

The following topical sessions and workshops have been selected for the conference. Please enter the Topical Letter Code (which is the letter before each title of the session or workshop) when submitting your abstract (example: A, B, C, AA....).

CODE: A

PRESENTATION TYPE: Technical

TITLE: Wrangling Flood Data as Big as Texas

TWDB Regional Flood Planning (RFP) is Texas' first statewide flood planning initiative, assessing flood risks from the Panhandle to the Gulf Coast. RFP created big data with many geospatial challenges that required coordination and processing efficiency — all on a compressed timeline.

This presentation explores the innovative geospatial solutions TWDB developed in this inaugural effort, including:

- Automated quality control review of 15 regions each with 30 feature classes.
- Automated processing of 80,000 square miles of 1-meter rasters into floodplain inundation polygons.
- Projecting future floodplains based on increasing rainfall trends based on a “no-action” scenario.
- Predicting the location of future residential development based on 10 input datasets including: floodplains, existing development, existing and planned transportation routes, and population projections for 80 Counties.
- Leveraging ESRI enterprise environment to maximize efficiency and visibility on spatial data updates using a versioned Spatial Database Engine.
- Encapsulating datasets into dynamic story maps and dashboards to inform stakeholders.

CODE: B**PRESENTATION TYPE:** Technical**TITLE:** USGS Flood Tools and Applications Part 1

The United States Geological Survey (USGS) has been a leader in collecting streamflow and flood event data for over a century. These data and their derived products are used to estimate the magnitude of floods necessary for building infrastructure to determining floodplains. Hydraulic models use flood frequency estimates and historic flood data to calibrate models for floodplain and flood inundation determination. In addition to traditional streamgauge activities, the USGS collects highwater mark data during flood events and coastal storms and develops methods for evaluating effects to flood events post-fire. The session will provide an overview of USGS activities, applications, and tools used by land and resource managers, flood response teams, and others in emergency response to evaluate and report flood magnitudes, estimate flood inundation, and determine flood impacts using real-time sensors. Specifically, the session will provide a review of the USGS Coastal Storm Team and Response activities, the USGS Flood Inundation Mapper, the USGS FireHydro Application, and the USGS StreamStats Application.

CODE: C

PRESENTATION TYPE: Panel

TITLE: 3DHP Program Overview

The US Geological Survey has launched the 3D Hydrography Program (3DHP), the first systematic remapping of the Nation's hydrography since the original 1:24,000-scale mapping program from 1947 to 1992. 3DHP data will be based on high-resolution elevation data collected by the 3D Elevation Program collected and validated to meet published specifications, maintained in a streamlined data model, and delivered to users through a series of web feature services and static products. This session will explore different components of 3DHP, including a program overview, the data collection approach, data management, and current and anticipated products.



CODE: D

PRESENTATION TYPE: Panel

TITLE: US Geological Survey 3D Hydrography Program (3DHP)

The US Geological Survey 3D Hydrography Program (3DHP) relies heavily on partners and the private sector to develop high-quality hydrography data from 3D Elevation Program data. This session will include a series of lightning talks to hear why and how people are investing in updated 3D hydrography data.

CODE: E**PRESENTATION TYPE:** Technical**TITLE:** USGS Flood Tools & Applications Part 2: StreamStats Beyond the Basin

The U.S. Geological Survey (USGS) StreamStats suite of services provides stakeholders with spatial analytical tools that are useful for water-resources planning and management as well as for engineering and design purposes. StreamStats is most known for its interactive web application, API services, and bulk delineation processing batch processor. However, in this technical session we will go “beyond the basin” by showcasing our other StreamStats tools available to potential users. Topics will include our recently expanded footprint of storm drain tools, our runoff and hydrograph estimation tools, and tools for regression estimates and gage statistics. These tools—which are available in both GUI and REST API formats— can be used by water managers to model flow states for infrastructure and modeling purposes.

CODE: F**PRESENTATION TYPE:** Technical**TITLE:** Complexities Associated with Developing a Watershed-wide Model with Multiple Methodologies

The four (4) watersheds of Boeuf River, Bayou Cocodrie, Tensas River, and Bayou Macon in northeast Louisiana are largely characterized by flat, low-lying areas. During larger rainfall events, backwater from the Ouachita River heavily influences the level of flooding in this region. Levee systems with multiple pump stations, closure structures and gravity drains line much of the western border of the region. Water control structures such as diversions and weirs affect the hydrology of the watersheds. This combination of natural characteristics and man-made modifications presents a unique challenge to development of hydrologic and hydraulic models that are truly representative of the observed flow patterns in the watersheds. While relative ease of two-dimensional modeling has made it possible to more closely model flat topographies, accurate representation of such watersheds requires stakeholder input, field investigations, selection of appropriate model parameters, and development of appropriate tools and procedures. In this session the WSP Team will introduce the audience to the variety of modeling methodologies employed in this region as well as the complexities of developing watershed-wide models. The Team will present on the geospatial and technological tools developed for use in these watersheds and discuss how they have helped improve results and introduce efficiencies in modeling. In presenting on modeling of pumps in a 2D environment, the Team will discuss a relatively newer feature in 2D modeling.



CODE: G

PRESENTATION TYPE: Technical

TITLE: State Efforts and Directions to Update Their Hydrography

Nationally, USGS has embarked on a replacement for the National Hydrography Program (NHD) with the new 3DHP. The implementation of this effort will rely on coordination with State Hydrography programs. This series of talks will feature State presentations on their efforts and directions to update their hydrography.



CODE: H

PRESENTATION TYPE: Technical

TITLE: Lakes Minimum Flows and Levels

Florida law states that the Water Management District's Governing Board "shall use the best information and methods available to establish limits which prevent significant harm to the water resources or ecology." District Minimum Flows and Levels (MFLs) are typically determined based on evaluations of topography, soils and vegetation data collected within plant communities and other pertinent information associated with a given priority water resource. MFLs take into account the ability of wetlands and aquatic communities to adjust to changes in hydrologic conditions. MFLs allow for an acceptable level of hydrologic change to occur. When water withdrawals shift hydrologic conditions of priority water bodies below levels defined by MFLs, significant ecological harm can occur. Novel geospatial tools are needed to help water resource scientists develop and assess meaningful criteria to ensure significant harm does not occur at priority water bodies. This session will focus on the application of geospatial tools to help evaluate the impact of lake level reduction on ecological and human use water resource values.



CODE: I

PRESENTATION TYPE: Technical

TITLE: Groundwater Mapping and Modeling

This session focuses on analysis, mapping and modeling of groundwater systems using geospatial tools. We encourage submissions highlighting the role of geospatial tools in groundwater applications and emphasizing the importance of data analysis in managing groundwater resources and making critical decisions.

CODE: J**PRESENTATION TYPE:** Technical**TITLE:** Machine Learning Applications in US

This session delves into intelligent and innovative methodologies for addressing complex water resources challenges, leveraging machine learning and artificial intelligence (AI) to provide insights and solutions. The power of AI and machine learning lies not only in their predictive capabilities but also in their capacity to analyze large-scale and multifaceted data.

A highlight of this session is a case study from the Everglades, showcasing how AI has been utilized for forecasting water levels, an essential tool in water management and decision-making. Aside of this, also the problem of knowing the influence of hydrology in atmospheric rivers in the Amazon, using predictive models that integrate various data, including hydrometeorological variables such as wind speed, water vapor transport, and evapotranspiration.

We invite presentations that demonstrate the potential of machine learning and AI in addressing complex challenges in water resources management, offering innovative solutions that consider the intricate interplay of natural, social, and economic factors.

CODE: AA

PRESENTATION TYPE: Workshop

TITLE: Elevation Derived Hydrography

Elevation Derived Hydrography is based on automated extraction of hydro features (streams, lakes, wetlands) from high resolution digital elevation models (DEM). This workshop presents various geomorphologic and AI techniques within GIS framework for various types of hydro feature extraction and classification. Techniques are applied to DEMs of different resolution, geographic location, and complexity. Pros and cons of different techniques, their performances, and viability are discussed through real world examples and demonstrations.

CODE: BB

PRESENTATION TYPE: Workshop

TITLE: The Application of Machine Learning (ML) Principles in Water Resources Forecasting

In recent years, Deep Learning and Machine Learning techniques have revolutionized forecasting in the water management sector, making them vital tools for decision-making processes. Predicting water flow based on rainfall data is of critical importance and this workshop aims to impart the foundational knowledge and practical skills to leverage these advanced technologies effectively.

Our workshop aims to demystify the general concepts underpinning AI-based forecasting models, providing practical insights on setting up your own forecasting system. We will delve into the practicalities of employing Long Short-Term Memory (LSTM) and Convolutional LSTM (ConvLSTM) models specifically for rainfall-runoff problems.

Participants will be engaged in hands-on exercises designed to solidify understanding and stimulate exploration of the potential of these techniques. Furthermore, we will provide relevant literature and reference materials to support ongoing learning beyond the workshop environment.

This workshop is dedicated to addressing the challenge of forecasting water levels in Everglades National Park (Everforecast). We will provide a comprehensive overview of the case study and delve into several key methodologies designed to tackle the primary issues.

This workshop not only equips attendees with a basic understanding and practical experience of implementing AI in water resources forecasting but also places these skills within the broader context of contemporary AI tools used in the sector. By the end of this workshop, participants will have a foundational understanding and a basic skill set for applying these tools to their own water resources challenges.