Drought Technology for Texas

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Water Forum II: Texas Drought and Beyond
University of Texas at Austin

22 October 2012

THE UNIVERSITY OF TEXAS AT AUSTIN

CENTER FOR INTEGRATED EARTH SYSTEM SCIENCE

- Water Forum I, Feb 13, 2012
- State water agencies and academic speakers
- Formed a Drought Technology Steering Committee to continue dialog
  - TWDB, TCEQ, TPWD, TDEM
  - UT Austin, TAMU – College Station, Texas Tech
- Acknowledgements: Brenner Brown, Kathy Alexander, David Bradsby, Mike Bewley, Byron Tapley, Himanshu Save, Gordon Wells, Teresa Howard, Johnnie Sullivan, Zong-Liang Yang, Xitian Cai, Jay Banner, Eric James, Charlie Kreitler, Cedric David, Dharhas Pothina

http://www.texasdroughtinfo.org

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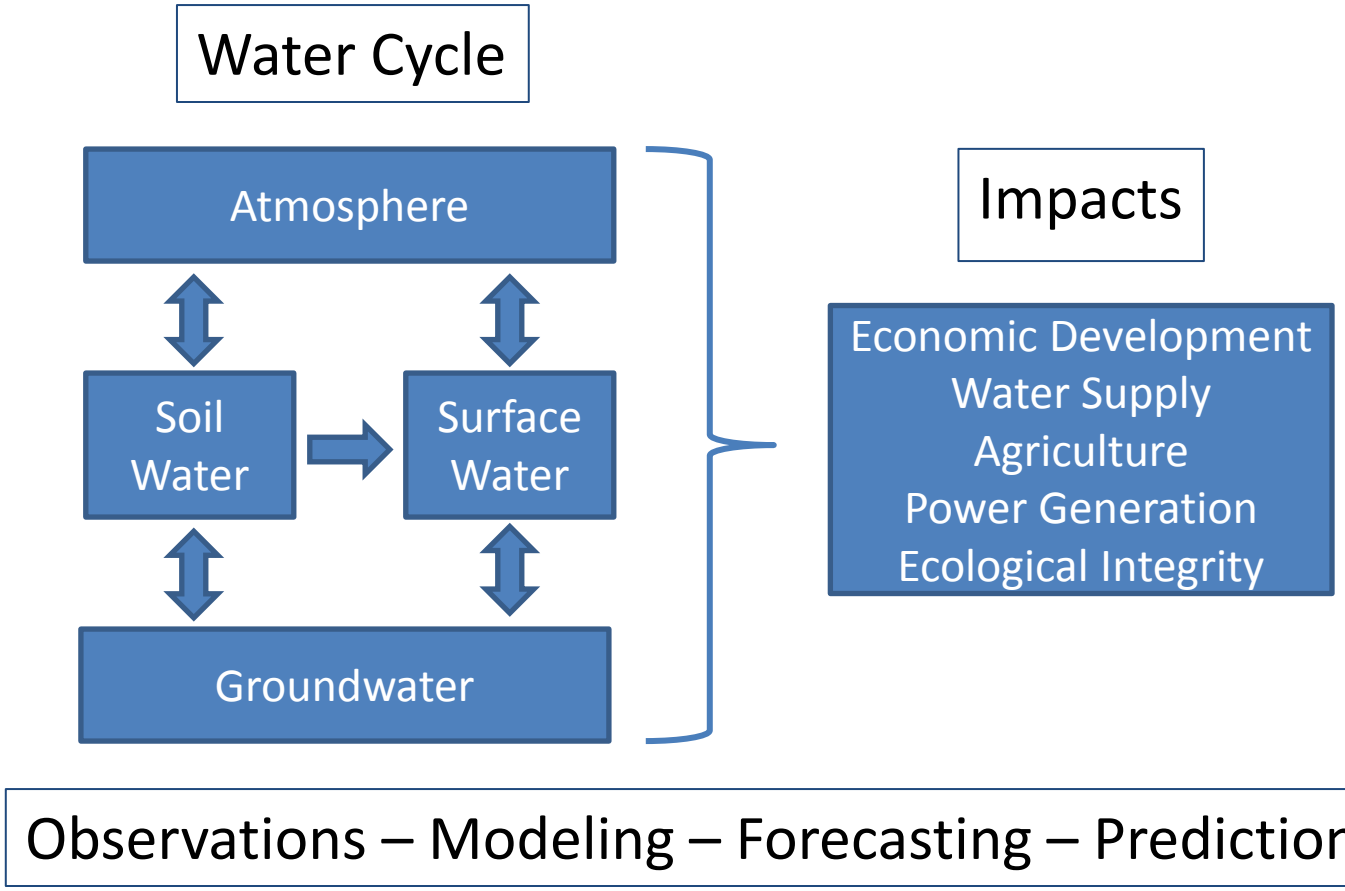
http://www.tamest.org/events/2012-water-summit.html

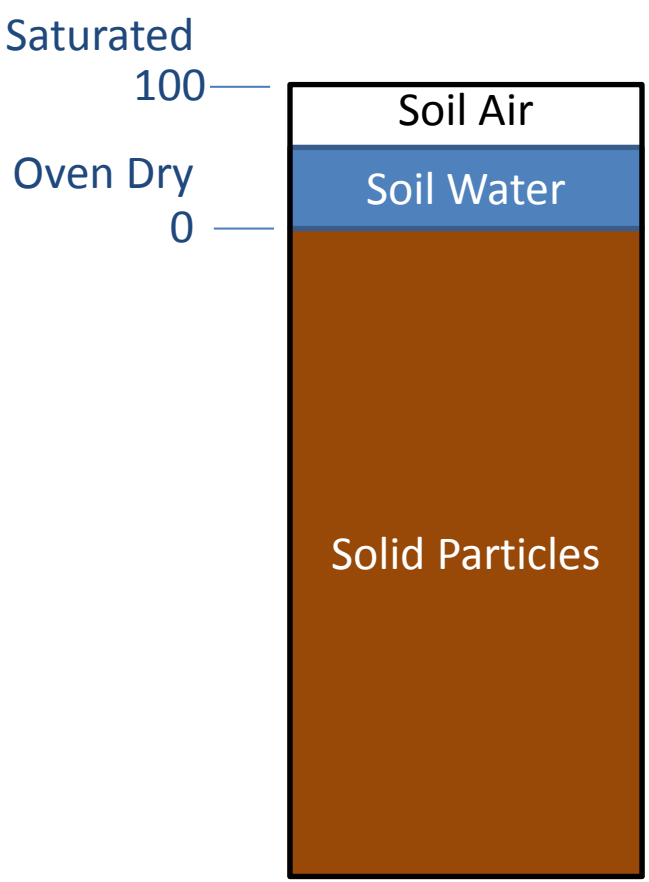
Drought Technology

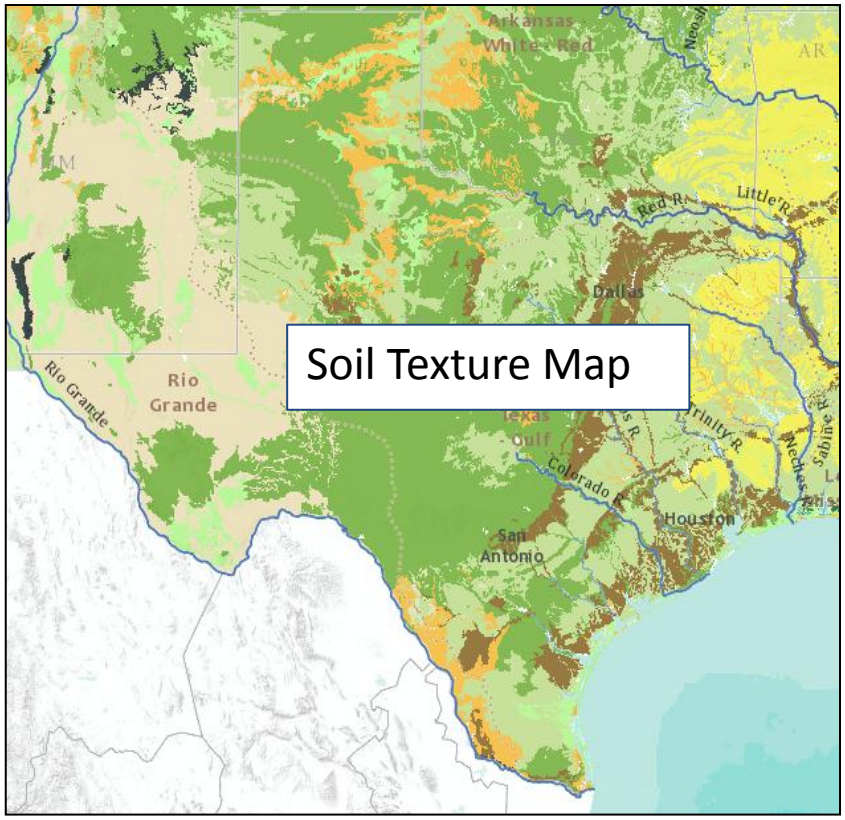


Soil Water In Texas

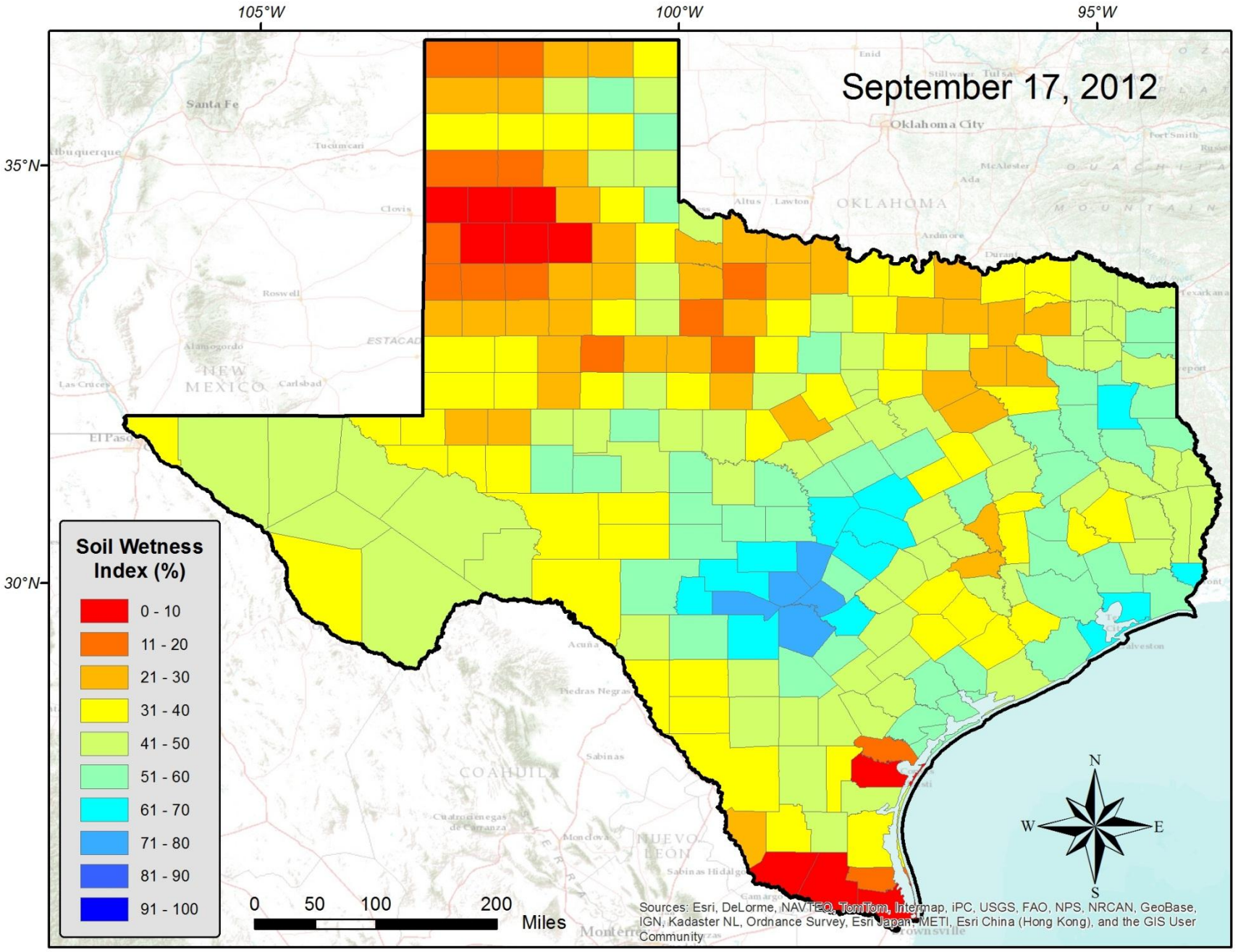
Soil water system has 78 Km^3 of water storage capacity in top 1m of soil

Soil Wetness Index

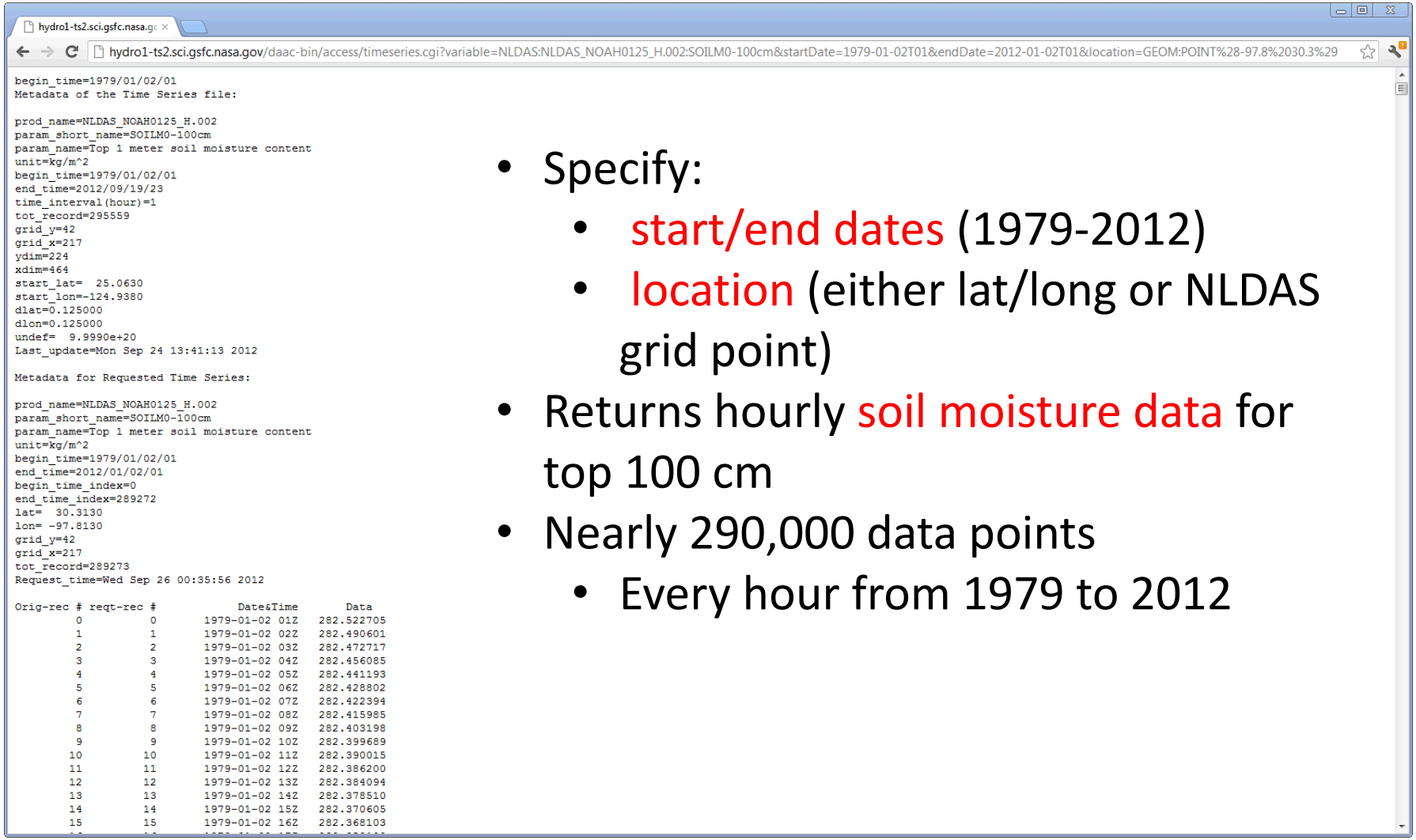




First meter of Texas soil contains
11 cm of soil water and soil air

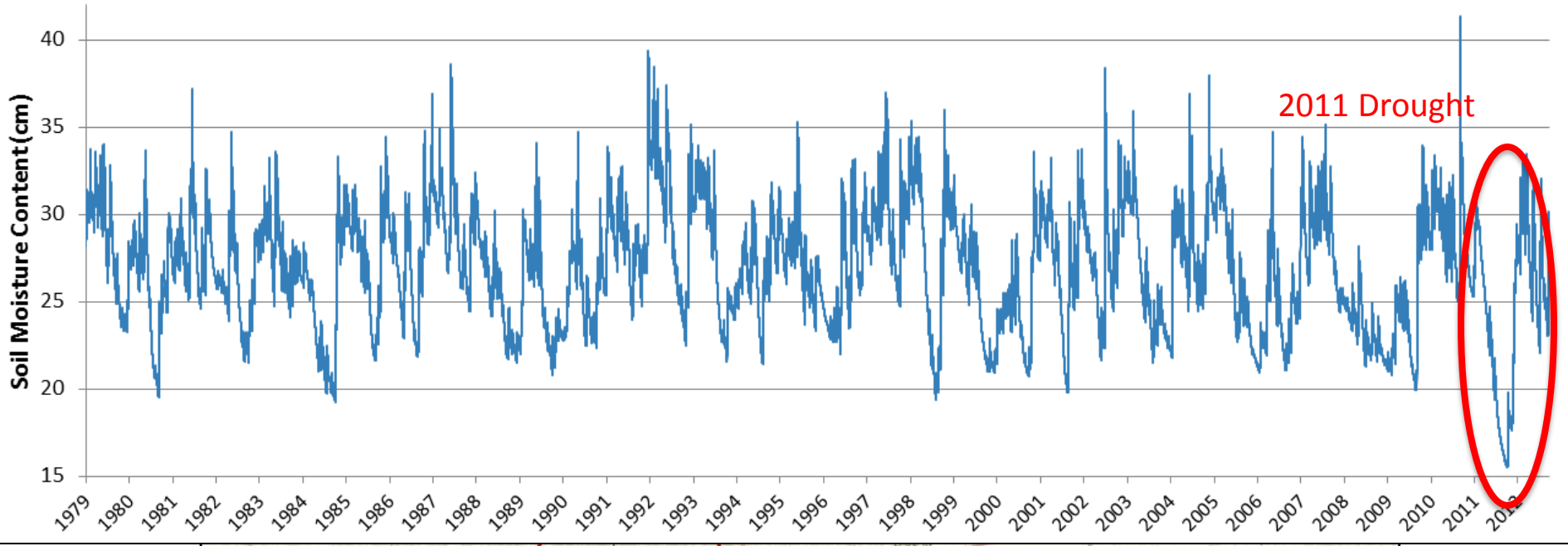

105°W
100°W
95°W
35°N
30°N
September 17, 2012
Soil Wetness Index (%)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
0 50 100 200
Miles
N
W
E
S
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

New NLDAS Web Service

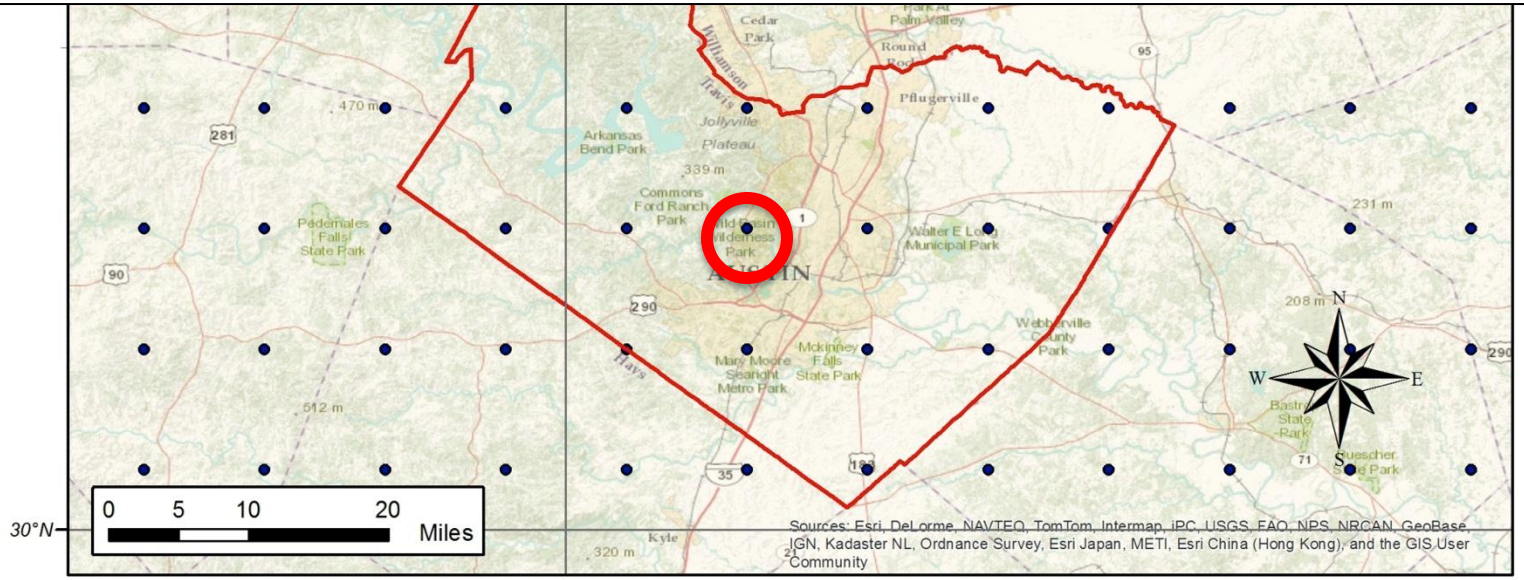


- Specify:
  - start/end dates (1979-2012)
  - location (either lat/long or NLDAS grid point)
- Returns hourly soil moisture data for top 100 cm
- Nearly 290,000 data points
  - Every hour from 1979 to 2012

NLDAS Grid Points over Texas

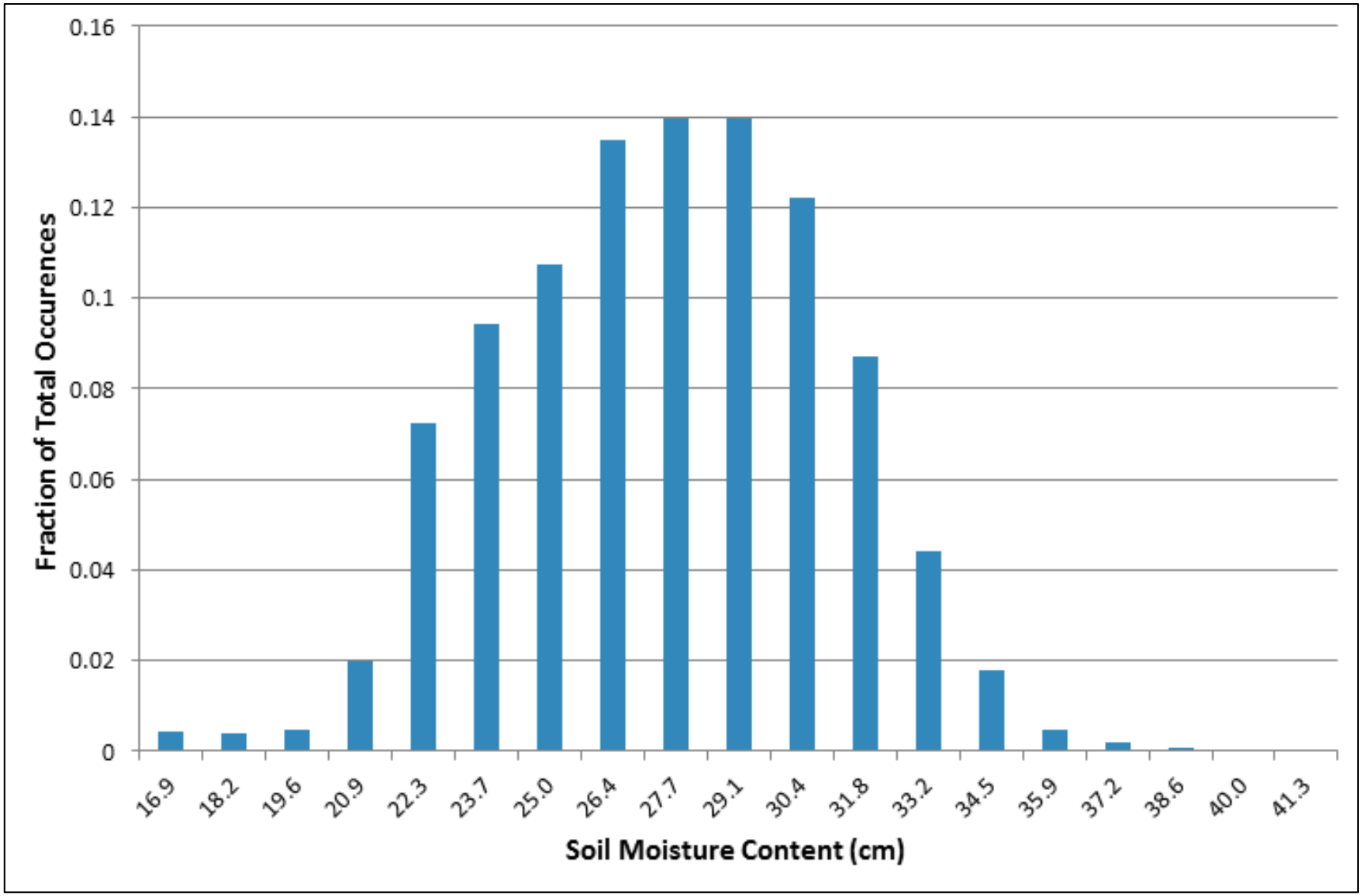


1979

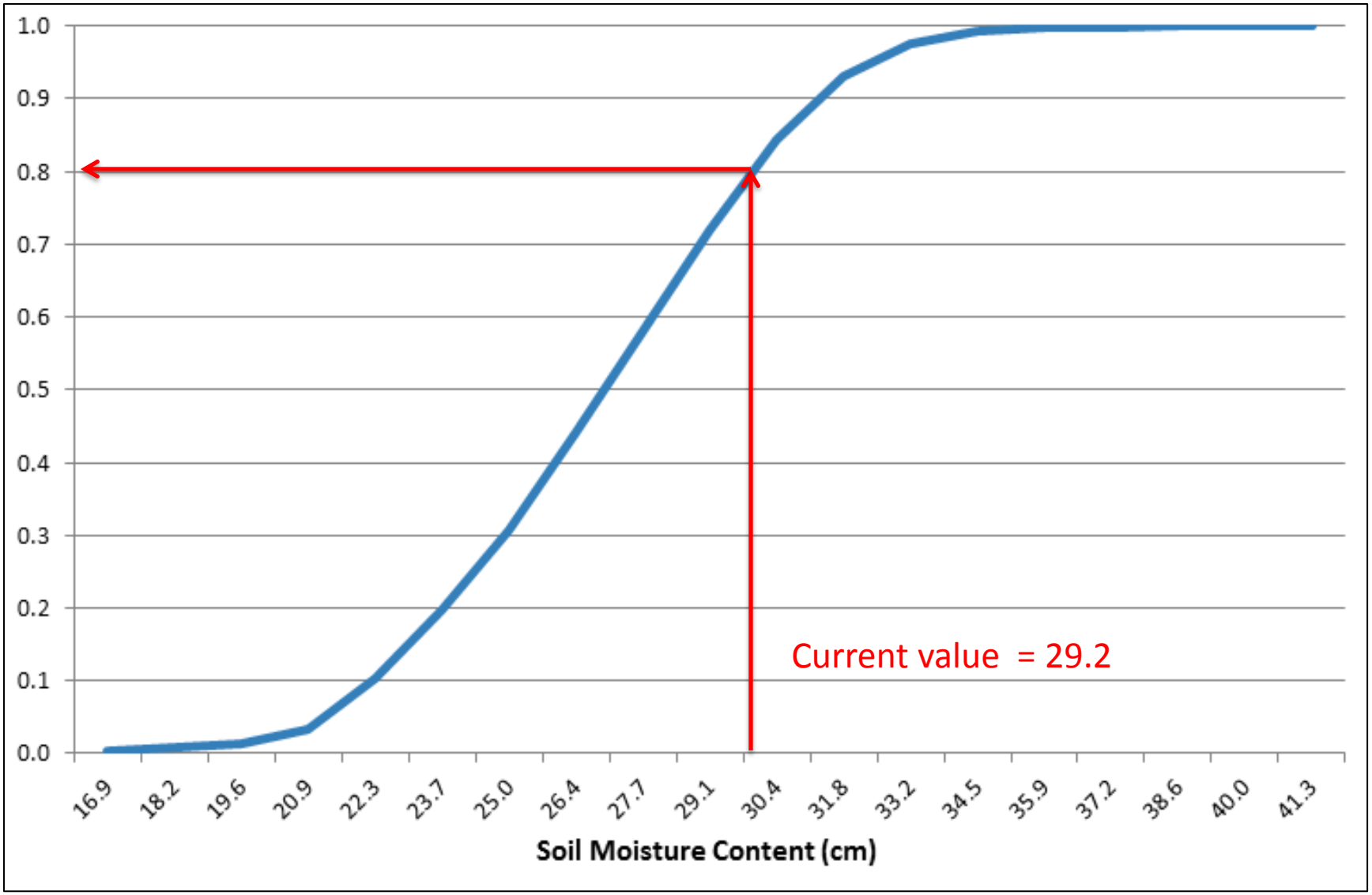


2012

Relative Frequency Curve

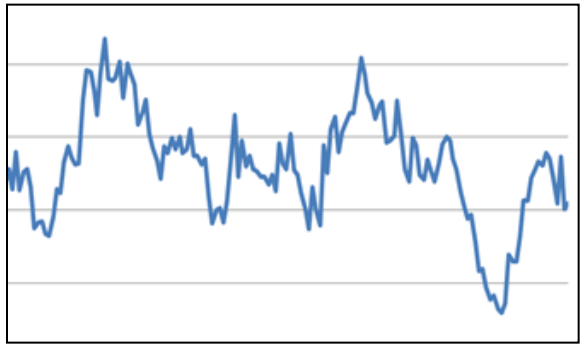


Cumulative Frequency Curve

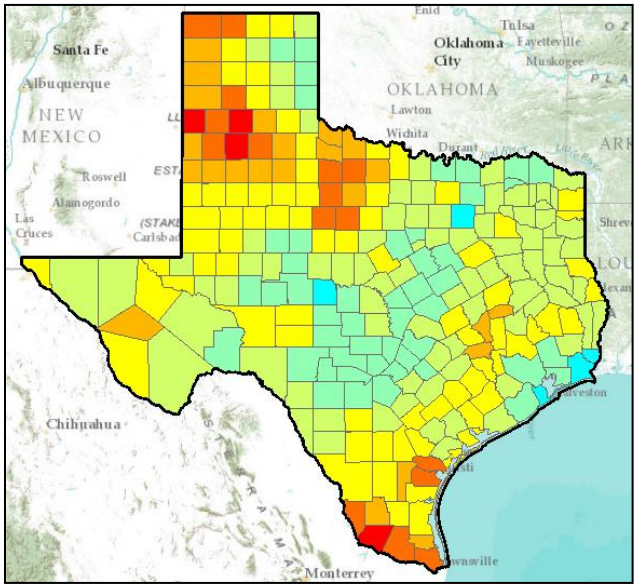


Texas Water and Climate Data System

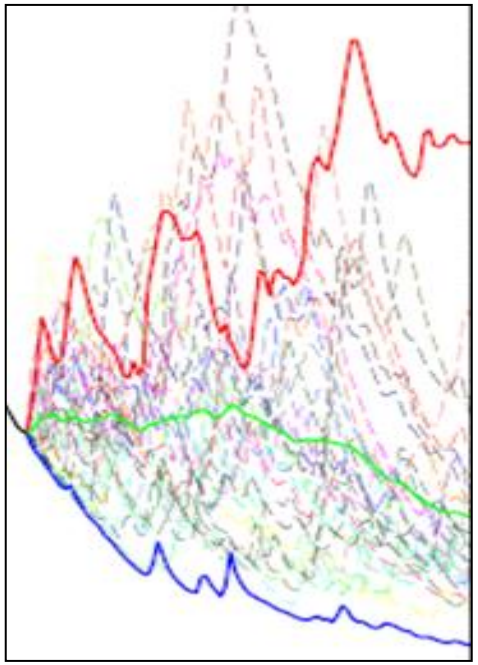
Improve our state-wide, real-time situational awareness of water conditions



Statistics from past



Current situation



Short-term predictions

Calculate the Soil Water Balance of Texas

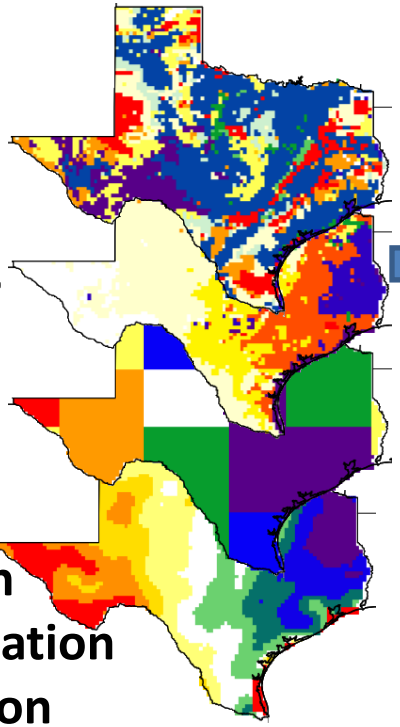
Land surface features

Soil type

Land cover

Soil color

Green vegetation fraction



Noah-MP land surface model

NLDAS atmospheric forcing

Temperature
Precipitation
Wind speed
Specific humidity
Surface pressure
Downward SW radiation
Downward LW radiation

Model output

Surface runoff
Sub-surface runoff
Soil moisture
Evapotranspiration
Water table ……

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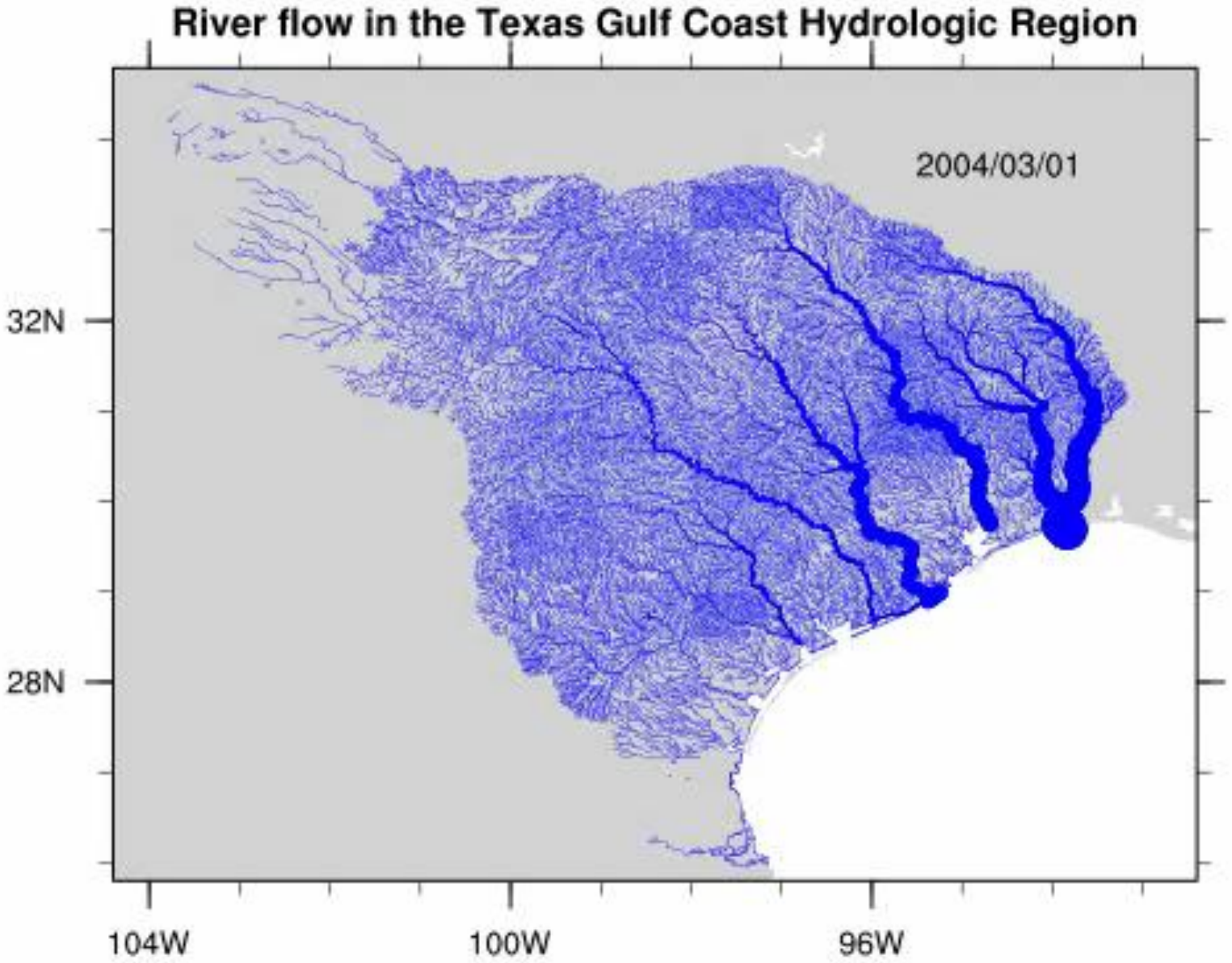
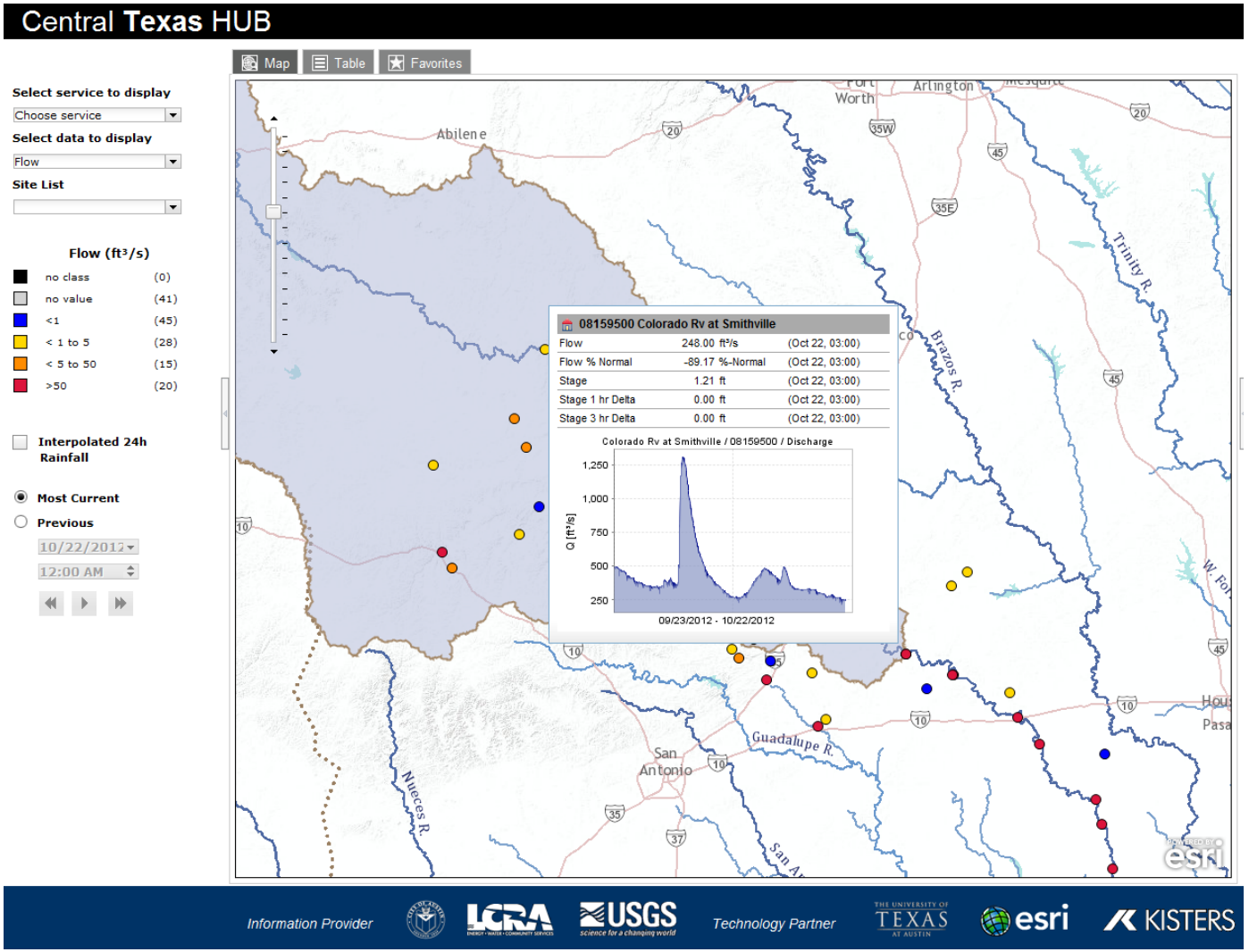


RAPID River Flow Model

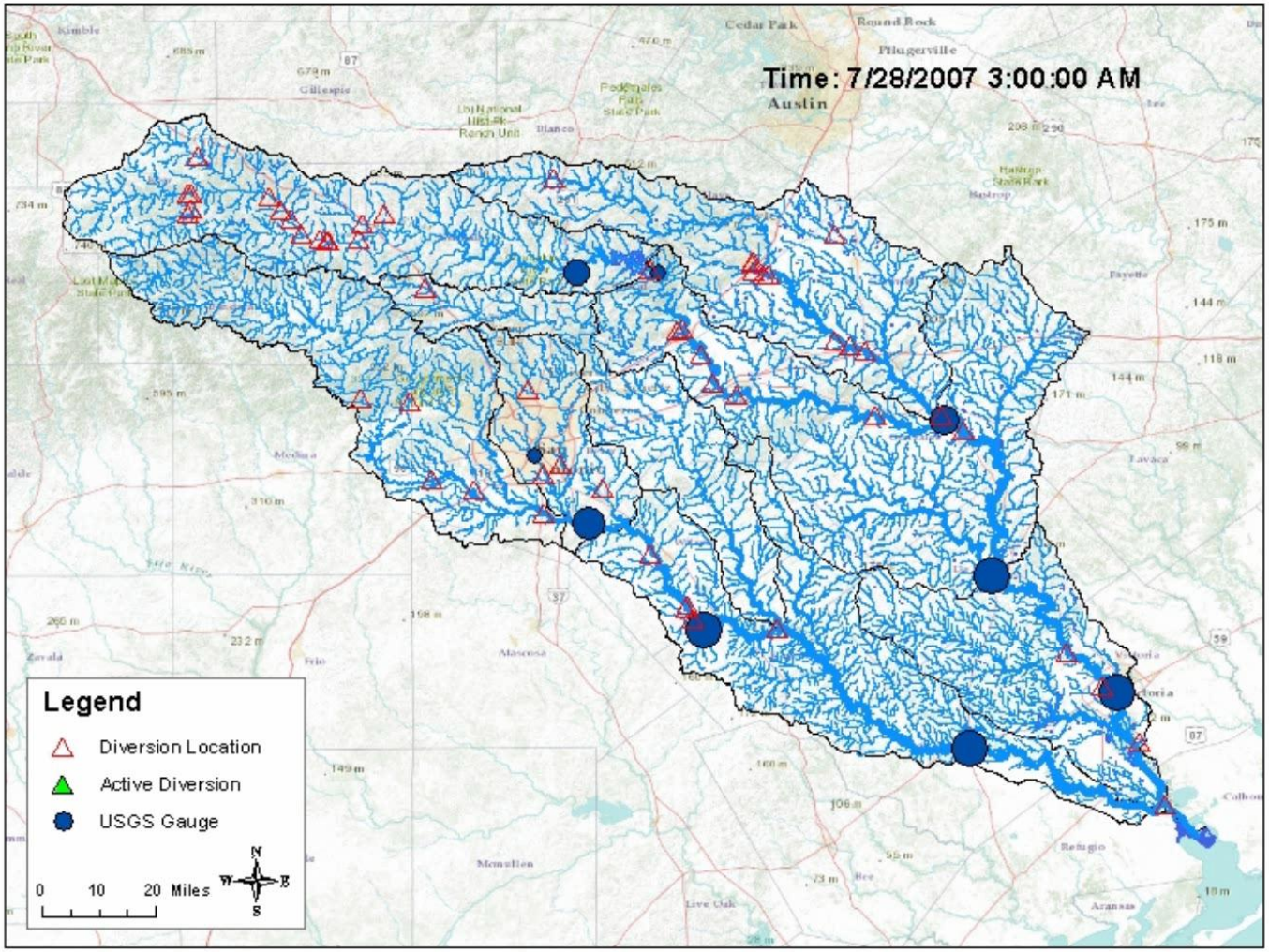
Central Texas Hub

Synthesized Real-Time Water Observations



http://www.CentralTexasHub.org

TCEQ Water Master Operations



Drought Technology for Texas

- Last severe drought in 1996 led to Senate Bill 1 in 1997 and SB2, SB3 later
- Great improvement in long term water planning (10 to 50 years in future)
- The 2011 drought exposed
  - We need a state-wide, real-time water climate and data system
  - We need to be able to see ahead 6-18 months for rational water decision making