The Southern Climate Impacts Planning Program

By:
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SCIPP
A NOAA RISA TEAM

LSU
Louisiana State University

What is SCIPP?

- A NOAA funded Regional Integrated Science Assessment (RISA) located in the South Central U.S.

- Mission: “Helping communities build resilience to weather and climate extremes now and in the future”.
  - Projects focused on strengthening the linkage between climate sciences and societal impacts.
  - Topics : Water availability, coastal issues, **precipitation**, hurricanes, drought, **climatic extremes** etc.
  - Stakeholder-focused research.
  - Leveraging partnerships to locate and connect with stakeholders.

Oklahoma Climatological Survey, South Central Climate Adaptation Science Center, Cooperative Institute for Mesoscale Meteorological Studies, **Southern Regional Climate Center**, School of Natural Resources at the University of Nebraska – Lincoln, School of Public Affairs and Administration Urban Planning Program at the University of Kansas, **Louisiana Sea Grant**, Sea Grant Texas, **Office of Homeland Security and Emergency Preparedness (New Orleans)**, **Applied Weather Associates (AWA).**

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Stakeholder Driven Research

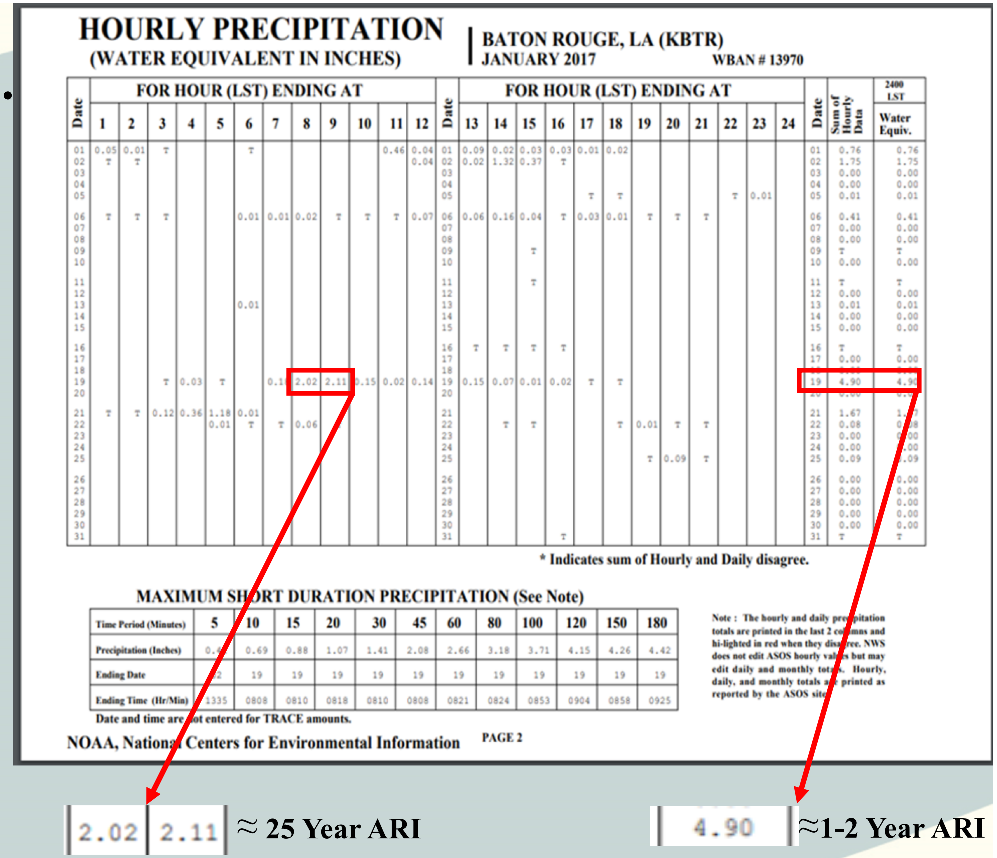
- SCIPP routinely provides climate information, data, tools, and research capabilities to stakeholders in the region.
- **Examples**
- Strategic Petroleum Reserve Climate Change Risk and Resilience Assessment
  - Provide regional climate science overview (historical + projected)
  - Conduct climate change variable evaluation and integrate climate science information in risk assessment.
  - Explore the role that climate stressors play in SPR's ability to meet its key organizational objectives in relation to the key resources needed to meet those objectives.
  - **Determine installations risk to future changes.**

No.	Sensitivity	Consequence (C)	No.	Climate Stressor	Likelihood (L)	C + L Score		Risk Score
S3	Ability to maintain necessary raw water quality and quantity for drawdown	Critical (I)	V2	Increases in magnitude of hottest annual temperature	High	IH	1	2
			V4	Increased rainfall amounts on days with rain	High	IH	1	
			V7	Increased number of days with heavy rainfall	Med-High	IMH	2	
			V10	Increased raw water temperature	Med-High	IMH	2	
			V16	Increased chance of flooding/high water levels	Medium	IM	3	
			V17	Increased chance of drought/low water levels	Medium	IM	3	
			V21	Changes in raw water quality – increase sediment	Med-Low	IML	6	

No.	Sensitivity	Risk Score
S1	Ability to respond if a weather event impacts more than one site at the same time	2
S2	Ability to meet statutory oil quantity requirements	2
S3	Ability to maintain necessary raw water quality and quantity for drawdown	2
S8	Reliance on a single supplier of commercial power line to each of the sites	2
S13	Large amount of old and fatigued equipment (70% past lifespan design)	2
S16	Availability of distribution systems, pipelines, and terminals in the region that SPR uses to meet mission requirements	2
S4	Ability to conduct process pump seal flushing and bearing cooling	3
S5	Increased build-up of silt in raw water systems	3
S11	Sites elevation and proximity to the ocean	3
S15	Outdoor workforce exposed to elements	3
S17	Ability to maintain oil temperature (i.e., increasing raw water temperatures affecting crude oil cooling capability)	5
S6	Ability to maintain necessary raw water quality for disposal of brine to the Gulf of Mexico (i.e., 95%+ salinity, pH levels, etc.)	6
S7	Ability to access raw water for flushing of brine strings during fill operations	8
S9	Adequate power required to run the DCS	6
S10	Command center, single facility for control of pumping stations	6
S12	Susceptibility to mold in buildings	10
S14	Wellhead exposure to weather	11

Stakeholder Driven Research Cont.

- Hourly Precipitation Climatology
  - Dissertation research (Dr. Barry Keim) + Precipitation Measurement + Agricultural Needs.
  - "Legler et al. (1999) discussed how seasonal precipitation forecasts might be beneficial for agricultural applications, but only if details were provided regarding not only totals, but changes in a comprehensive suite of precipitation characteristics".
  - Daily data are critical to our understanding of precipitation, its intermittent nature highlights the need to quantify other characteristics (Trenberth and Zhang 2017), for example, intensity, frequency, and duration, which do not operate at the daily scale.



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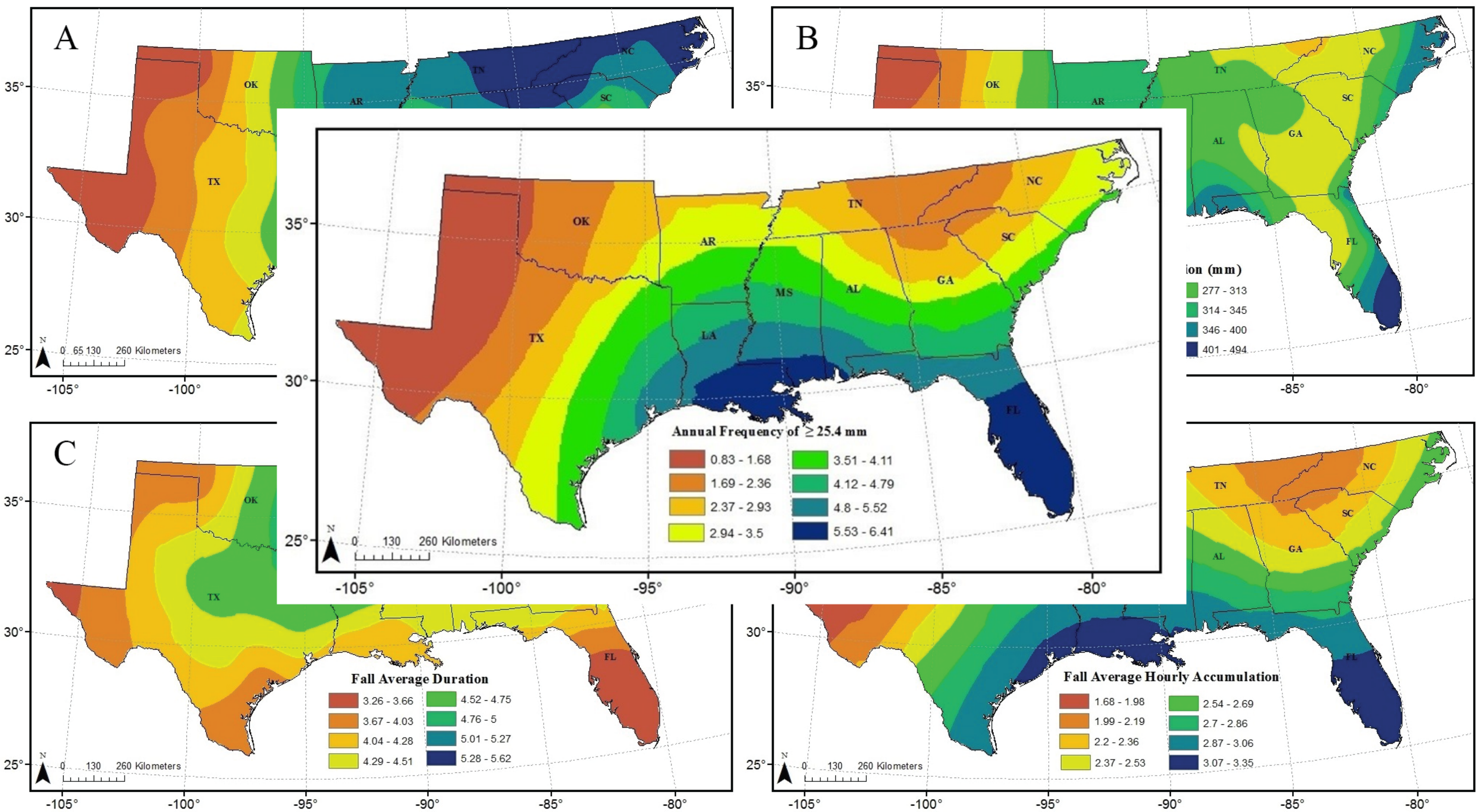
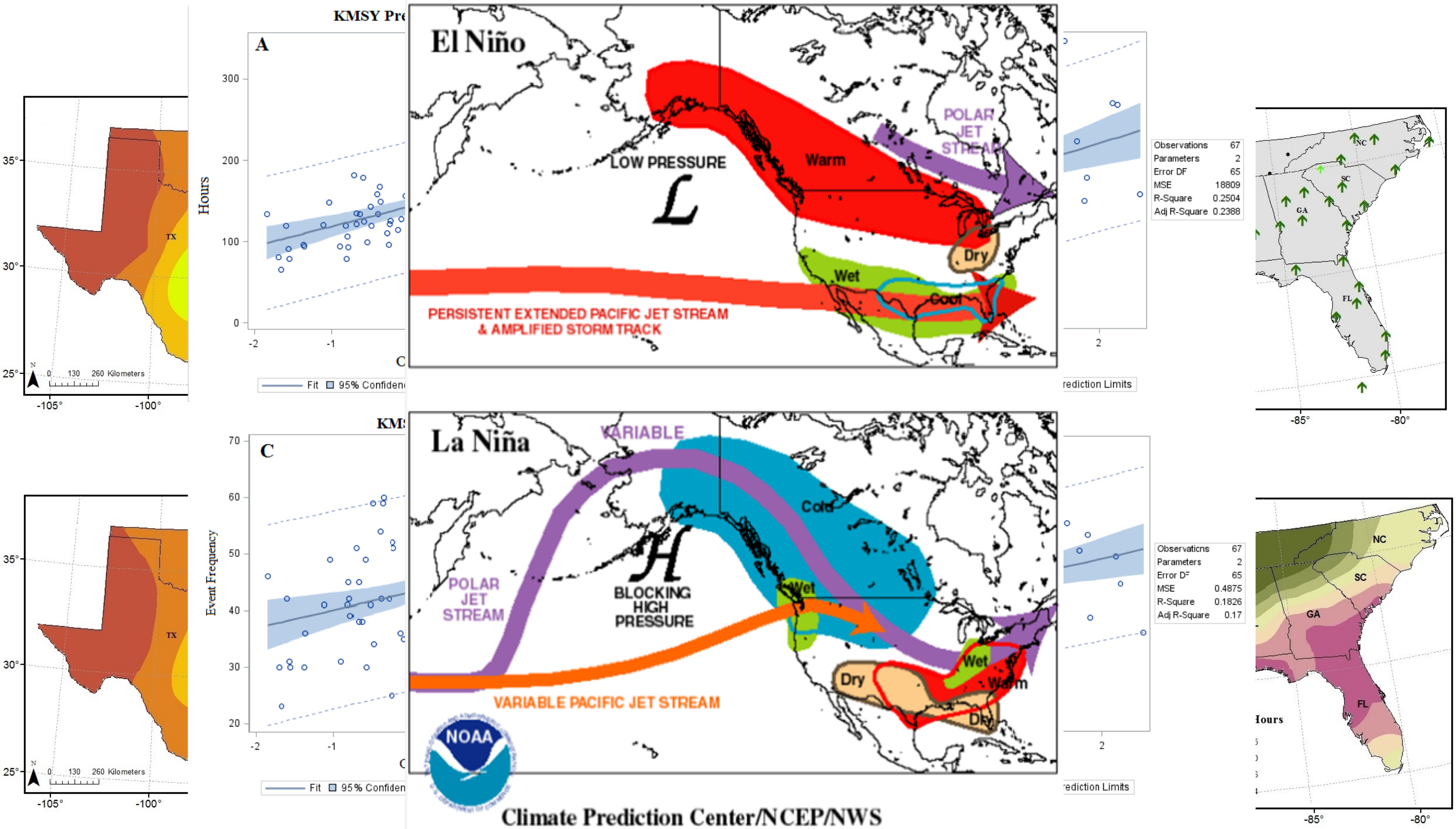
Climatology





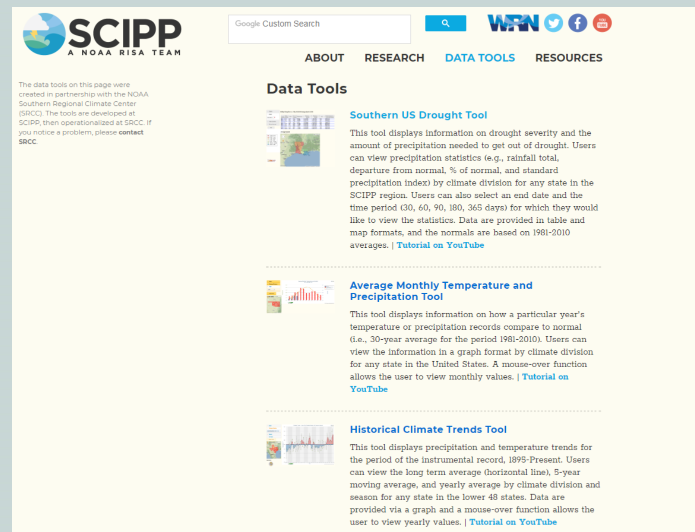
El Niño
LOW PRESSURE
L
Warm
POLAR JET STREAM
Dry
Wet
Cool
PERSISTENT EXTENDED PACIFIC JET STREAM
& AMPLIFIED STORM TRACK
La Niña
VARIABLE
Cold
H
BLOCKING HIGH PRESSURE
POLAR JET STREAM
Wet
Dry
Warm
VARIABLE PACIFIC JET STREAM
NOAA
Climate Prediction Center/NCEP/NWS
KMSY
A
C
Hours
Event Frequency
Fit
95% Confiden
rediction Limits
Observations 67
Parameters 2
Error DF 65
MSE 18809
R-Square 0.2504
Adj R-Square 0.2388
MSE 0.4875
R-Square 0.1826
Adj R-Square 0.17
TX
NC
SC
GA
FL
0 130 260 Kilometers
-105°
-100°
-85°
-80°
35°
30°
25°

Key Stakeholder Needs – SCIPP Perspective

- What are our stakeholders asking for (themes)….
  1. Translation of research results for decision makers.
     1. Is Climate Change real? Did this event occur because of climate change?
     2. Current knowledge on topics (rainfall, temperatures, wind, etc.).

  2. Providing climate data and information.
     1. Surgedat
     2. Research (precipitation)
     3. Data (historical + projections)

  3. Tools
     1. Southern Drought tool
     2. Historical Climate Trends Tool
     3. Average Monthly Temperatures and Precipitation Tool
     4. Simple Planning Tool for Oklahoma Climate Hazards



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Water Reservoir Data Visualization Tool

- Developed by the Southern Regional Climate Center (Dr. David Sathiaraj) + SCIPP.
- Currently covers Texas (91), Oklahoma (30), and Louisiana (1).
- Utility : Help Water Planners regulate water resources at reservoirs + local level users
  - Plan for onset of drought conditions + as well as flooding (high impact precip. events).
  - Small/medium sized communities with reservoir dependence need capability to better manage and prepare.
  - Help public understand complexities of reservoirs and forecasting.
- Examples:
  - Community experiences excessively wet spring (release water/excessive usage) transitions to drought in summer-fall (demand for water exceeds supply).
  - Shorter term as well, 10-16 days (GFS limits).
- **Individual reservoirs meta-data**. Includes -> percent full, elevation, elevation area capacity curves, dead pool elevation, dead pool capacity, conservation pool / storage (minimum amount of storage for continual operations), flood pool elevation (max level a reservoir can handle).

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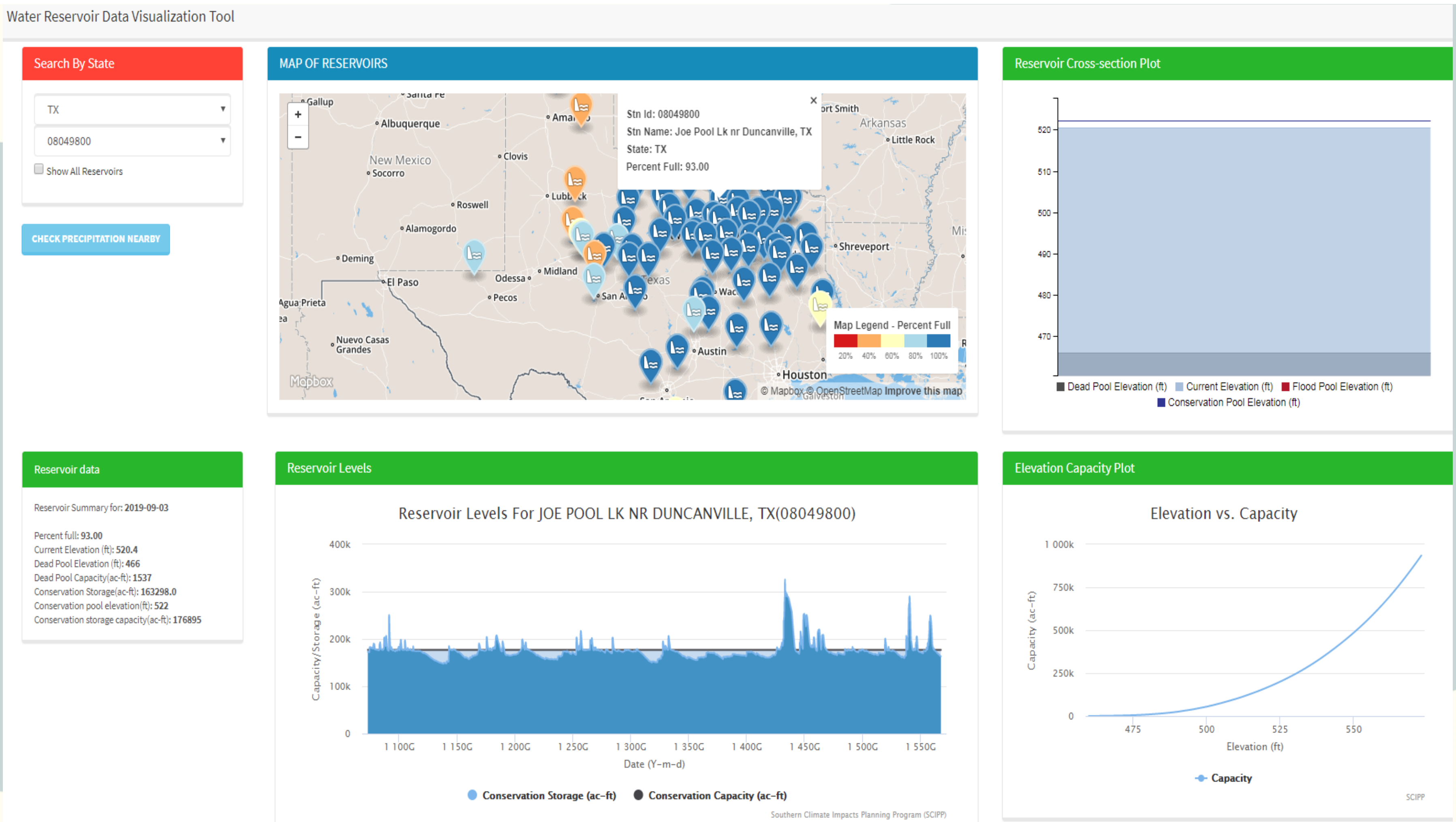

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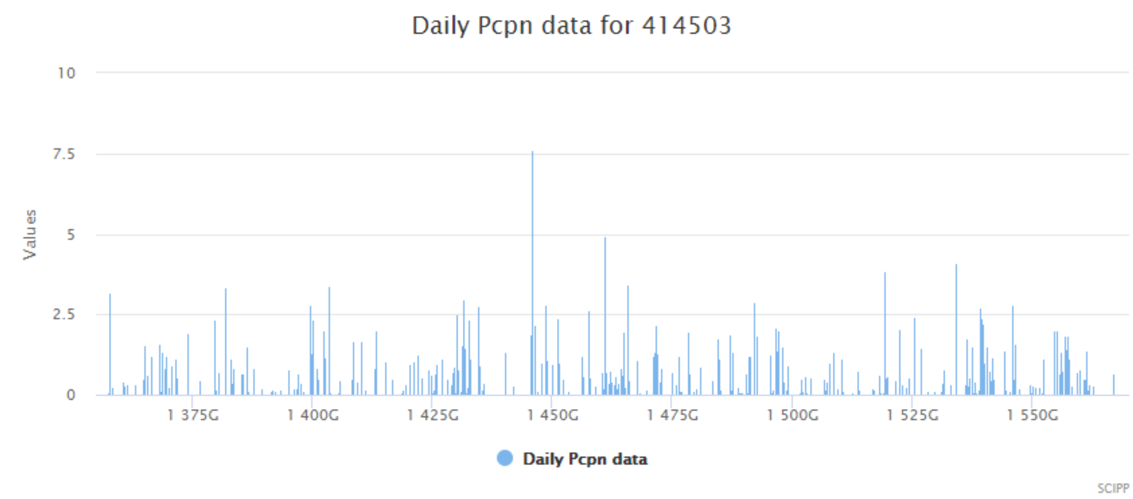
Select Precipitation Station

CLEBURNE {USC00411800}

Precipitation Data



Future for Water Reservoir Visualization Tool

- Expand to other states (NM + KS for drought region).
- Reservoir Editor (for individual reservoir managers and smaller reservoirs that are not connected with USGS + USACE networks).
  - They plug their data into the editor for display of reservoir in the tool.

- Looking for stakeholders + users that are interested in the tool.
  - "Test communities"

- Predictive analytics capability, providing future forecasts (projections) of reservoir levels based on modeled meteorological conditions that can help plan for the onset of droughts or floods (Machine learning).
  - Season to Season forecasts
  - Shorter term as well, 10-16 days (GFS limits).

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Voyage Planning Analysis Tool (VPAT)

Developed by Southern Regional Climate Center (Eric Rohli, Xinbo Huang, Dr. David Sathiaraj).

River height (stage) forecasting tool.

Utility: Planning barge trips (optimizing load with duration).

How it works…

- 12-days (GFS mainly + other inputs)
- Purely machine learning (no hydrologic analysis).
- Weighting stations upstream.
- Near instant hourly river height predictions.
- If you have data on releases (dam) can help predictive power (model only ingests GFS variables).
    - Possible link to Reservoir Tool.

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Voyage Planning Analysis Tool | River Forecast

Station

Search by

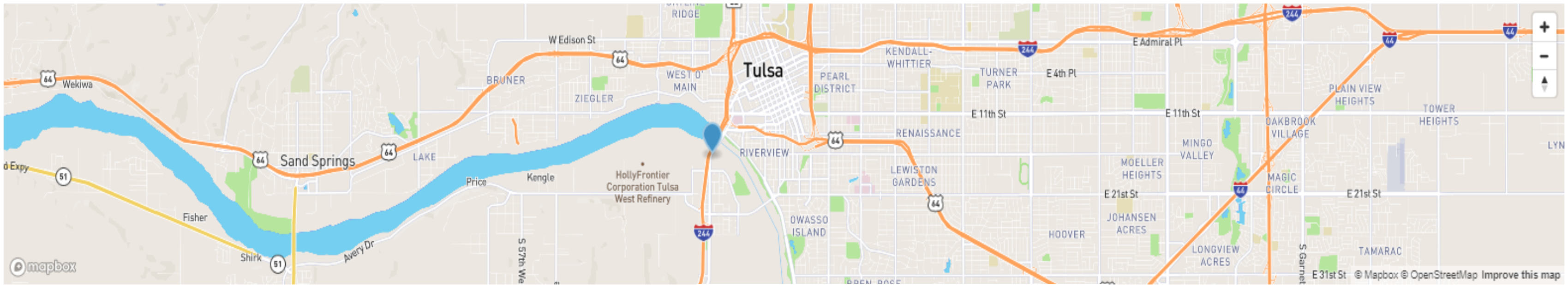
ID

07164500 (Arkansas River at Tulsa, OK)

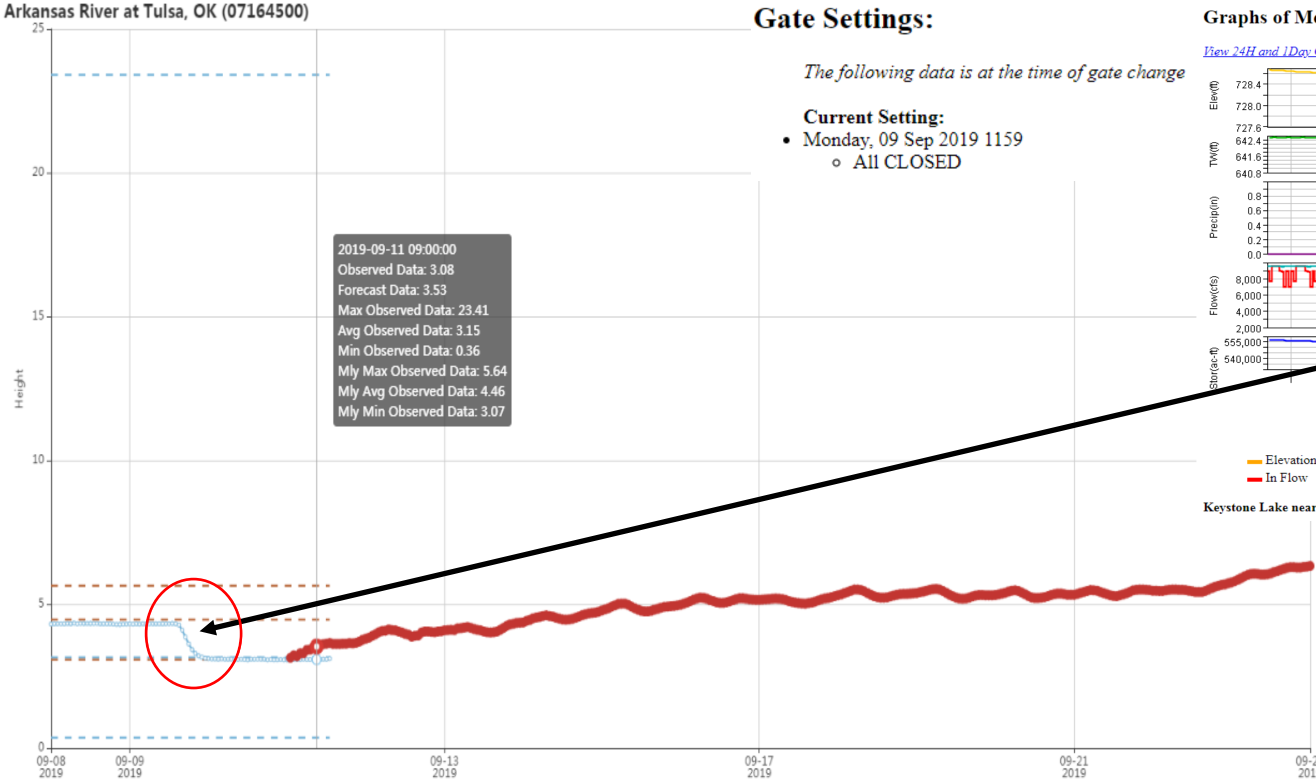
Date

2019-09-11

Days	Height
1	3.87
2	4.02
3	4.47
4	4.75
5	5.07
6	5.02
7	5.23
8	5.19
9	5.23
10	5.31
11	5.43
12	6.15



Arkansas River at Tulsa, OK (07164500)



Gate Settings:

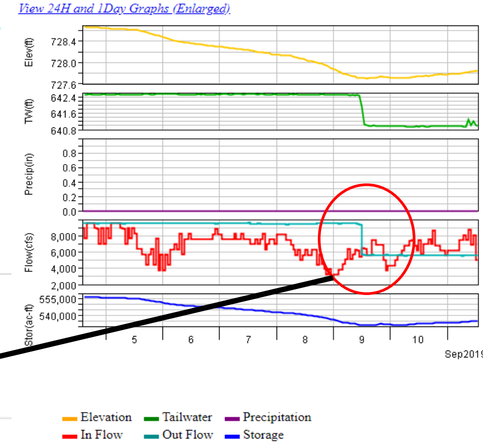
The following data is at the time of gate change

Current Setting:

- Monday, 09 Sep 2019 1159
  - All CLOSED

Graphs of Measured and Calculated Lake Parameters:

View 24H and 1Day Graphs (Enlarged)



Keystone Lake near Sand Springs, OK

Thank you!

Questions?