oklahoma Mesonet Sensor Data



Journal Articles

Abreu, S.L. C.B. Godsey, J.T. Edwards, and J.G. Warren, 2011: **Assessing carbon and nitrogen stocks of no-till systems in Oklahoma**. *Soil Tillage Research*, **117**, 28-33. DOI: 10.1016/j.still.2011.08.004.

Ackerman, C. J., H. T. Purvis, G. W. Horn, S. I. Paisley, R. R. Reuter, and T. N. Bodine, 2001: **Performance of light vs heavy steers grazing Plains Old World bluestem at three stocking rates**. *J. Animal Science*, **79**, 493-499.

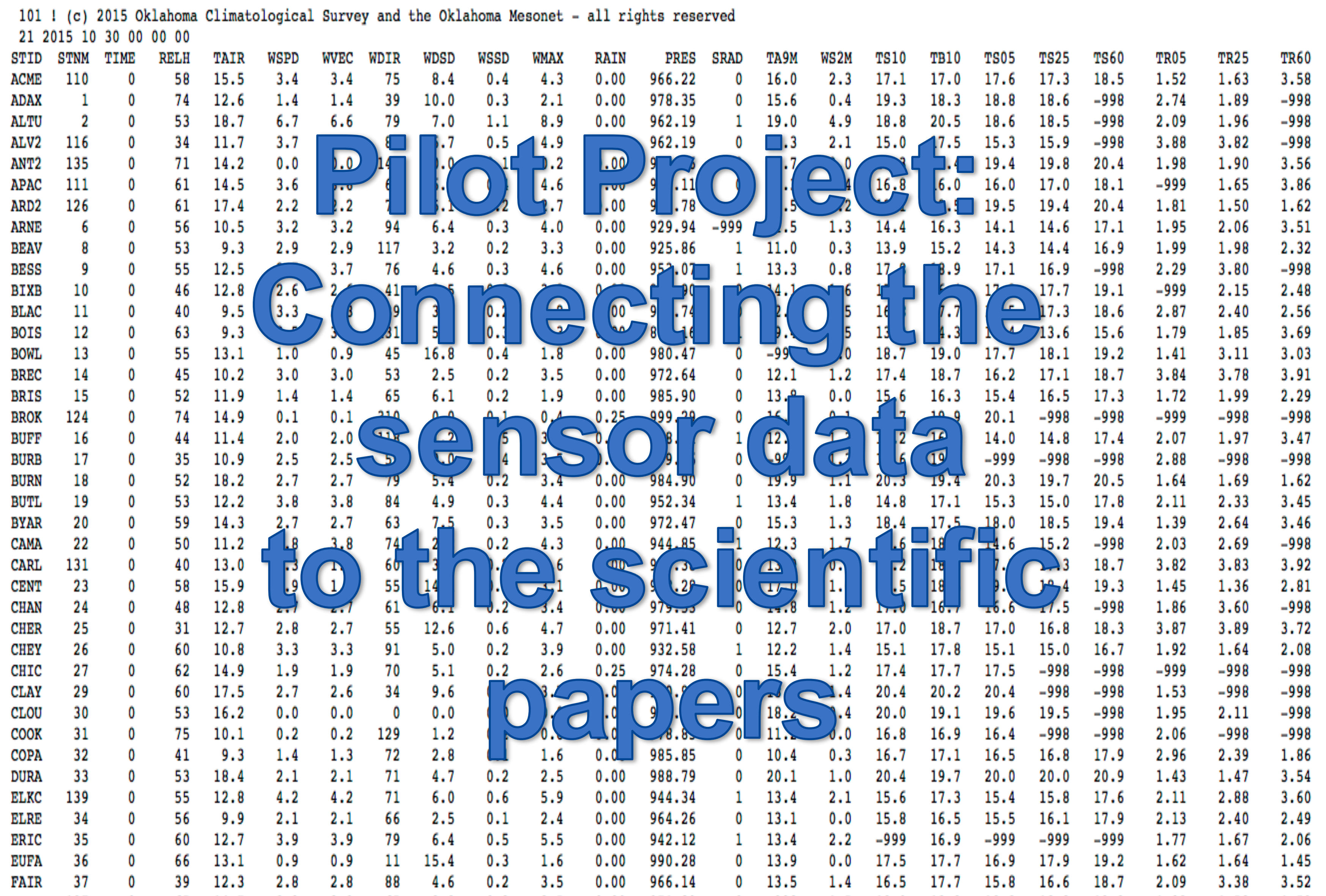
Adams-Selin, R. D., and R. H. Johnson, 2010: **Mesoscale Surface Pressure and Temperature Features Associated with Bow Echoes**. *Monthly Weather Review*, **138**, 212-227.

Adler, R. F., G. J. Huffman, A. Chang, R. Ferraro, P. Xie, J. Janowiak, B. Rudolf, U. Schneider, and Coauthors, 2003: **The Version-2 Global Precipitation Climatology Project (GPCP) Monthly Precipitation Analysis (1979-Present)**. *J. Hydrometeorol.*, **4**, 1147-1167.

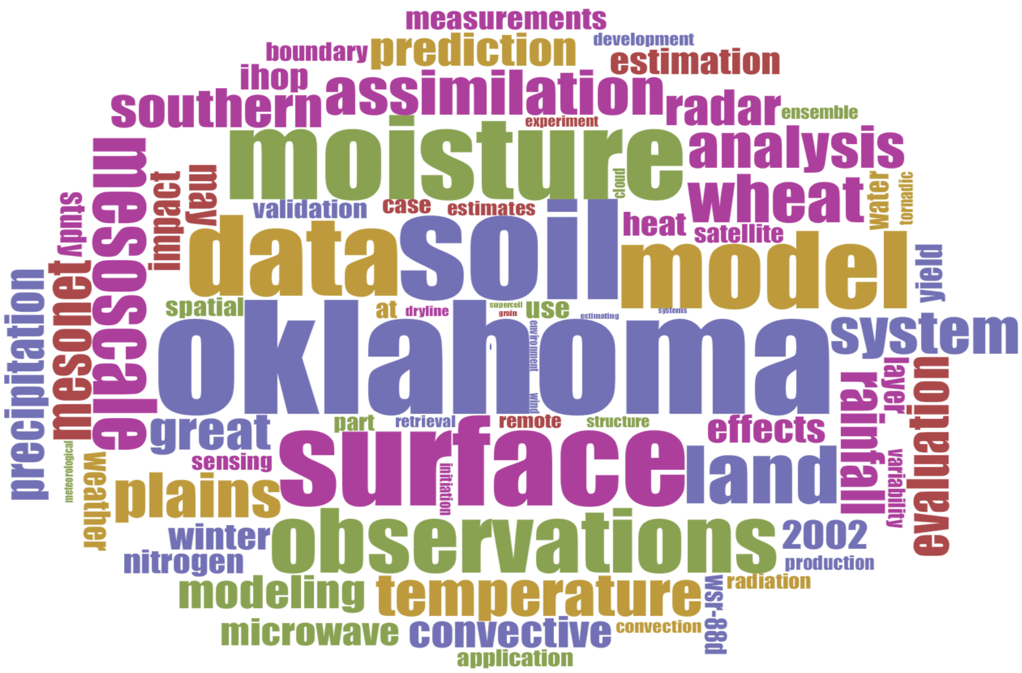
Albanese, G., C.A. Davis, and B.W. Compton, 2012: **Spatiotemporal scaling of North American continental interior wetlands: implications for shorebird conservation**. *Landscape Ecol.*, **27**, 1465-1479. (DOI: 10.1007/s10980-012-9803-7).

Scientific papers referencing Oklahoma Mesonet

Pilot Project: Connecting the sensor data to the scientific papers



```
101 ! (c) 2015 Oklahoma Climatological Survey and the Oklahoma Mesonet - all rights reserved
21 2015 10 30 00 00 00
STID  STNM  TIME  RELH  TAIR  WSPD  WVEC  WDIR  WDSD  WSSD  WMAX  RAIN  PRES  SRAD  TA9M  WS2M  TS10  TB10  TS05  TS25  TS60  TR05  TR25  TR60
ACME   110     0    58  15.5   3.4   3.4    75   8.4   0.4   4.3  0.00  966.22     0  16.0   2.3  17.1  17.0  17.6  17.3  18.5  1.52  1.63  3.58
ADAX     1     0    74  12.6   1.4   1.4    39  10.0   0.3   2.1  0.00  978.35     0  15.6   0.4  19.3  18.3  18.8  18.6  -998  2.74  1.89  -998
ALTU     2     0    53  18.7   6.7   6.6    79   7.0   1.1   8.9  0.00  962.19     1  19.0   4.9  18.8  20.5  18.6  18.5  -998  2.09  1.96  -998
ALV2   116     0    34  11.7   3.7  [illegible] [illegible] [illegible]   0.5   4.9  [illegible]  962.19     0  [illegible]   2.1  15.0  [illegible]  15.3  15.9  -998  3.88  3.82  -998
ANT2   135     0    71  14.2   0.0  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  19.4  19.8  20.4  1.98  1.90  3.56
APAC   111     0    61  14.5   3.6  [illegible] [illegible] [illegible] [illegible]   4.6  [illegible] [illegible] [illegible] [illegible] [illegible]  16.8  [illegible]  16.0  17.0  18.1  -999  1.65  3.86
ARD2   126     0    61  17.4   2.2  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  19.5  19.4  20.4  1.81  1.50  1.62
ARNE     6     0    56  10.5   3.2   3.2    94   6.4   0.3   4.0  0.00  929.94  -999  [illegible]   1.3  14.4  16.3  14.1  14.6  17.1  1.95  2.06  3.51
BEAV     8     0    53   9.3   2.9   2.9   117   3.2   0.2   3.3  0.00  925.86     1  11.0   0.3  13.9  15.2  14.3  14.4  16.9  1.99  1.98  2.32
BESS     9     0    55  12.5  [illegible]   3.7    76   4.6   0.3   4.6  0.00  [illegible]     1  13.3   0.8  [illegible] [illegible]  17.1  16.9  -998  2.29  3.80  -998
BIXB    10     0    46  12.8   2.6  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  17.7  19.1  -999  2.15  2.48
BLAC    11     0    40   9.5   3.3  [illegible] [illegible] [illegible]   0.2  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  17.3  18.6  2.87  2.40  2.56
BOIS    12     0    63   9.3  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  13.6  15.6  1.79  1.85  3.69
BOWL    13     0    55  13.1   1.0   0.9    45  16.8   0.4   1.8  0.00  980.47     0  [illegible] [illegible]  18.7  19.0  17.7  18.1  19.2  1.41  3.11  3.03
BREC    14     0    45  10.2   3.0   3.0    53   2.5   0.2   3.5  0.00  972.64     0  12.1   1.2  17.4  18.7  16.2  17.1  18.7  3.84  3.78  3.91
BRIS    15     0    52  11.9   1.4   1.4    65   6.1   0.2   1.9  0.00  985.90     0  [illegible]   0.0  [illegible]  16.3  15.4  16.5  17.3  1.72  1.99  2.29
BROK   124     0    74  14.9   0.1   0.1  [illegible] [illegible] [illegible] [illegible]  0.25  [illegible]     0  [illegible] [illegible] [illegible] [illegible]  20.1  -998  -998  -999  -998  -998
BUFF    16     0    44  11.4   2.0   2.0  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]     1  [illegible] [illegible] [illegible] [illegible]  14.0  14.8  17.4  2.07  1.97  3.47
BURB    17     0    35  10.9   2.5   2.5  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]     0  [illegible] [illegible] [illegible] [illegible]  -999  -998  -998  2.88  -998  -998
BURN    18     0    52  18.2   2.7   2.7    79   5.4   0.2   3.4  0.00  984.90     0  19.9   1.1  20.3  19.4  20.3  19.7  20.5  1.64  1.69  1.62
BUTL    19     0    53  12.2   3.8   3.8    84   4.9   0.3   4.4  0.00  952.34     1  13.4   1.8  14.8  17.1  15.3  15.0  17.8  2.11  2.33  3.45
BYAR    20     0    59  14.3   2.7   2.7    63   7.5   0.3   3.5  0.00  972.47     0  15.3   1.3  18.4  17.5  18.0  18.5  19.4  1.39  2.64  3.46
CAMA    22     0    50  11.2  [illegible]   3.8  [illegible] [illegible]   0.2   4.3  0.00  944.85     1  12.3   1.7  [illegible] [illegible] [illegible]  15.2  -998  2.03  2.69  -998
CARL   131     0    40  13.0  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  18.7  3.82  3.83  3.92
CENT    23     0    58  15.9  [illegible] [illegible]    55  [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]  19.3  1.45  1.36  2.81
CHAN    24     0    48  12.8  [illegible] [illegible]    61   6.1   0.2   3.4  [illegible] [illegible]     0  14.8   1.2  [illegible]  16.7  16.6  17.5  -998  1.86  3.60  -998
CHER    25     0    31  12.7   2.8   2.7    55  12.6   0.6   4.7  0.00  971.41     0  12.7   2.0  17.0  18.7  17.0  16.8  18.3  3.87  3.89  3.72
CHEY    26     0    60  10.8   3.3   3.3    91   5.0   0.2   3.9  0.00  932.58     1  12.2   1.4  15.1  17.8  15.1  15.0  16.7  1.92  1.64  2.08
CHIC    27     0    62  14.9   1.9   1.9    70   5.1   0.2   2.6  0.25  974.28     0  15.4   1.2  17.4  17.7  17.5  -998  -998  -999  -998  -998
CLAY    29     0    60  17.5   2.7   2.6    34   9.6  [illegible] [illegible] [illegible] [illegible]     0  [illegible] [illegible]  20.4  20.2  20.4  -998  -998  1.53  -998  -998
CLOU    30     0    53  16.2   0.0   0.0     0   0.0  [illegible] [illegible] [illegible] [illegible]     0  18.2  [illegible]  20.0  19.1  19.6  19.5  -998  1.95  2.11  -998
COOK    31     0    75  10.1   0.2   0.2   129   1.2  [illegible] [illegible] [illegible] [illegible]     0  [illegible] [illegible]  16.8  16.9  16.4  -998  -998  2.06  -998  -998
COPA    32     0    41   9.3   1.4   1.3    72   2.8  [illegible]   1.6  [illegible]  985.85     0  10.4   0.3  16.7  17.1  16.5  16.8  17.9  2.96  2.39  1.86
DURA    33     0    53  18.4   2.1   2.1    71   4.7   0.2   2.5  0.00  988.79     0  20.1   1.0  20.4  19.7  20.0  20.0  20.9  1.43  1.47  3.54
ELKC   139     0    55  12.8   4.2   4.2    71   6.0   0.6   5.9  0.00  944.34     1  13.4   2.1  15.6  17.3  15.4  15.8  17.6  2.11  2.88  3.60
ELRE    34     0    56   9.9   2.1   2.1    66   2.5   0.1   2.4  0.00  964.26     0  13.1   0.0  15.8  16.5  15.5  16.1  17.9  2.13  2.40  2.49
ERIC    35     0    60  12.7   3.9   3.9    79   6.4   0.5   5.5  0.00  942.12     1  13.4   2.2  -999  16.9  -999  -999  -999  1.77  1.67  2.06
EUFA    36     0    66  13.1   0.9   0.9    11  15.4   0.3   1.6  0.00  990.28     0  13.9   0.0  17.5  17.7  16.9  17.9  19.2  1.62  1.64  1.45
FAIR    37     0    39  12.3   2.8   2.8    88   4.6   0.2   3.5  0.00  966.14     0  13.5   1.4  16.5  17.7  15.8  16.6  18.7  2.09  3.38  3.52
```



From the titles of journal articles referencing Oklahoma Mesonet

Pilot Project Research Questions:

1. **How** to identify **who** is using OK Mesonet data?
2. **Where** are they? (Geographically and disciplinarily)
3. **How** is the data used?
4. **What** are the data use specifics?
5. Are there ***bibliometric patterns*** in papers using OK Mesonet data?
6. Are there ***datacentric patterns*** in papers using OK Mesonet data?
7. What are the **implications** for management of OK Mesonet data?

Bibliometric Questions:

- How to identify who is using OK Mesonet data?
- Where are they? (Geographically and disciplinarily)
- Are there ***bibliometric patterns*** in papers using OK Mesonet data?

Datacentric Research Questions:

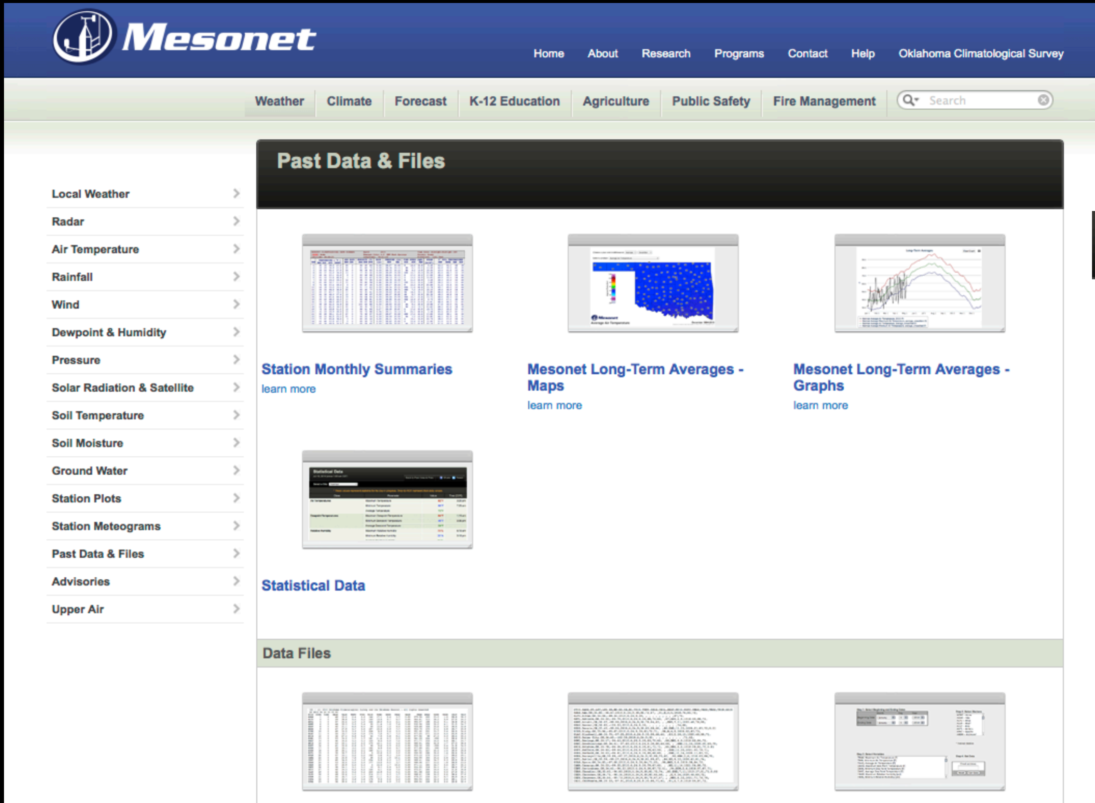
- How is the data used?
- What are the data specifics?
- Are there ***datacentric patterns*** in papers using OK Mesonet data?

Mesonet Research Question:

- What are the **implications** for management of OK Mesonet data?

Bibliometric Questions:

1. How to identify who is using OK Mesonet data?



Past Data & Files

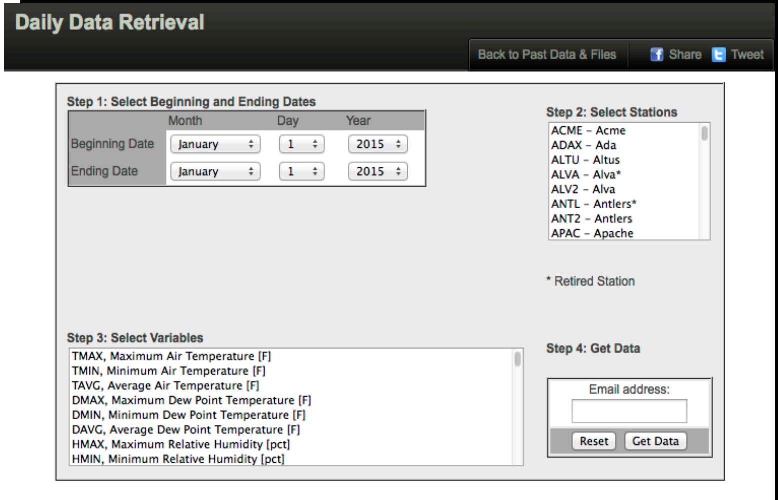
Station Monthly Summaries

Mesonet Long-Term Averages - Maps

Mesonet Long-Term Averages - Graphs

Statistical Data

Data Files



Daily Data Retrieval

Step 1: Select Beginning and Ending Dates

	Month	Day	Year
Beginning Date	January	1	2015
Ending Date	January	1	2015

Step 2: Select Stations

ACME – Acme
ADAX – Ada
ALTU – Altus
ALVA – Alva*
ALV2 – Alva
ANTL – Antlers*
ANT2 – Antlers
APAC – Apache

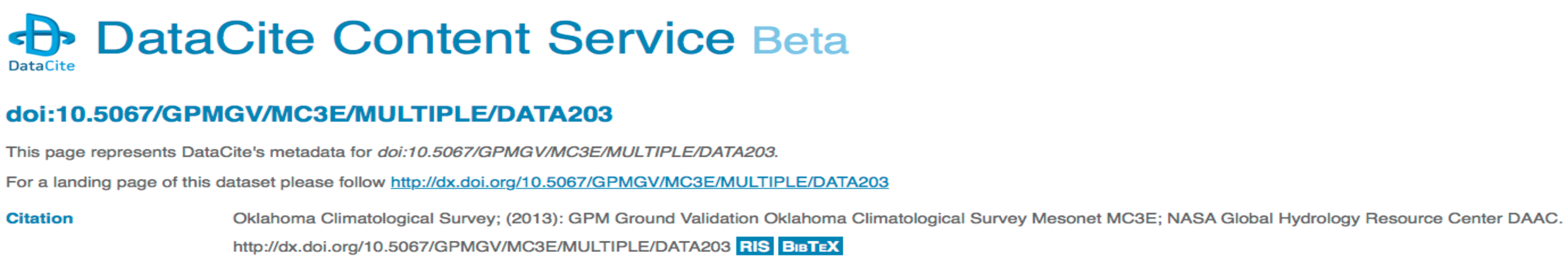
* Retired Station

Step 3: Select Variables

TMAX, Maximum Air Temperature [F]
TMIN, Minimum Air Temperature [F]
TAVG, Average Air Temperature [F]
DMAX, Maximum Dew Point Temperature [F]
DMIN, Minimum Dew Point Temperature [F]
DAVG, Average Dew Point Temperature [F]
HMAX, Maximum Relative Humidity [pct]
HMIN, Minimum Relative Humidity [pct]

Step 4: Get Data

Email address:



DataCite Content Service Beta

doi:10.5067/GPMGV/MC3E/MULTIPLE/DATA203

This page represents DataCite's metadata for *doi:10.5067/GPMGV/MC3E/MULTIPLE/DATA203.*

For a landing page of this dataset please follow http://dx.doi.org/10.5067/GPMGV/MC3E/MULTIPLE/DATA203

Citation	Oklahoma Climatological Survey; (2013): GPM Ground Validation Oklahoma Climatological Survey Mesonet MC3E; NASA Global Hydrology Resource Center DAAC. http://dx.doi.org/10.5067/GPMGV/MC3E/MULTIPLE/DATA203

Potential Bibliometrics Information

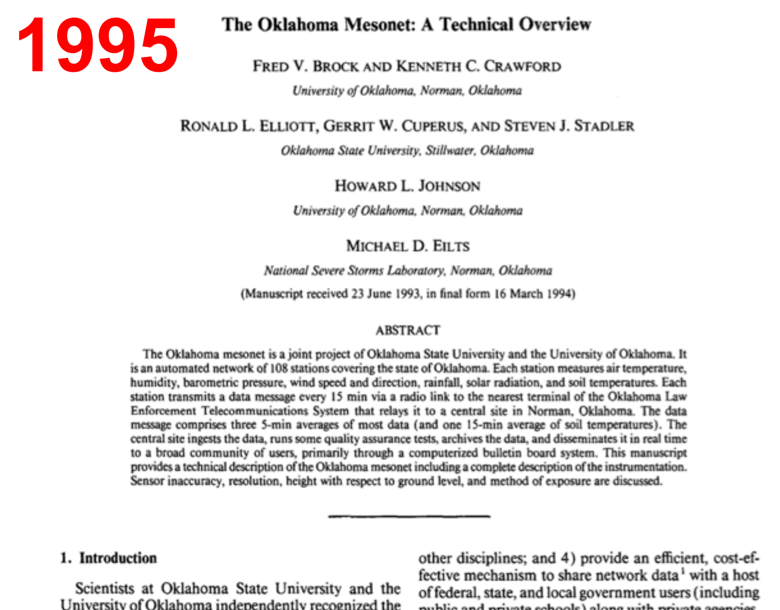
- Author(s) affiliation/locations
- Author(s) citation/co-citation networks

- Paper/journal titles
- Paper citation/co-citation networks
- Publication date(s)
- Paper/journal discipline/emphasis
- Paper topic(s), keywords

- Innovations/patents/models

- OK Mesonet data source/citation/acknowledgements

1995



The Oklahoma Mesonet: A Technical Overview

Fred V. Brock and Kenneth C. Crawford
University of Oklahoma, Norman, Oklahoma

Ronald L. Elliott, Gerrit W. Cuperus, and Steven J. Stadler
Oklahoma State University, Stillwater, Oklahoma

Howard L. Johnson
University of Oklahoma, Norman, Oklahoma

Michael D. Eilts
National Severe Storms Laboratory, Norman, Oklahoma

(Manuscript received 23 June 1993, in final form 16 March 1994)

ABSTRACT

The Oklahoma mesonet is a joint project of Oklahoma State University and the University of Oklahoma. It is an automated network of 108 stations covering the state of Oklahoma. Each station measures air temperature, humidity, barometric pressure, wind speed and direction, rainfall, solar radiation, and soil temperatures. Each station transmits a data message every 15 min via a radio link to the nearest terminal of the Oklahoma Law Enforcement Telecommunications System that relays it to a central site in Norman, Oklahoma. The data message comprises three 5-min averages of most data (and one 15-min average of soil temperatures). The central site ingests the data, runs some quality assurance tests, archives the data, and disseminates it in real time to a broad community of users, primarily through a computerized bulletin board system. This manuscript provides a technical description of the Oklahoma mesonet including a complete description of the instrumentation. Sensor inaccuracy, resolution, height with respect to ground level, and method of exposure are discussed.

1. Introduction

Scientists at Oklahoma State University and the University of Oklahoma independently recognized the need to establish a surface network for agricultural, hydrological, and meteorological monitoring nearly 10 years ago. With funding from the State of Oklahoma, they formed a joint project to develop the Oklahoma mesonetwork (abbreviated mesonet). The goals of the mesonet (Crawford et al. 1992) are to 1) operate a high quality network of 108 automated stations that measure about 10 variables each and transmit these data, in real time, every 15 min; 2) relay that information via a state telecommunications network to a central processing site for quality assurance, archival, product generation, and dissemination; 3) share this new data stream with the research community in Oklahoma and combine network data with other data streams for application in agriculture, meteorology, and other disciplines; and 4) provide an efficient, cost-effective mechanism to share network data[1] with a host of federal, state, and local government users (including public and pri
Besides the a
logical goals,
work must al
energy conse
system was co
broad goals.

The meson
mittee of six
University, tw
one from the
steering comn
form special t
lecting meson

Corresponding author address: Dr. Fred V. Brock, School of Meteorology, University of Oklahoma, Norman, OK 73019.

[1] Those wishin
homa Climatolo
OK 73019-0628.

Dr. Fred Brock (first OK Mesonet lab manager) *et al.*'s paper as both "concept symbol" (Small, 1978) and "black box" (Latour, 1987) for Mesonet

2015

THE OKLAHOMA MESONET - A TECHNICAL OVERVIEW

By: BROCK, FV (BROCK, FV); CRAWFORD, KC (CRAWFORD, KC); ELLIOTT, RL (ELLIOTT, RL); CUPERUS, GW (CUPERUS, GW); STADLER, SJ (STADLER, SJ); JOHNSON, HL (JOHNSON, HL); EILTS, MD (EILTS, MD)

JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY
Volume: 12 Issue: 1 Pages: 5-19
DOI: 10.1175/1520-0426(1995)012<0005:TOMATO>2.0.CO;2
Published: FEB 1995
View Journal Information

Abstract

The Oklahoma mesonet is a joint project of Oklahoma State University and the University of Oklahoma. It is an automated network of 108 stations covering the state of Oklahoma. Each station measures air temperature, humidity, barometric pressure, wind speed and direction, rainfall, solar radiation, and soil temperatures. Each station transmits a data message every 15 min via a radio link to the nearest terminal of the Oklahoma Law Enforcement Telecommunications System that relays it to a central site in Norman, Oklahoma. The data message comprises three 5-min averages of most data (and one 15-min average of soil temperatures). The central site ingests the data, runs some quality assurance tests, archives the data, and disseminates it in real time to a broad community of users, primarily through a computerized bulletin board system. This manuscript provides a technical description of the Oklahoma mesonet including a complete description of the instrumentation. Sensor inaccuracy, resolution, height with respect to ground level, and method of exposure are discussed.

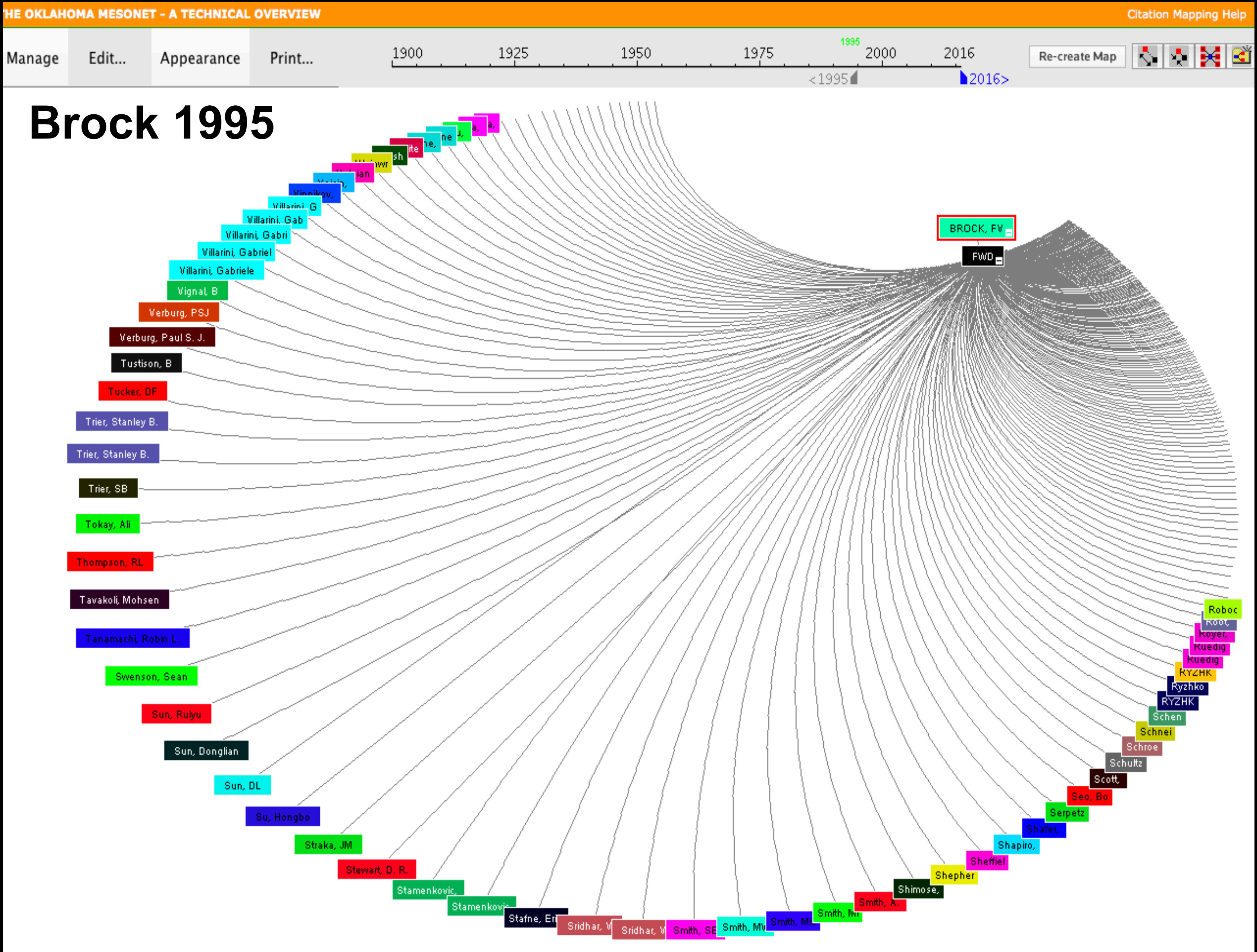
Citation Network

343 Times Cited
19 Cited References
View Related Records
View Citation Map
Create Citation Alert

(data from Web of Science TM Core Collection)

All Times Cited Counts
344 in All Databases
343 in Web of Science Core Collection
48 in BIOSIS Citation Index
1 in Chinese Science Citation Database
0 in Data Citation Index
0 in SciELO Citation Index

Brock 1995


HE OKLAHOMA MESONET - A TECHNICAL OVERVIEW
Citation Mapping Help
Manage
Edit...
Appearance
Print...
1900
1925
1950
1975
1995
2000
2016
<1995
2016>
Re-create Map
BROCK, FV
FWD
Villarini, G
Villarini, Gab
Villarini, Gabri
Villarini, Gabriel
Villarini, Gabriele
Vignal, B
Verburg, PSJ
Verburg, Paul S. J.
Tustison, B
Tucker, DF
Trier, Stanley B.
Trier, Stanley B.
Trier, SB
Tokay, Ali
Thompson, RL
Tavakoli, Mohsen
Tanamachi, Robin L.
Swenson, Sean
Sun, Ruiyu
Sun, Donglian
Sun, DL
Su, Hongbo
Straka, JM
Stewart, D. R.
Stamenkovic,
Stamenkovic
Stafne, Er
Sridhar, V
Sridhar, V
Smith, SE
Smith, MV
Smith, M
Smith, M
Smith, A.
Shimose,
Shepher
Sheffiel
Shapiro,
Shafer,
Serpetz
Seo, Bo
Scott,
Schultz
Schroe
Schnei
Schen
RYZHK
Ryzhko
RYZHK
Ruedig
Ruedig
Royer,
Rood,
Roboc

Quality Assurance (opening the “black box”)

VOLUME 27 JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY OCTOBER 2010

Quality Assurance Procedures for Mesoscale Meteorological Data

CHRISTOPHER A. FIEBRICH, CYNTHIA R. MORGAN, AND ALEXANDRIA G. MCCOMBS
Oklahoma Mesonet, and Oklahoma Climatological Survey, Norman, Oklahoma

PETER K. HALL JR.
Iberdrola Renewables, Portland, Oregon

RENEE A. MCPH
Oklahoma Mesonet, and Oklahoma Climatolog

(Manuscript received 18 December 2009,

ABSTRACT

Mesoscale meteorological data present their own challeng
(QA) process because of their variability in both space and t
perform quality control at many different stages (e.g., sensor
sessment). As part of an ongoing refinement of quality a
Oklahoma Mesonet continually review advancements and t
article's aim is to share those reviews and resources with sc
program. General QA considerations, general automated tes
discussed.

1. Introduction

Proper interpretation of meteorological data requires knowledge of its context, including its metadata and any quality assurance procedures applied to the data. Mesoscale data present their own challenges and advantages during the quality assurance process. Unfortunately, a meteorological observation can become inaccurate during many different stages of its life cycle. Although proactive maintenance and sensor recalibration can greatly improve data quality (Fiebrich et al. 2006), some inac-

stage
an e
ratin
auto
prod
McP
Di
croel
ogie
netw

---

474 JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY VOLUME 17

Quality Assurance Procedures in the Oklahoma Mesonetwork

MARK A. SHAFER, CHRISTOPHER A. FIEBRICH, AND DEREK S. ARNDT
Oklahoma Climatological Survey, Norman, Oklahoma

SHERMAN E. FREDRICKSON*
National Severe Storms Laboratory, Norman, Oklahoma

Norman, Oklahoma

14 June 1999)

ecision makers alike. The models that
sed by a wider community, from policy
s to emergency managers' decisions to
e network, the Oklahoma Mesonetwork

t principal components: an instrument
ion. The instrument laboratory ensures
standards established by the Mesonet
al inspection of the performance of the
onitor data each day, set data flags as
nspection provides human judgment to

communication links. A QA manager
y flow. The QA manager receives daily
nicians in the field, and issues summary
Mesonet staff remain in contact through
ese means of communication provide a
as, to feedback on action taken by the

of the network through operational data
and long-term analyses. This manuscript de-
y assurance (QA) procedures developed
course of building the Mesonet and em-
ationally in May 1999.
homa Mesonet operates 115 stations on a

VOLUME 24 JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY MARCH 2007

Statewide Monitoring of the Mesoscale Environment: A Technical Update on the Oklahoma Mesonet

RENEE A. MCPHERSON,* CHRISTOPHER A. FIEBRICH,* KENNETH C. CRAWFORD,* RONALD L. ELLIOTT,+
JAMES R. KILBY,* DAVID L. GRIMSLEY,* JANET E. MARTINEZ,* JEFFREY B. BASARA,*
BRADLEY G. ILLSTON,* DALE A. MORRIS,* KEVIN A. KLOESEL,* STEPHEN J. STADLER,+
ANDREA D. MELVIN,* ALBERT J. SUTHERLAND,# HIMANSHU SHRIVASTAVA,* J. D. CARLSON,+
J. MICHAEL WOLFINBARGER,* JARED P. BOSTIC,* AND DAVID B. DEMKO*

**Oklahoma Climatological Survey, Norman, Oklahoma*
+Oklahoma State University, Stillwater, Oklahoma
#Oklahoma Cooperative Extension Service, Oklahoma State University, Norman, Oklahoma

(Manuscript received 11 January 2006, in final form 27 June 2006)

ABSTRACT

Established as a multipurpose network, the Oklahoma Mesonet operates more than 110 surface observing stations that send data every 5 min to an operations center for data quality assurance, product generation, and dissemination. Quality-assured data are available within 5 min of the observation time. Since 1994, the Oklahoma Mesonet has collected 3.5 billion weather and soil observations and produced millions of decision-making products for its customers.

1. Introduction

The University of Oklahoma (OU) and Oklahoma State University (OSU) operate more than 110 surface observing stations comprising the Oklahoma Mesonet (Brock et al. 1995). Remote stations send data every 5

duced millions of decision-making products for its customers.

2. Overview of the Oklahoma Mesonet

Scientists and engineers at OSU and OU planted the

Potential Datacentric Information:

- Air temperature (1.5 m)
- Air temperature (9 m)
- Barometric pressure
- Rainfall
- Relative humidity (1.5 m)
- Soil moisture (5 cm)
- Soil moisture (25 cm)
- Soil moisture (60 cm)
- Soil temperature (5 cm)
- Soil temperature (10 cm)
- Soil temperature (25 cm)
- Soil temperature (60 cm)
- Solar radiation (1.8 m)
- Wind speed/direction (2 m)
- Wind speed/direction (10 m)

Potential Mesonet Information:

- Mesonet installation site(s)
- [stated or calculated]

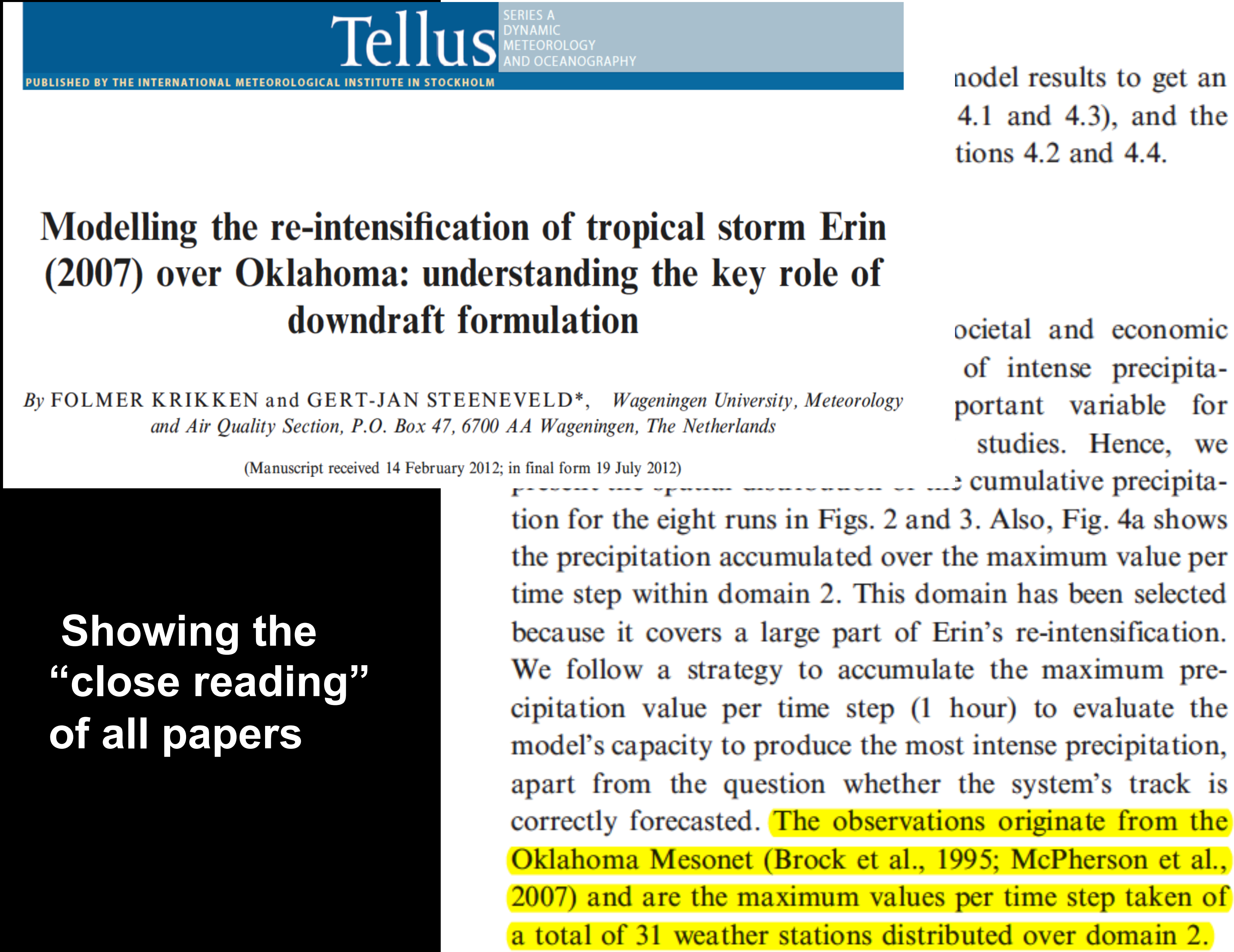
- Data date(s)
- Data time(s)

- Data resolution [minimum size of objects represented in data set]
- Data duration [varies for different measures]

Significant event(s)

- Special calculations, methodologies, etc.

- Other state mesonets used in study



Tellus
SERIES A
DYNAMIC
METEOROLOGY
AND OCEANOGRAPHY
PUBLISHED BY THE INTERNATIONAL METEOROLOGICAL INSTITUTE IN STOCKHOLM

Modelling the re-intensification of tropical storm Erin (2007) over Oklahoma: understanding the key role of downdraft formulation

By FOLMER KRIKKEN and GERT-JAN STEENEVELD*, *Wageningen University, Meteorology and Air Quality Section, P.O. Box 47, 6700 AA Wageningen, The Netherlands*

(Manuscript received 14 February 2012; in final form 19 July 2012)

nodel results to get an
4.1 and 4.3), and the
tions 4.2 and 4.4.

ocietal and economic
of intense precipita-
portant variable for
studies. Hence, we
e cumulative precipitation for the eight runs in Figs. 2 and 3. Also, Fig. 4a shows the precipitation accumulated over the maximum value per time step within domain 2. This domain has been selected because it covers a large part of Erin's re-intensification. We follow a strategy to accumulate the maximum precipitation value per time step (1 hour) to evaluate the model's capacity to produce the most intense precipitation, apart from the question whether the system's track is correctly forecasted. The observations originate from the Oklahoma Mesonet (Brock et al., 1995; McPherson et al., 2007) and are the maximum values per time step taken of a total of 31 weather stations distributed over domain 2.

Showing the
"close reading"
of all papers

Rangeland Ecology & Management 68 (2015) 290–297

Contents lists available at ScienceDirect

Rangeland Ecology & Management

journal homepage: http://www.elsevier.com/locate/rama

Drought Influences Control of Parasitic Flies of Cattle on Pastures Managed with Patch-Burn Grazing☆

J. Derek Scasta [a,*], David M. Engle [b], Justin L. Talley [c], John R. Weir [d], Samuel D. Fuhlendorf [b], Diane M. Debinski [e]

[a] *Assistant Professor, Department of Ecosystem Science and Management, University of Wyoming, Laramie, WY, 82071, USA*
[b] *Regents Professors, Department of Natural Resource Ecology and Management, Oklahoma State University, Stillwater, OK, 74078, USA*
[c] *Associate Professor, Department of Entomology and Plant Pathology, Oklahoma State University, Stillwater, OK 74078, USA*
[d] *Research Associate, Department of Natural Resource Ecology and Management, Oklahoma State University, Stillwater, OK, 74078, USA*
[e] *Professor, Department of Ecology, Evolution and Organismal Biology Department, Iowa State University, Ames, IA, 50013, USA*

ARTICLE INFO

Article history:
Received 9 June 2014
Accepted 13 February 2015

Keywords:
ecology
patch-burning
pest management
production
pyric-herbivory
rangeland

ABSTRACT

We compared the influence of patch-burn grazing to traditional range management
of the most economically injurious fly parasites of cattle. Horn flies (*Haemat*
(*Musca autumnalis*), stable flies (*Stomoxys calcitrans*), and horse flies (*Tabanus* spp.
locations in Oklahoma and Iowa, USA, in 2012 and 2013. Experiments at both locations
three times on rangeland grazed by mature Angus cows. Grazing was year-long in O
Iowa from May to September. One-third of patch-burn pastures were burned an
managed pastures were burned completely in 2012 but not at all in 2013. Because of si
we analyzed locations separately with a mixed effects model. Horn flies and face fli
thresholds with patch-burn grazing but at or above economic thresholds in unburned p
in Iowa that were burned in their entirety had fewer horn flies but did not have fewer
with no burning. There was no difference among treatments in horn fly or face fly
pastures. Stable flies on both treatments at both locations never exceeded the econo
of treatment. Minimizing hay feeding coupled with regular fire could maintain lo
Horse flies at both locations and face flies in Oklahoma were in such low abundance t
were difficult to detect or explain. The lack of a treatment effect in Oklahoma and va
result of a drought year followed by a wet year, reducing the strength of feedbacks dr
pastures burned with patchy fires. Patch-burning or periodically burning entire pastu
a viable cultural method for managing some parasitic flies when drought is not a cons

Introduction

External parasites of beef cattle cause substantial financial losses, exceeding $2 billion annually in the United States (Byford et al., 1992).

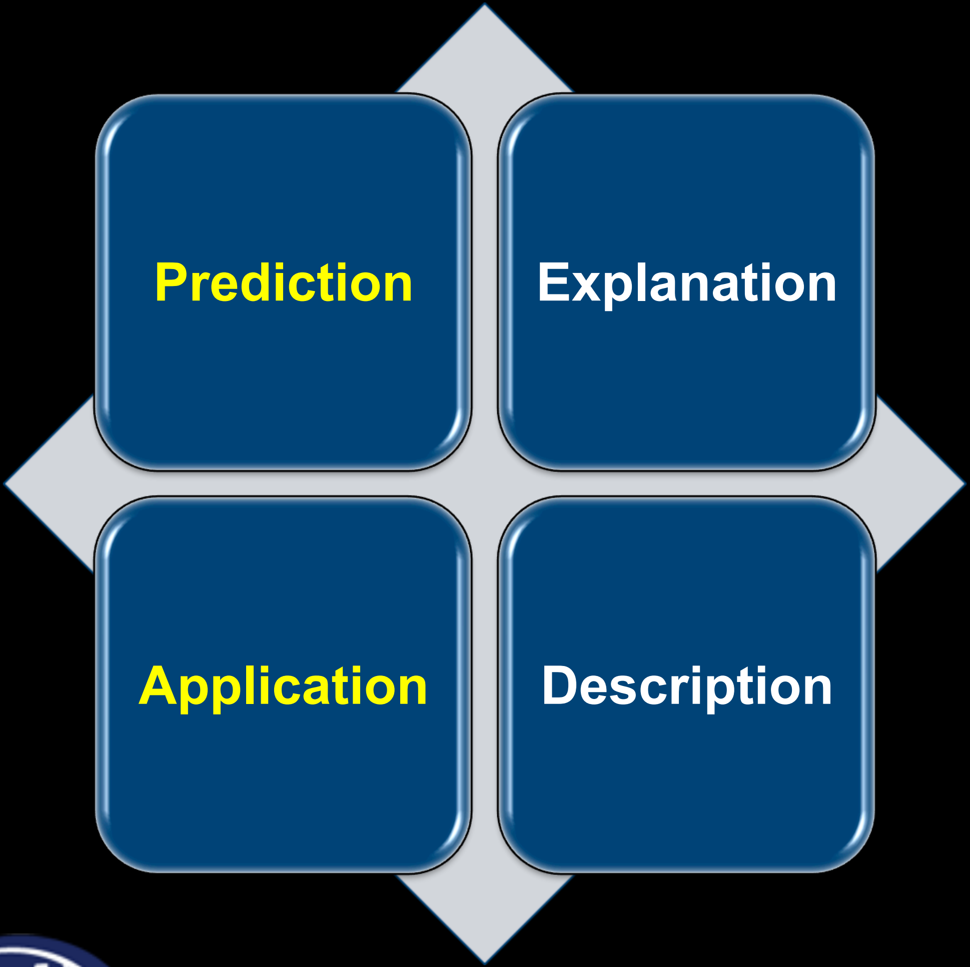
et al., 2008). Considering that approximately 50
herd relies on the forage base of central North
the ecology and management of these grasslands
implications for fly parasite mitigation and prof

---

when taking pictures filled the frame with the animal. We also took all pictures within a discrete time window (Thomas et al., 1989) with the sun at our back, which enhances the visible detection of flies on cattle. Thus, digital zoom in the laboratory accounts for any variability and at the distances images were collected overcomes detection probability issues. Furthermore, we consulted the entomological literature for appropriate methods, conducted sampling under the guidance of a livestock entomologist, used an independent laboratory technician for all identification and counting (independent meaning this person did not know the pastures or cows and did not take the pictures), used digital images that serve as a record that could be re-examined if needed, assessed cattle of uniform black color (Franks et al., 1964), and revised our methods from our 2011 study (Scasta et al., 2012) to incorporate digital technology.

Monthly precipitation and monthly mean temperature data from both state automated weather observation networks were collected from the Mt. Ayr, Iowa Mesonet station and Marena, Oklahoma Mesonet station and summarized (Iowa Environmental Mesonet, 2014; Oklahoma Mesonet, 2014). Precipitation was summarized on the basis of the accumulating monthly total for 2012 and 2013 and plotted with the long-term mean. Monthly mean temperature was summarized on a monthly basis and plotted with the long-term mean. Long-term means for the stations were calculated for 1893 to 2013 for Mt. Ayr, Iowa and 1999 to 2013 (the period of record) for Marena, Oklahoma.

5 Billion Data Points and Counting….



Time

Prediction

Explanation

Application

Description

Events

Mesonet