

Session Abstracts

Geographic Programs and Applications for the 2030 Census

Presented by Maria Panaccione-Tweve, U.S. Census Bureau

Description: As the U.S. Census Bureau prepares for the 2030 Census, the Geography Division continues to strengthen partnerships with tribal, federal, state, and local governments. This session will highlight key geographic programs including the Boundary and Annexation Survey (BAS), Local Update of Census Addresses (LUCA), Participant Statistical Areas Program (PSAP), and New Construction (NC) and demonstrate how partner contributions support accurate data collection, tabulation, and dissemination for the Decennial Census.

The session will also provide a preview of the Geography Division Partner Portal (GDPP), designed to enhance the participant experience, and the Geographic Update Partnership Software (GUPS) Web, which utilizes open-source and web-based technologies to improve accessibility and efficiency.

Keywords: *2030 Census, Census, Census Bureau, Decennial Census, Geography, Partnerships, open source*

Integrating Geospatial Technologies, Machine Learning, and Remote Sensing for Urban Climate Resilience, Sustainability, and Equitable Planning

Presented by Mahi Patel, Silver Oak University

Description: This study addresses the growing environmental challenges caused by rapid urbanization and climate change, including urban heat islands (UHI), flooding, and air quality degradation. It presents an integrated geospatial framework combining remote sensing, GIS, machine learning, and cloud-based platforms for urban resilience analysis. Multi-source satellite datasets (Landsat 8/9, Sentinel-1/2, and MODIS) are processed using Google Earth Engine to derive land use/land cover, land surface temperature, vegetation indices, and flood indicators. Machine learning models such as Random Forest, Gradient Boosting, and Support Vector Machines are applied for classification and predictive risk mapping. The framework integrates reproducible workflows and UAS data for validation. The outcomes include high-accuracy maps and actionable insights for climate adaptation, disaster management, and sustainable urban planning.

Keywords: *Remote Sensing, Geographic Information Systems (GIS) Machine Learning, Climate Change, Urban Resilience*

Building the Digital Twin: Leveraging LiDAR and GIS for Smarter Asset Management

Presented by Steve Mulberry, NV5

Description: A major city in the Northwest is advancing its asset management strategy through a GIS-centric approach, focusing on the modernization and digital transformation of its critical infrastructure. To support this initiative, the City engaged NV5 to begin the creation of a digital twin encompassing treatment plants, pump stations, and various industrial facilities. This effort integrates 3D visualization within the Esri ecosystem and ensures compatibility with Trimble Unity, an Asset Lifecycle Management System, establishing a scalable digital foundation for future operations.

This session will explore the methods and technologies used in developing a comprehensive digital twin, highlighting the benefits of reality capture and the Scan-to-BIM-to-GIS-to-AMS workflow. Attendees will gain actionable insights on enhancing operational efficiency through 3D fieldwork capabilities and learn practical steps to implement similar solutions within their organizations.

Keywords: *Digital Twin, LiDAR, Utilities, Treatment Plants, Pump Stations*