

MCF Staff



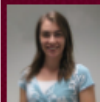
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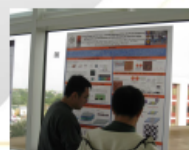
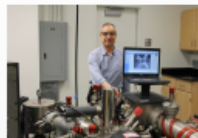
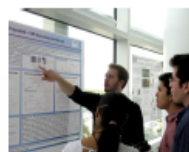
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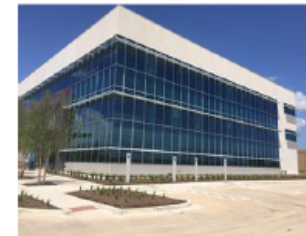
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Available Techniques

- Raman confocal
- FE-SEM with EDS
- SIMS microscopy
- Thermal Analysis
- Electron Microprobe
- Atomic force microscopy
- UV-Vis-NIR spectroscopy
- Dip-pen nanolithography
- Spectroscopic ellipsometry
- Fluorescence spectroscopy
- Nanoindentation and scratching
- Fluorescence confocal microscopy
- FIB-FESEM with EBSD and TOF-SIMS
- X-ray & UV photoelectron spectroscopy



The Materials Characterization Facility (MCF) at Texas A&M University is a core user facility serving the characterization needs of materials science and engineering researchers. We provide a variety of analytical capabilities, including assorted microscopy and spectroscopy techniques and cleanroom fabrication. Central to our teaching and research missions, we assist and train researchers to use the instrumentation and provide sample analysis for both university and industrial clients.



Want to become an MCF user?
Contact our staff for more
information at <http://mcf.tamu.edu>

Or visit us at
Materials Characterization Facility
Giesecke Engineering Research Building
College Station, TX 77843-3471



Materials Characterization Facility



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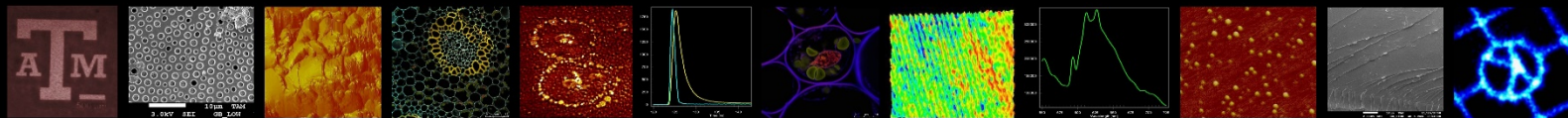


The Materials Characterization Facility (MCF) provides a variety of analytical capabilities, including scanning electron microscopy and spectroscopy, cleanroom fabrication. Central to our research missions, we assist and train users to use the instrumentation and provide analysis for both university and industrial clients.



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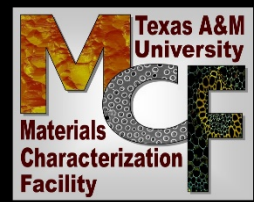
Working with the MCF

Our PhD level staff scientists are available to support:

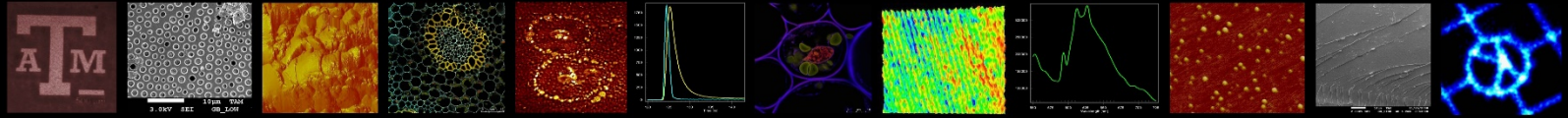
- > Instrumentation training for users
- > Single sample measurement and analysis
- > Routine long term sampling
- > Collaborative research partnerships
- > **Tours and educational activities (workshops/courses)**

Partnerships with outside are accomplished via:

- > Grants and contracts
- > Measurement and testing agreements
- for routine single or multiple sample analyses



Materials Characterization Facility



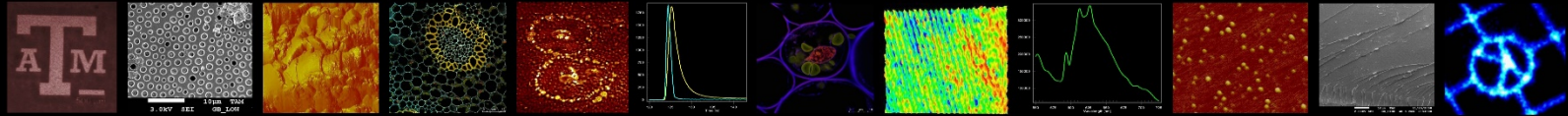
a user facility for the fabrication and characterization of microchemical systems

Funding of the MCF

The facility receives funding (70%) from the Office of the Vice President for Research, the College of Engineering/TEES, and the College of Science, with the remaining 30% being generated by user fees.

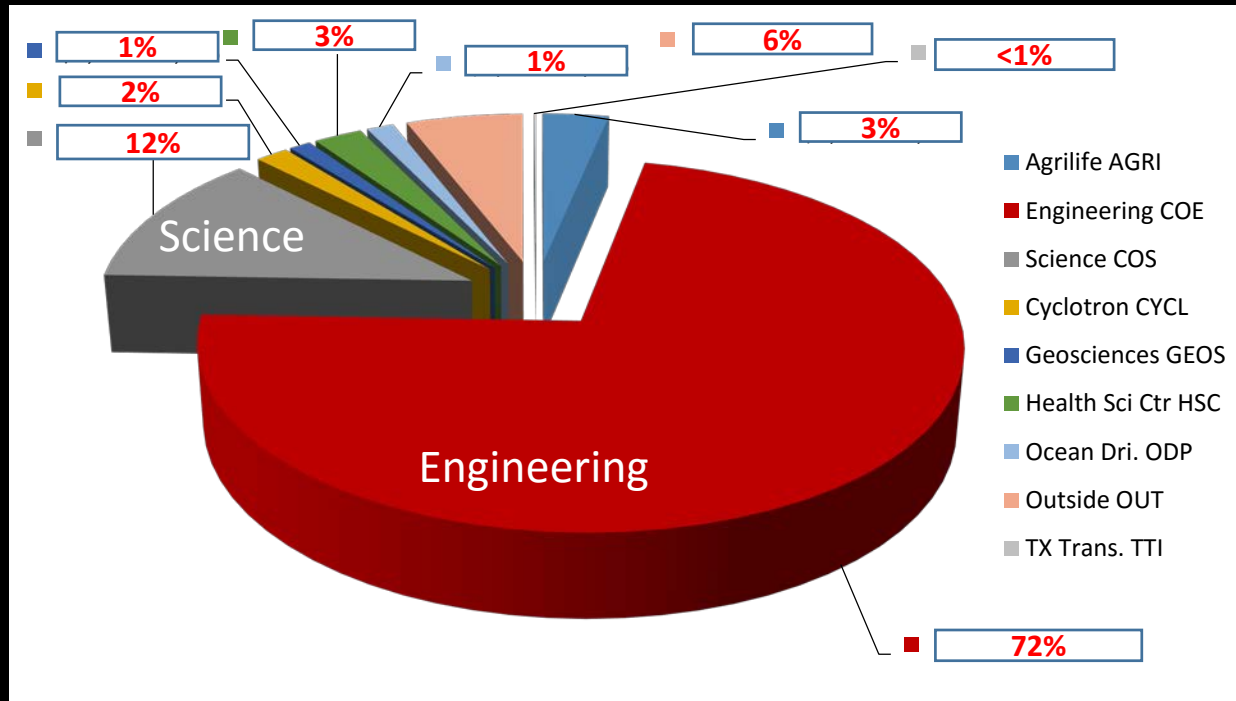
We have a large user-base (109 groups in FY16) with investigators across departments from the Colleges of Agriculture, Engineering, Geosciences, the HSC and Science as well as a host of outside users.

User fees rates are determined every two years by a rate study
> Different rates for internal vs external users



a user facility for the fabrication and characterization of microchemical systems

User Breakdown FY16*



* As of April 2016

Integrated Metabolomic Analysis Core (IMAC)

June 2016

IMAC - Overview

- Awarded by the Texas A&M Research Development Fund (RDF) in August 2015 to Drs. Jayaraman, Dangott, Chapkin, Safe, Alaniz
- Proposal for acquiring instrumentation for metabolite and small molecule analysis
- Support for one PhD scientist and one research assistant for 2 years, with 3 additional years cost-sharing from Colleges
- Housed in the Protein Chemistry Laboratory

IMAC – Philosophy and Policies

- Open access core facility; all users have access to instruments based on availability
- Different levels of service from drop-off to collaborative projects
- Emphasis on training postdoctoral fellows and students on specific projects
- Short courses and workshops on advances in metabolomics and bioinformatics
- Webinars in collaboration with instrument companies and vendors

Facility Update - Infrastructure

- Based on input from user meetings, three instruments for metabolomics have been purchased
 - Q-Exactive Plus Orbitrap mass spectrometer (Thermo Scientific) for untargeted metabolomics (discovery projects)
 - TSQ Quantiva for targeted metabolomics (quantitation projects)
 - TSQ EVO gas chromatography mass spectrometer for targeted/untargeted metabolomics
 - Cloud-based bioinformatic software
- Training on instruments is ongoing
- Currently in testing phase; Open to users from August/Sep

Facility Update – Operations

- PhD Scientist (Dr. Cory Klemashevich) hired; starts July 1
- Research assistant position currently open (target start date – Aug 15)
- Website under development
- Three-tier price structure (TAMU; Academic - External; Industry) developed
- Advisory Board constituted
 - Profs. Stephen Safe (CVM), Robert Chapkin (Agrilife), Frank Raushel (Science), Robert Alaniz (HSC)

Facility Update - Successes

- IMAC is now a core facility in the Center for Translational and Environmental Health Research (CTEHR), a NIH P30 Center involving TAMU, IBT, and BCM
- Contributed to three manuscripts
 - Dr. Vladimir Panin; Dept of Biochemistry and Biophysics (1, in press)
 - Dr. Freidhelm Schroeder; Dept of Veterinary Physiology & Pharmacology (1, in press; 1, under review)
- Support letter for 5 NIH grants and 1 CPRIT ETRA grant
- Webinar scheduled with Thermo Scientific

Looking back...

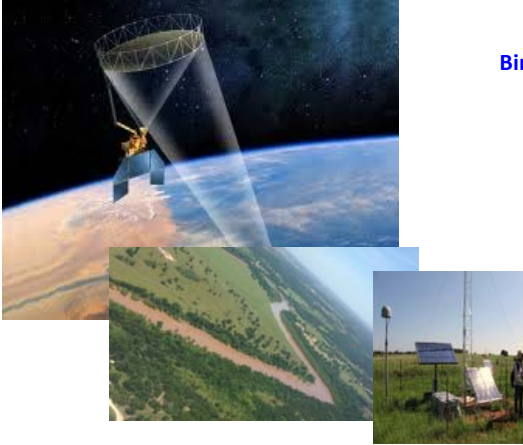
- Purchasing process was greatly facilitated by the University
- Strong support from Colleges in hiring process
- Confusion on source and location of funds; might be better if it is centralized; but did not delay process

Texas Water Observatory

Texas Water Observatory (TWO)

In Brazos Corridor

Water Monitoring Network, Designed Field Experiments, Data Portal, Process Understanding, Modeling Systems, Analyses and Assessment



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Co-PIs
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Gretchen Miller, COE
Cristine Morgan, COALS
Mark Everett, GEO
Steven Quiring*, GEO

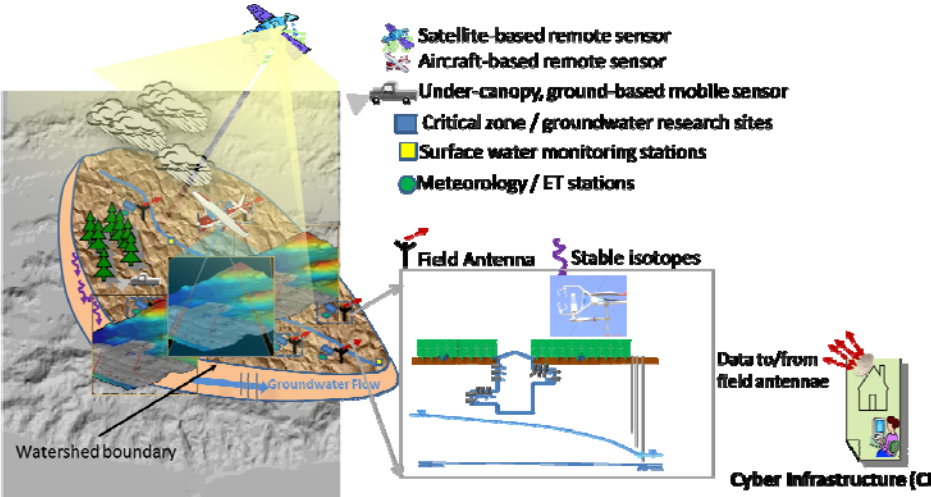
CPI Meeting
Texas A&M University
June 22, 2016

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Texas Water Observatory

TX Water Observatory (TWO) Network

A Master Test Bed



- Satellite-based remote sensor
- Aircraft-based remote sensor
- Under-canopy, ground-based mobile sensor
- Critical zone / groundwater research sites
- Surface water monitoring stations
- Meteorology / ET stations

Field Antenna Stable isotopes

Groundwater Flow

Watershed boundary

Data to/from field antennae

Cyber Infrastructure (CI)

2



Texas Water Observatory: A Four Prong Initiative

- **Observatory Network**
 - Establishing a series of real-time and near-real time sensor networks in critical zone across Texas (starting at Brazos corridor) monitoring various surface/subsurface water parameters and fluxes (physical, chemical, biological) in various land use land cover, climatic gradient, erosional/depositional environment. It will be supplemented by air-/ space-based remote sensing platforms
- **Data Portal**
 - Developing and maintaining web-based data access portal, real-time web query, data retrieval, normalization, analysis and interpretation. Water related data would include, but not be limited to precipitation, humidity, evapotranspiration, groundwater, surface discharge, soil moisture, water demand, water supply, water use, and water quality, among others.
- **Modeling Systems**
 - The Texas Water Observatory would integrate surface and groundwater hydrology and decision-making modeling; apply, test and refine existing models; develop modeling software and provide technical assistance on problems related to models
- **Analyses and Assessment**
 - Application of these Texas Water Observatory models for decision makers would provide critical data on climate, surface and groundwater resources, water quality, and threats to water supplies.

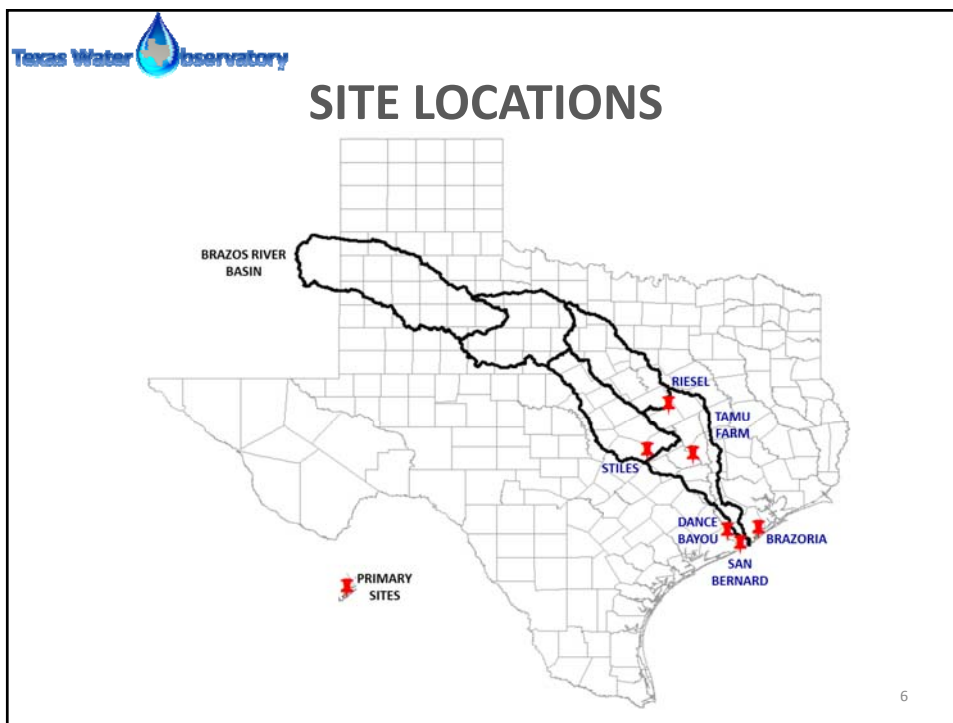
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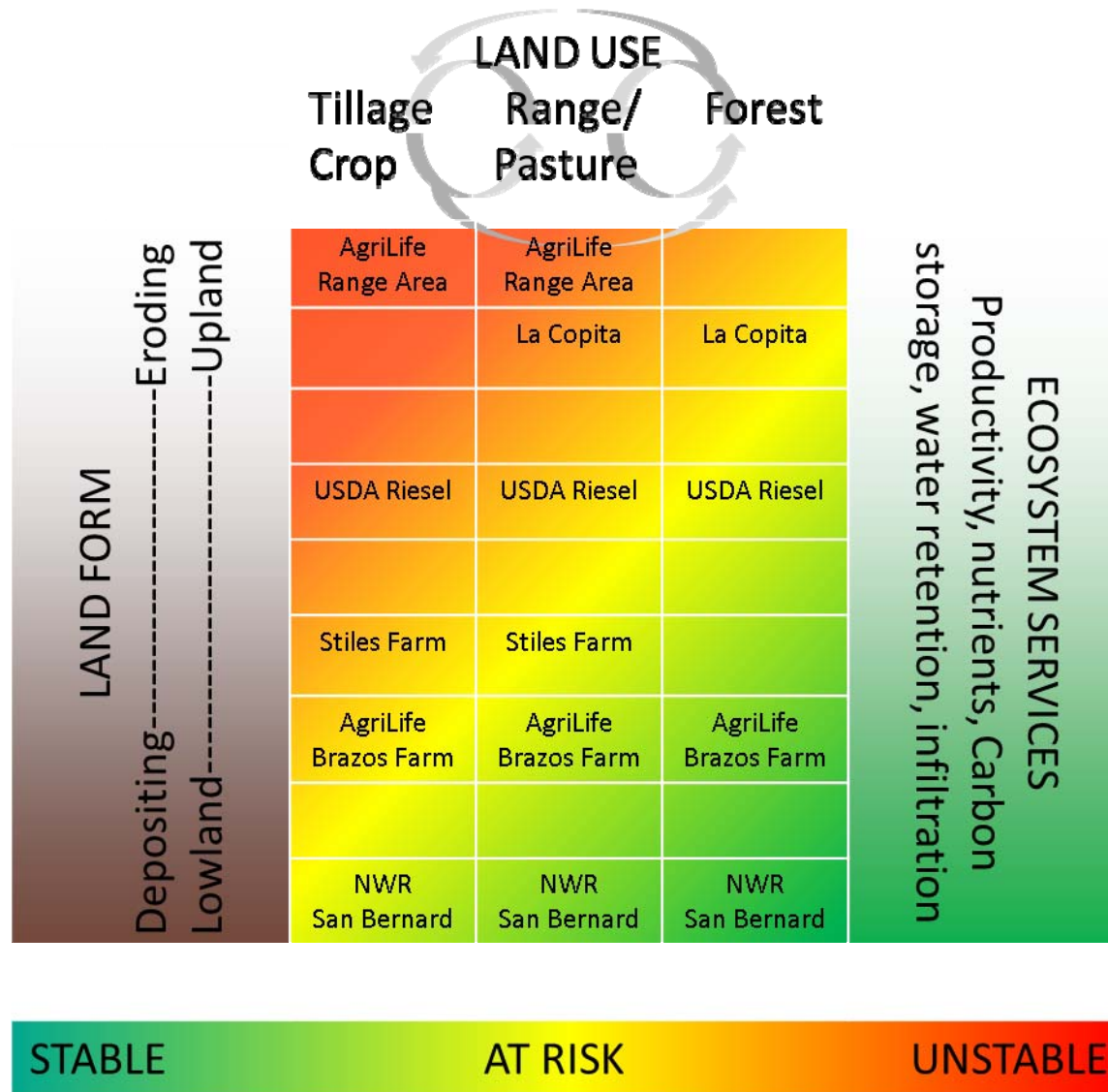
TWO infrastructures will serve as a regional resource for better understanding and/or managing:

- Agriculture** – Drought Monitoring, Irrigation Planning, Root Zone Soil Moisture Status, Land and Crop Management, Evapotranspiration Dynamics, Water-Energy-Food Nexus, Water Quality
- Water Resources** – Water Availability, Streamflow, Surface Water Store, Soil Water Store, Ground Water Store, Water Withdrawals, Water Infrastructure Planning
- Ecosystems** – Water and Ecosystem Services, Flood and Drought Impacts, Aquatic Habitat in Drought Conditions, Wetlands and Lakes
- Biodiversity** – Water Stress and Impacts in Biota, Water Infrastructure and Biodiversity, Gradients across Urban and Rural Corridor
- Disasters** – Flood, Drought, Soil Erosion and Sedimentation, Land Degradation, Adaption to Climate Variation
- Health** – Water Quality, Effect of Flood and Drought, Availability of Potable Water
- Energy** – Water for (Hydropower, Cooling Power Plant, Fracking Shale Gas, Biofuel Production)
- Weather and Climate** – Improved Regional Modeling and Forecast for Precipitation, Temperature, Humidity, and Extreme Events

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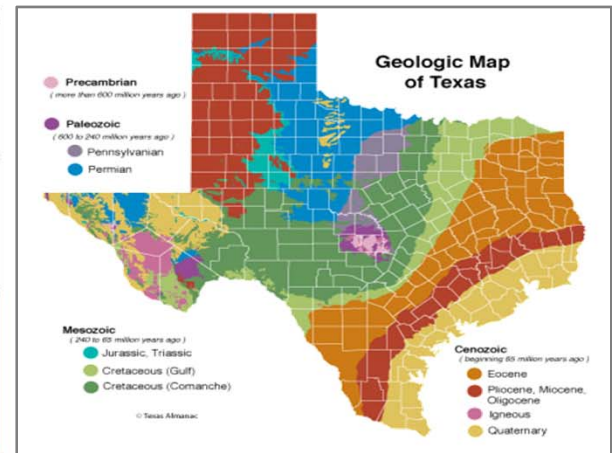
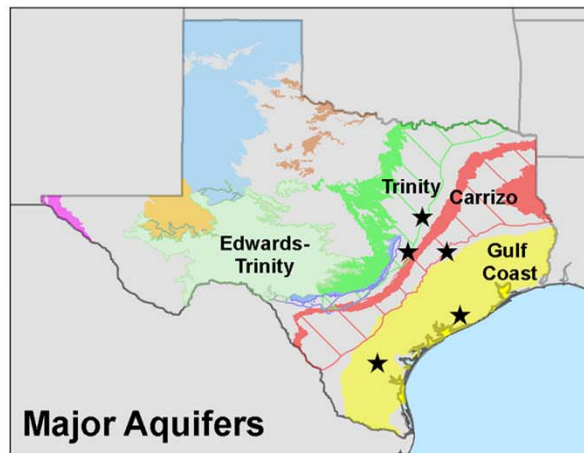
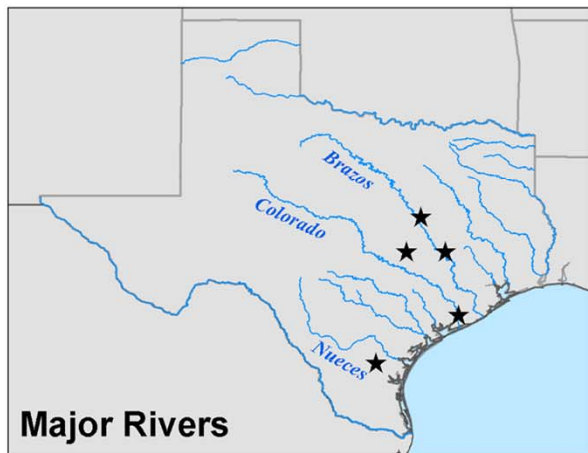
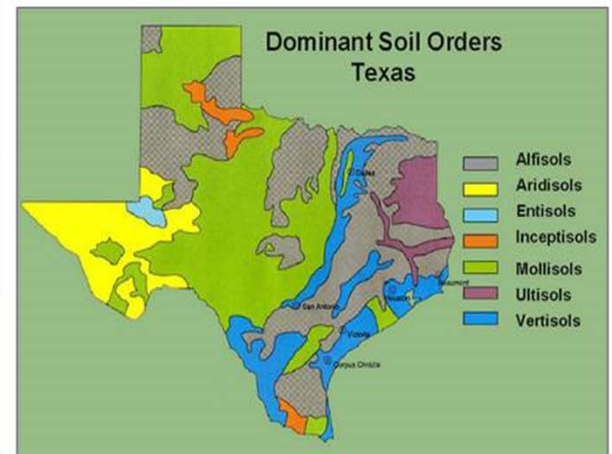
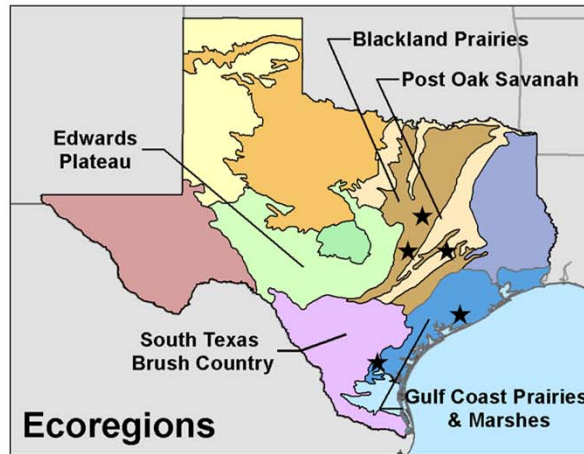
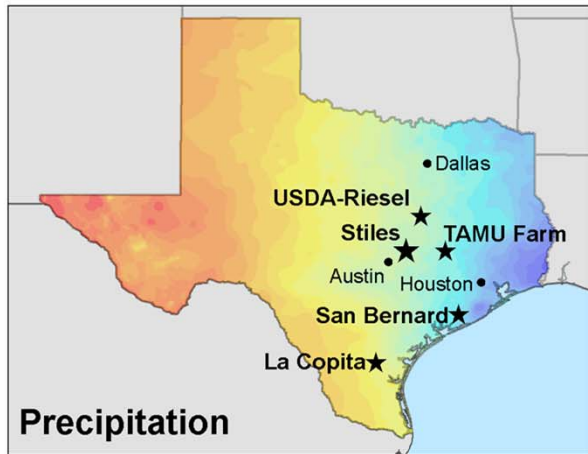


Texas Landscape



DIVERSITY IN TEXAS HYDRO-CLIMATES:

Factors impacting hydrology

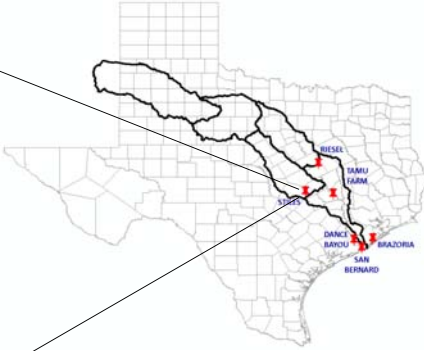



Texas Water Observatory

MONITORING WATER, CARBON AND ENERGY UNDER REPRESENTATIVE LANDCOVERS

STILES

Land cover: Unimproved pasture



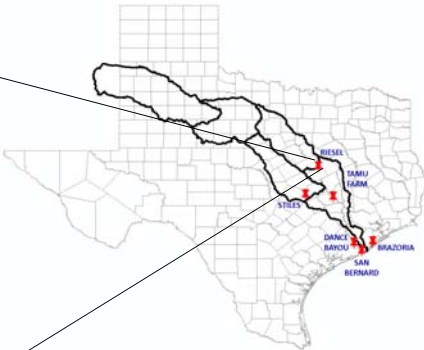

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Texas Water Observatory

MONITORING WATER, CARBON AND ENERGY UNDER REPRESENTATIVE LANDCOVERS

USDA-RIESEL

Land cover: Native Prairie



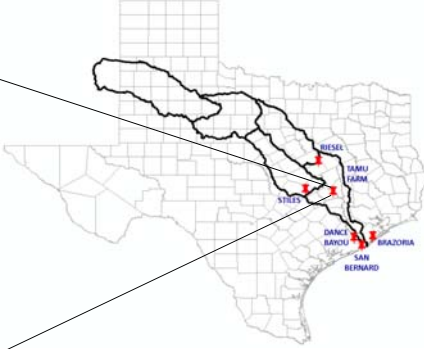

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Texas Water Observatory

MONITORING WATER, CARBON AND ENERGY UNDER REPRESENTATIVE LANDCOVERS

TAMU FARM

Land cover: Agriculture/Mixed



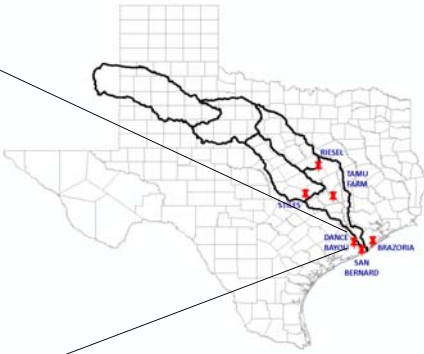

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Texas Water Observatory

MONITORING WATER, CARBON AND ENERGY UNDER REPRESENTATIVE LANDCOVERS

DANCE BAYOU

Land cover: Forest



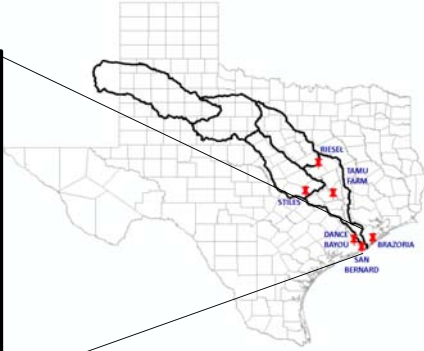

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Texas Water Observatory

MONITORING WATER, CARBON AND ENERGY UNDER REPRESENTATIVE LANDCOVERS

COASTAL MARGIN

Land cover: Salt marsh







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Texas Water Observatory

MEASURING FLUXES AND SOIL PARAMETERS

GPR studies Eddy covariance tower




Scintillometer

Deep-shallow coring


14

Texas Water Observatory

MEASUREMENT ACROSS SCALES



Instrumented soil pit



COSMOS

15

Texas Water Observatory

OPPORTUNITIES FOR TWO

- **SCIENTIFIC COLLABORATION**
 - USDA-ARS, NOAA, US Wildlife and Fisheries, NASA (Global Precipitation Mission, SMAP mission), DOE, TWDB, TCEQ, TSSWCB, TNC, and international collaborations.
 - Partner with established observatories like CZOs, Ameriflux, LTAR, LTER, Climate Hubs and NEON.
 - Partner with other universities in Texas and beyond.
- **PATHWAY FOR NEW GRANTS**
 - Be the pioneer in Texas for distributed in-situ monitoring of water, energy and carbon across a river basin.
 - Establish proof of concept and lay foundation for various large research grants from NSF, DOE and NASA.
- **OUTREACH AND INTEREST TO GENERAL PUBLIC**
 - Appropriate platform to educate students, operational managers and public about water, carbon and energy cycle

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CHALLENGES FOR TWO

- **MANAGEMENT**
 - Access to various field sites and properties not owned by TAMU.
 - Regular remote monitoring of locations and reliability on on-site staff of partner agencies.
 - Partner locations susceptible to changes in management or site conditions.
 - Developing futuristic MOUs and permits with partner institutions.
- **OPERATIONAL**
 - Site loss/damage due to flooding and other natural disasters.
 - Safety issues because of presence of wildlife.
 - Need for baseline technical staff for regular inspection/maintenance of field sites.
 - Staff for database management because of diverse nature of collected data (format, spatial, temporal, spatio-temporal)
 - Data sharing protocol