# TEXASVIEW 2022 - 2023

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TEXASVIEW 2022 - 2023 ACTIVITIES

TexasView identifies the need to increase the number of undergraduate and graduate students who use remote sensing in an applied, project-oriented fashion. This High-Impact Activity (HIA) addresses grant ***objective 3: Promote research and remote sensing experience at the university undergraduate and graduate level to increase numbers and visibility of graduating students with employment skills in remote sensing.*** Three institutions participated this year:

- **Forest Biomass Estimation Using Terrestrial Laser (LiDAR) Scanning (TLS)** and **Remote Sensing** and **Morphological Analysis to Characterize Cretaceous Formations at Natural Bridge Caverns in Comal County, TX.** *Midwestern State University (MSU) College of Geosciences.*
- **Strengthening non-major students' geographical literacy through the development of project-based GIS labs.** *University of North Texas (UNT) Department of Geography.*
- **Geospatial Assessment of Water Quality and Environmental Changes: A Case Study of the Permian Basin, Texas.** *University of Texas Permian Basin (UTPB) Geoscience Department.*
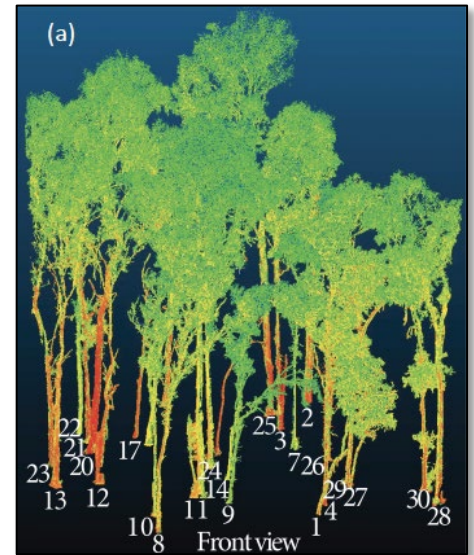
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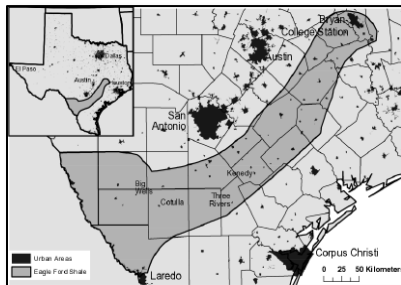
Project-based GIS lab: Local impact of oil production.
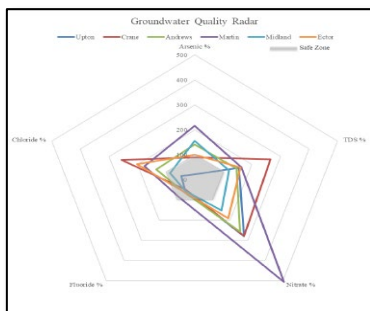
Concentration of studied groundwater parameters in six studied counties relative to their corresponding EPA maximum contamination levels.

- MSU analyzed terrestrial LiDAR remote sensing technology for developing 3D models to quantify above-ground biomass (AGB) to promote sustainable forestry management strategies.
  - 3D reconstruction models create detailed and plausible models.
  - LiDAR-based tree-specific AGB agrees with harvest data and surpasses previous methodologies.
- UNT developed real-world application-based labs involving geospatial data gathering and analytical skills using GIS. They also developed an assessment tool to gauge the impacts of GIS Systems on student computer literacy.
  - The first project-based lab used data from a county in south-central Texas; students preferred to use more local data
  - A UNT student has developed a new class project focused on the interaction between trees and air pollution using data from the UNT campus.
- UTPB analyzed changes in ground water quality in the Permian Basin over a 3-decade time span, integrating landcover maps with water quality data.
  - The number of contaminants in groundwater has increased due to anthropogenic activities
    - Petroleum spills
    - Use of inorganic chemical fertilizers
  - Landsat-based landcover maps document the increases in petroleum development and crop land cover.

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BENEFITS TO TEXAS

Support for student research has multiple benefits. Students address issues affecting the State of Texas and develop new workforce skills.

- *My project* called "Remote Sensing and Morphological Analysis to Characterize Cretaceous Formations at Natural Bridge Caverns in Comal County, TX" allowed me to explore and gain experience in LiDAR data acquisition, geospatial data analysis, and programming using MATLAB. The project allowed me to further my research on groundwater flow in the Natural Bridge Caverns in Comal County.

- *I learned* useful research and presenting techniques along with a computer coding language and how to operate a TLS instrument. This research was looking into how accurately a model can estimate both two- and three-dimensional features of trees such as the height and the total volume of a tree. These estimations are important because they relate to climate change predictions. Also, this method is nondestructive, meaning we would not have to cut down any trees to find accurate estimations.

- *The advanced* method of using LiDAR as a foundation for field work allowed us to create precise and comprehensive representations of the terrain and vegetation cover, enabling us to create a better database for future environmental research on the UNT campus. Being able to collaborate and teach other students who volunteered for field data collection was invaluable experience for my future career. This summer has left an indelible mark on my academic and personal growth, and I am eager to continue exploring the frontiers of this exciting field.

Locations of possible flow areas

a.

Comparison between the Lidar-based AGB with BAAD
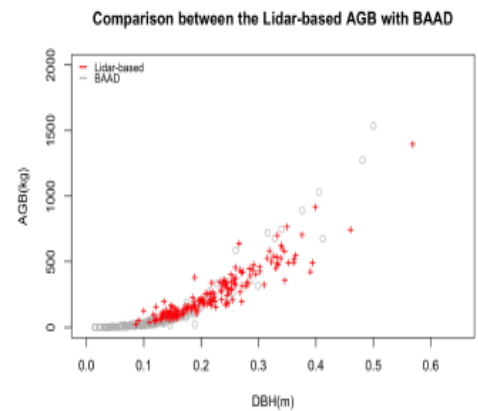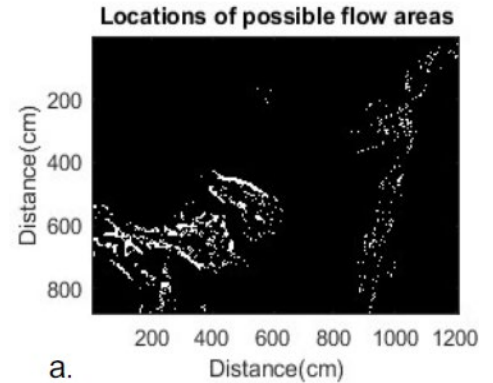
TEXASVIEW CONSORTIUM MEMBERSHIP

Established in 2002, the TexasView Remote Sensing Consortium consists of thirteen university partners distributed across the state. Members include universities large and small, public and private. TexasView members work closely with state, regional and local agencies to promote remote sensing at all levels.

TexasView is founded on the concept of free and public exchange among its members of data, information and knowledge concerning the Earth and its processes, as observed by remote sensing and GIS technologies, for education, research, and local government applications.

Midwestern State

The University of Texas at Austin

The University of North Texas

Sul Ross State University

Texas A&M

Texas Tech

University of Texas of the Permian Basin

Stephen F. Austin

Texas A&M at Corpus Christi

The University of Texas at El Paso

Texas State University

The University of Texas at San Antonio

University of Houston

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