



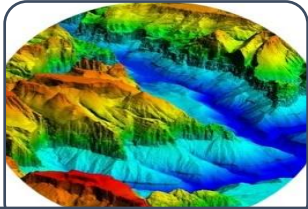
Foundational data for coastal resilience and economy

Michael Tischler, PhD
Acting Associate Director
USGS Core Science Systems

Geospatial World Forum
April/May, 2026



Core Science Systems Programs and Centers



National Geospatial Program (NGP)

Provides vital foundational digital geospatial data of the topography, natural landscape, and built environments of the United States. Provides geographic information to advance science, support government, enlighten citizens, and enable decision making.



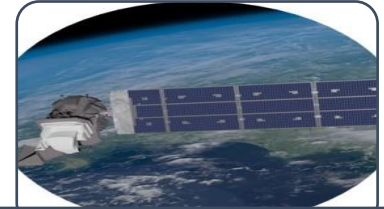
Federal Geographic Data Committee (FGDC)

Provides executive, managerial, and advisory direction and oversight for geospatial decisions and initiatives across the Federal government and for the National Spatial Data Infrastructure. The FGDC is chaired by the Secretary of the Interior with the Deputy Director for Management, OMB as Vice-Chair.



Science Synthesis, Analysis, and Research Program (SSAR)

Provides analysis and synthesis of scientific data and information, interdisciplinary research to improve understanding of Earth systems, and preservation of library collections. Provides high-performance computing capabilities and AI expertise to scientists for the acceleration and expansion of scientific discovery.



National Land Imaging Program (NLI)

Operates the Landsat satellites and provides an archive of remotely sensed land data, supplying continuous access to current and historical land images worldwide. Provides remotely sensed data and applications to assess the impact of natural disasters, monitor global agricultural production, and support national defense.



National Geospatial Technical Operations Center (NGTOC)

Provides geospatial services and expertise for data acquisition, data management, product generation, and delivery supporting USGS programs.



Earth Resources Observation and Science Center (EROS)

Provides global leadership in land imaging, using remotely sensed data to track how Earth is changing.

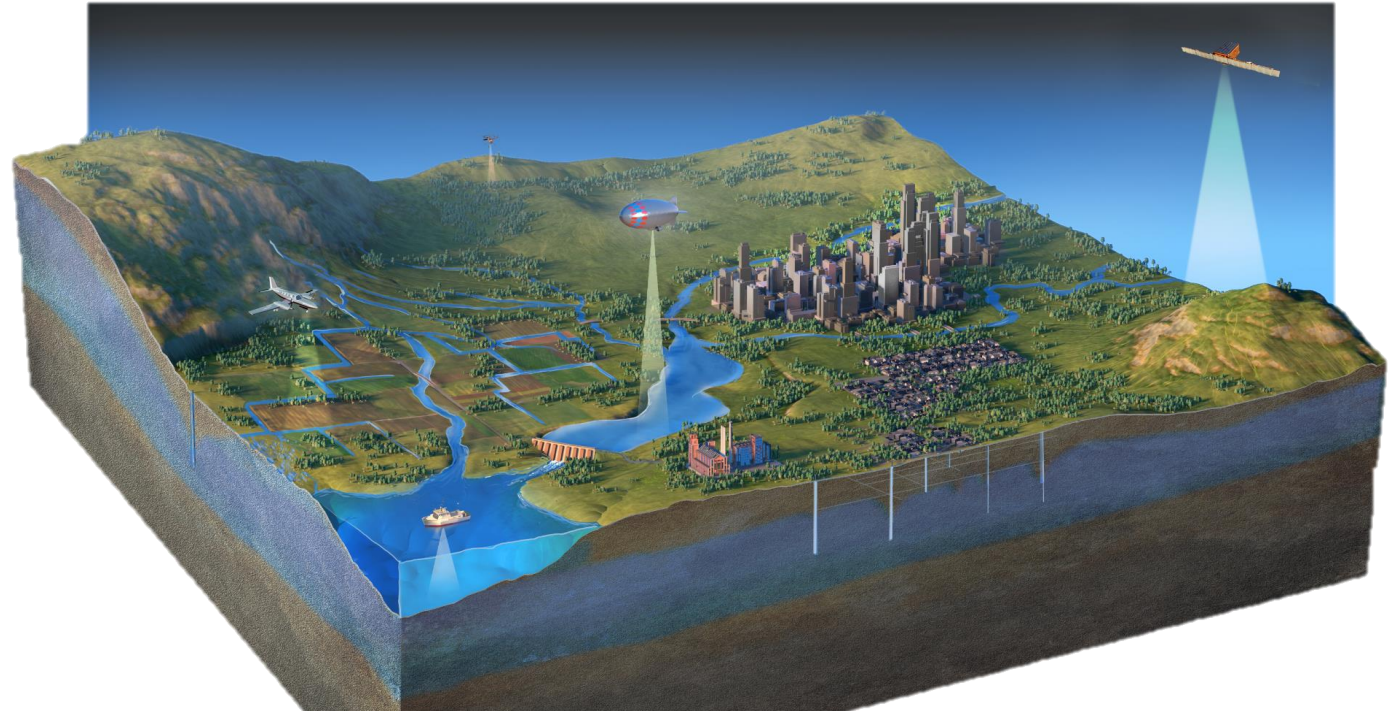


National Civil Applications Center (NCAC)

Provides access to Intelligence Community and military Earth observing imagery to meet DOI, USGS, and other Federal agency missions.

USGS provides a variety of foundational data and science

- High resolution elevation supports coastal development, resilience, and economy
 - 3D Elevation Program
 - Partnership with I-Atlas
 - Coastal National Elevation Database
- Minerals and mining assessments
- Alaska Mapping



Supporting the Nation's Critical Applications:

Provides foundational data to: Earth MRI, National Landslides Preparedness Act, FEMA next generation of flood hazard and risk information, The NOAA National Water Model, and The EPA Clean Water Act

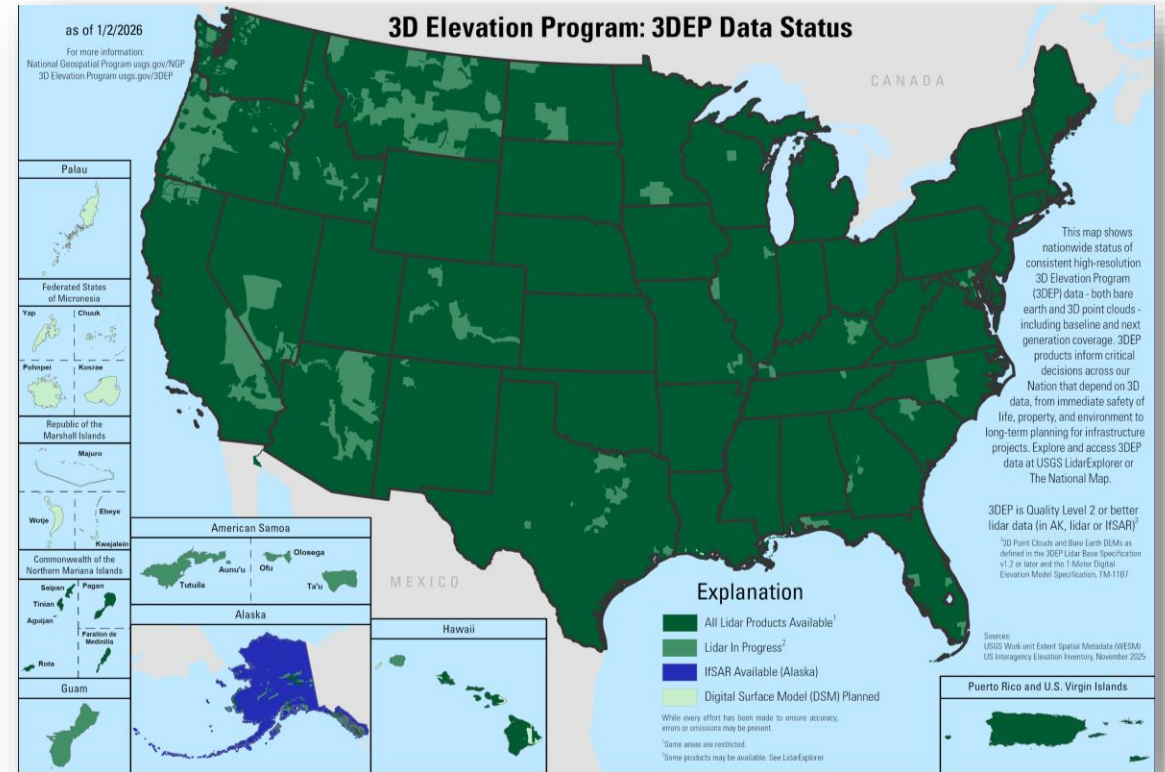
3D Elevation Program (3DEP)

The 3DEP mission is to respond to growing needs for high-quality topographic data and for a wide range of other three-dimensional (3D) representations of the Nation's natural and constructed features

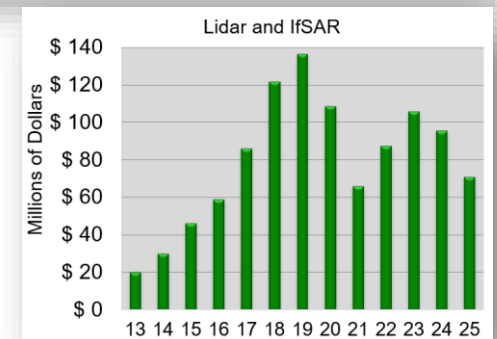
3DEP has been focused on acquiring and delivering the nationwide baseline dataset of consistent, high-accuracy elevation data as the **program's first primary milestone**

This baseline dataset is the first of its kind in the world being built at this scale, and has been a highly successful partnership across public and private sectors

At the end of **FY 2025**, **99%** of the Nation had 3DEP-quality data available or in progress.



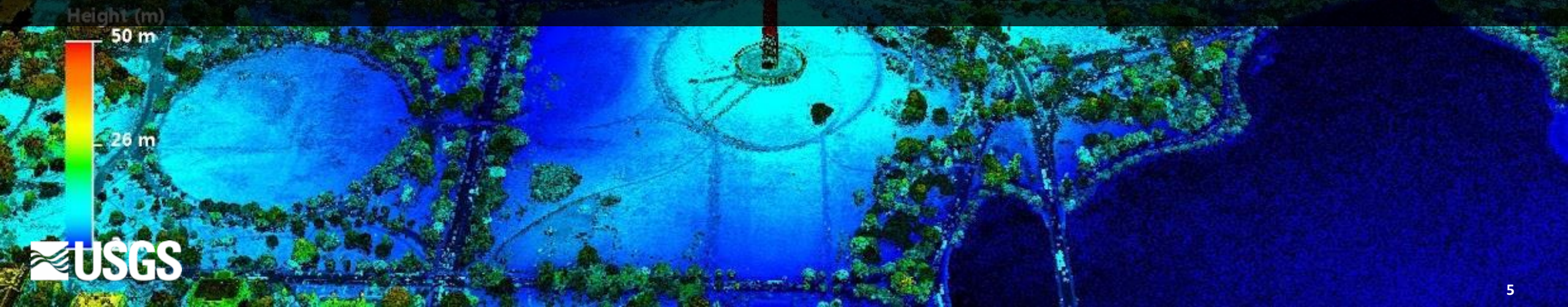
Data acquisition investments by all partners, by fiscal year





100%

of the Nation will have 3DEP baseline data available or in progress by the end of FY26



3DEP Data are Critical to Science



How LiDAR is Being Used to Help With Natural Disaster Mapping and Management

10 Mar 2019 THE ENGINEERING COMMUNITY



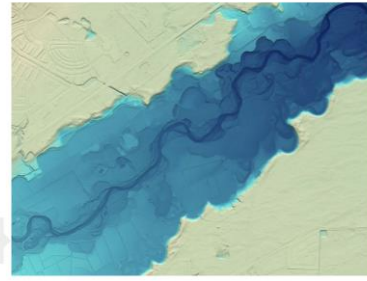
Figure 1. U.S. Geological Survey (USGS) flood-inundation maps for a 3.95-mile reach of the Saluda River near Greenville, South Carolina, originating approximately 150 feet downstream from Saluda Lake Dam. A lidar-derived digital elevation model was used to aid in hydraulic modeling to create these maps. The extent of inundation depicted corresponds to river stages of 20.0 feet (A) and 6.0 feet (B) at USGS streamgage 02162500 (yellow triangle) on the Saluda River. The red line corresponds to the model extent.

Revealing our dynamic landscape through new high-resolution topographic data

Nevada Bureau of Mines and Geology's regional-scale lidar mapping provides novel insights into earthquake, flood and glacial history

Science & Technology | December 18, 2018
Jane Tom

Lidar mapping of the Carson River near Dayton, Nevada, indicates flood history and helps inform planning by accurately defining what land could be inundated when flood waters rise.



Lidar Reveals Chacoan Roads and Ritual Sites at Gasco Site

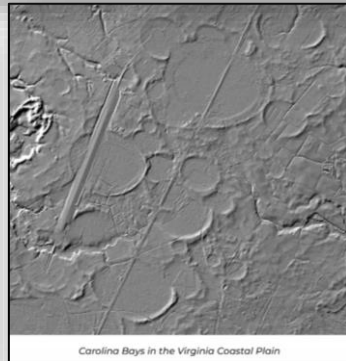


NY Times article "See How the Dixie Fire Created Its Own Weather"

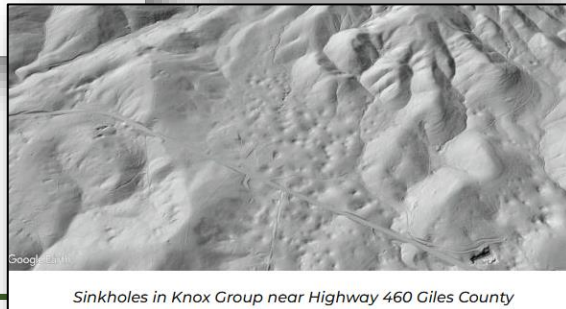
Lidar for earthquakes



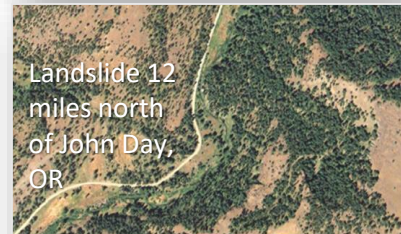
- Lidar allows us to see hazards through heavy forest
- Hillshade from bare-earth DEM
- San Andreas fault, CA



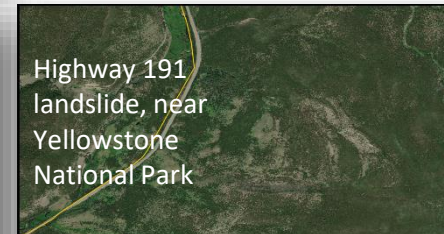
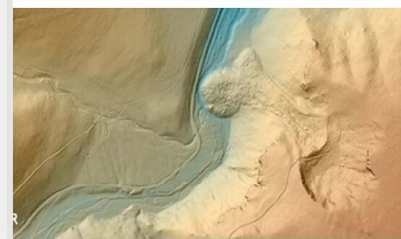
Carolina Bays in the Virginia Coastal Plain



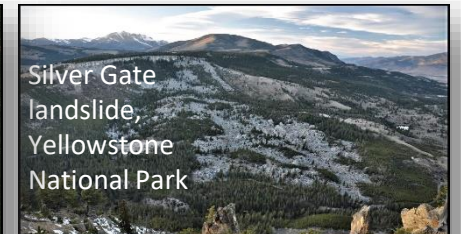
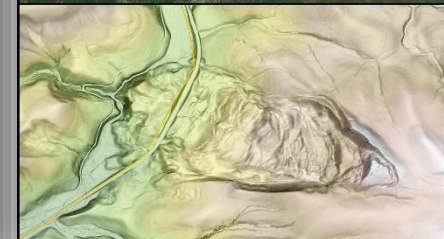
Sinkholes in Knox Group near Highway 460 Giles County



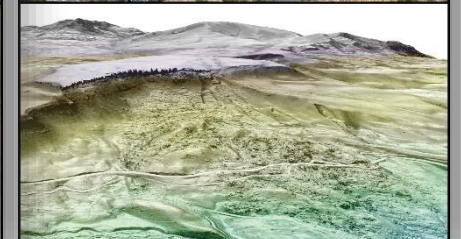
Landslide 12 miles north of John Day, OR



Highway 191 landslide, near Yellowstone National Park



Silver Gate landslide, Yellowstone National Park

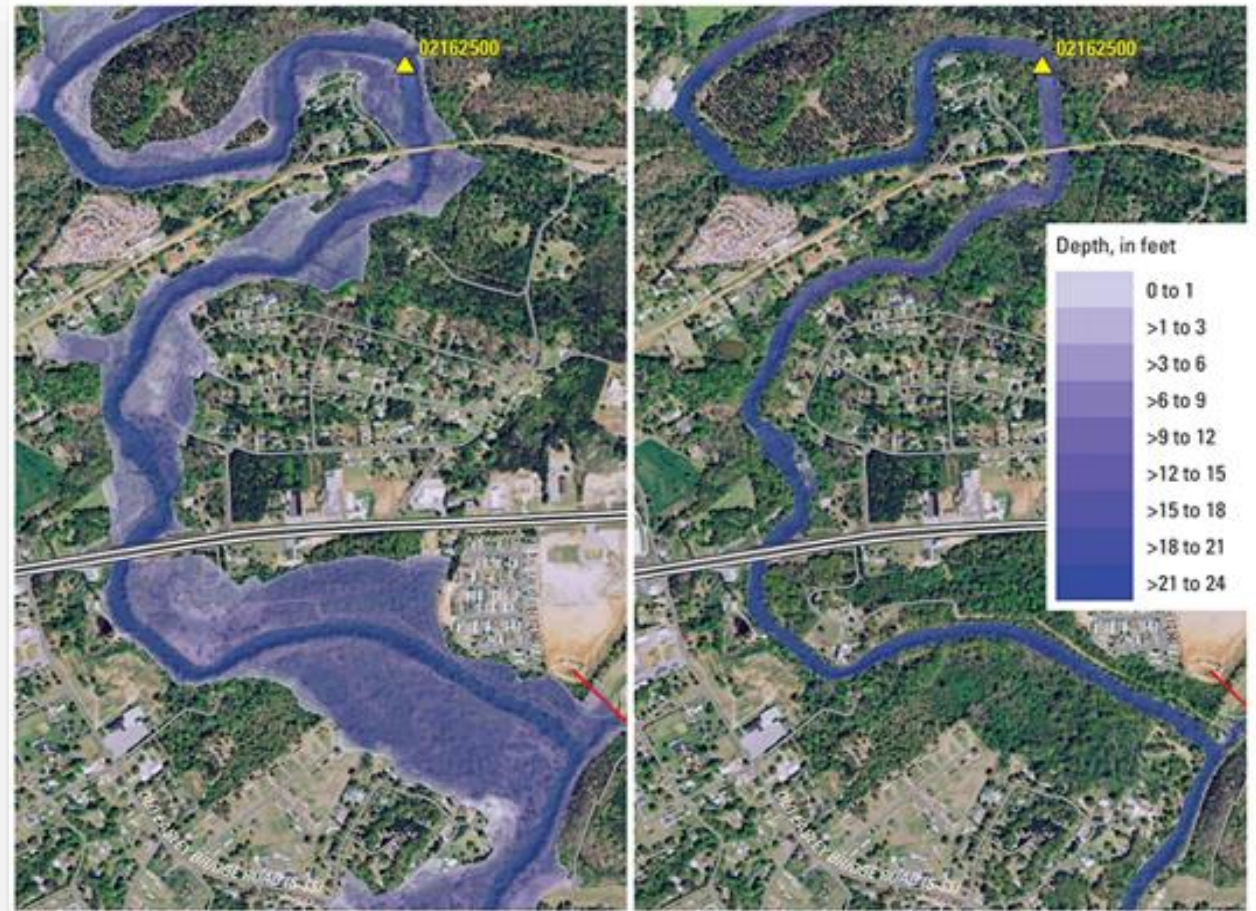




3DEP for Flood Risk Management

Lidar data are critical to the National Flood Insurance Program

- Produce higher quality flood maps including Flood Insurance Rate Maps
- Manage dam and levee safety programs to reduce flood risks
- Improve hydrologic modeling and flood forecasting
- Improve State and local flood risk management and response
- Improve stormwater facilities and dam design
- Extract building footprints and identify the finished floor elevation to quantify potential damages based on flooding depths

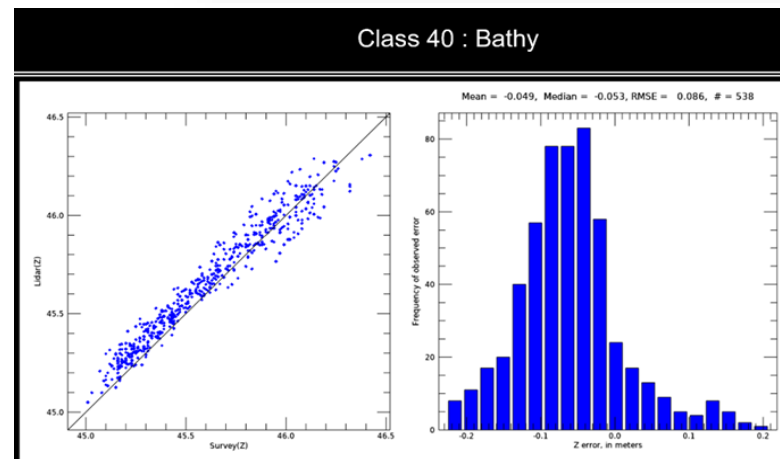
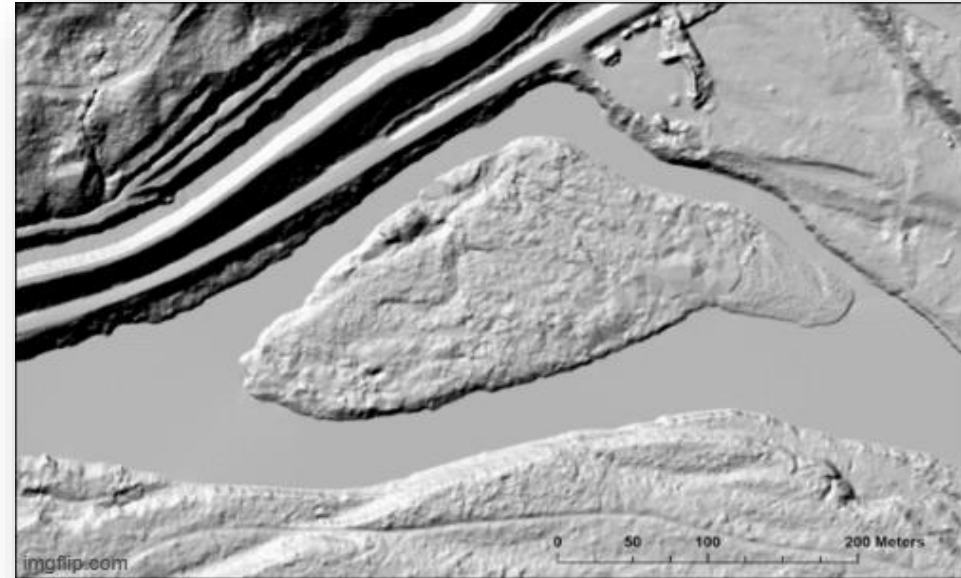


Lidar aids hydraulic modeling to model flood inundation on the Saluda River near Greenville, SC

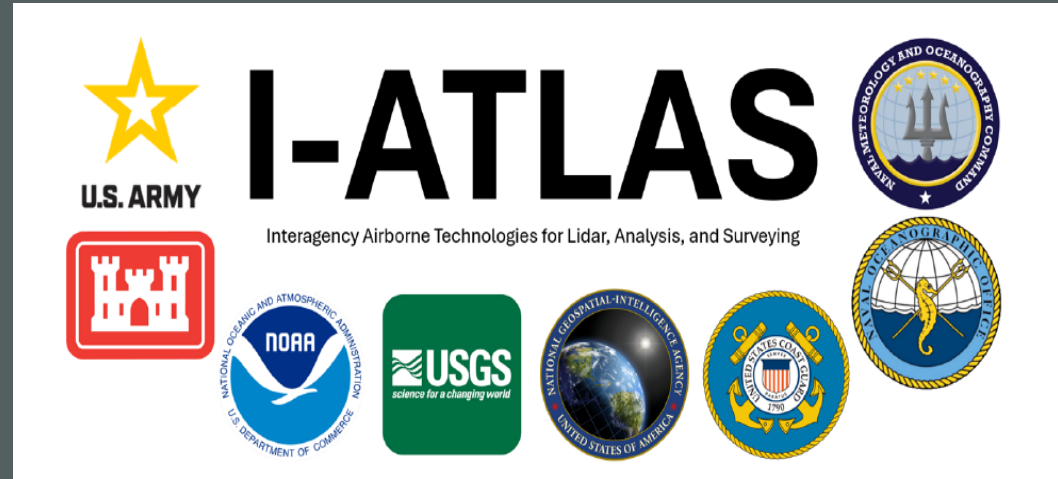
Inland Bathymetry

- Research on accuracy, river bottom detection, spatial coverage, and sensor performance in varying environmental conditions.
- FY26 3DEP projects include acquisition of sonar for the first time
 - Extend data coverage in deep pools or turbid water
 - Compare sonar to lidar to assess point classification accuracy (bottom vs. suspended sediment)
- Begin implementing the new Interagency Airborne Technologies for Lidar, Analysis, and Surveying (I-ATLAS) topobathymetric lidar specification.
- Continued focus on coordination with other Federal agencies

Hydroflattened DEM vs. topobathymetric DEM for McKenzie River, OR



Interagency Airborne Technologies for Lidar, Analysis, and Surveying (I-ATLAS)



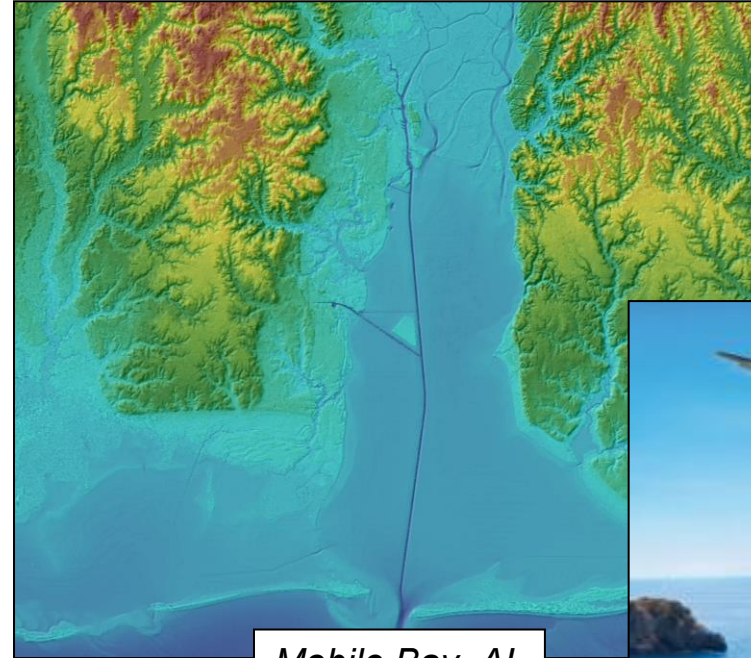
- ❑ 28-year JALBTCX partnership among USACE, NAVO, NOAA, and USGS
- ❑ Leveraging work in government, industry, and academia to advance airborne lidar and coastal mapping technology and applications.
- ❑ Added NGA and USCG to enhance efficiency and quality of airborne lidar bathymetry for the Nation.

❑ I-ATLAS Core Functions:

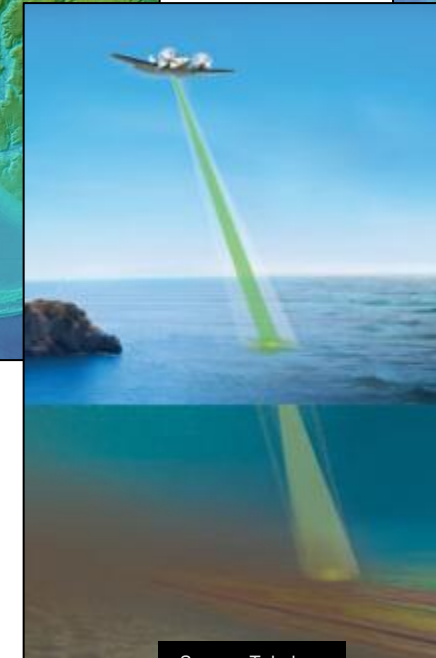
- ❑ Develops, operationalizes, coordinates airborne lidar bathymetry systems
- ❑ Tests and validates new sensors
- ❑ Develops common specifications, standards, and best practices for the acquisition of airborne lidar bathymetry data

Coastal National Elevation Database (CoNED)

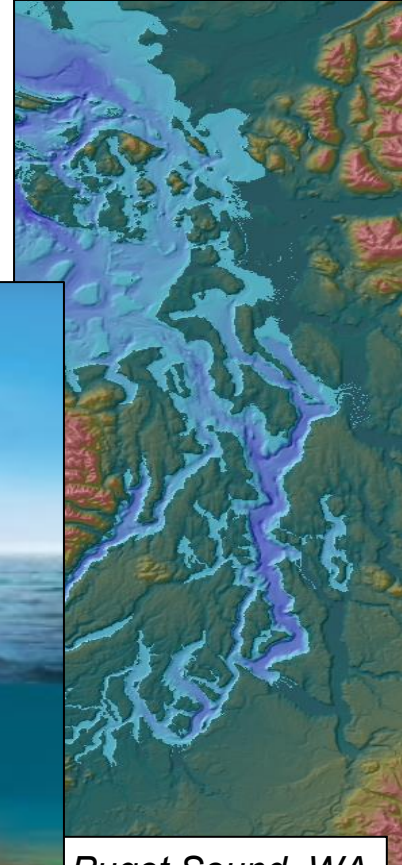
- 1-m topographic-bathymetric DEM (TBDEM)
- Seamless elevation across the land-water interface
- Primarily lidar source data
- Product of USGS EROS (2013 – present)



Mobile Bay, AL



Source: Teledyne



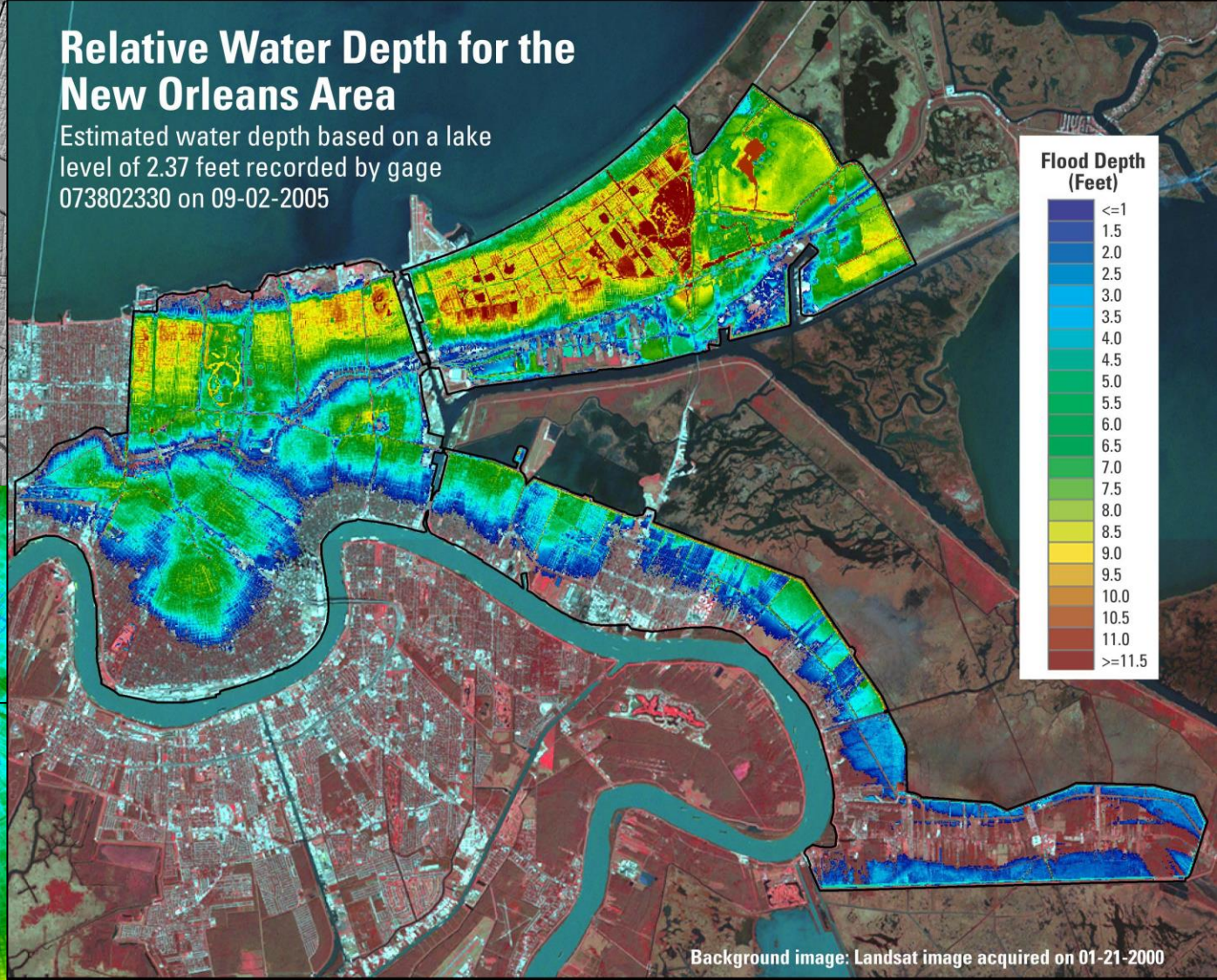
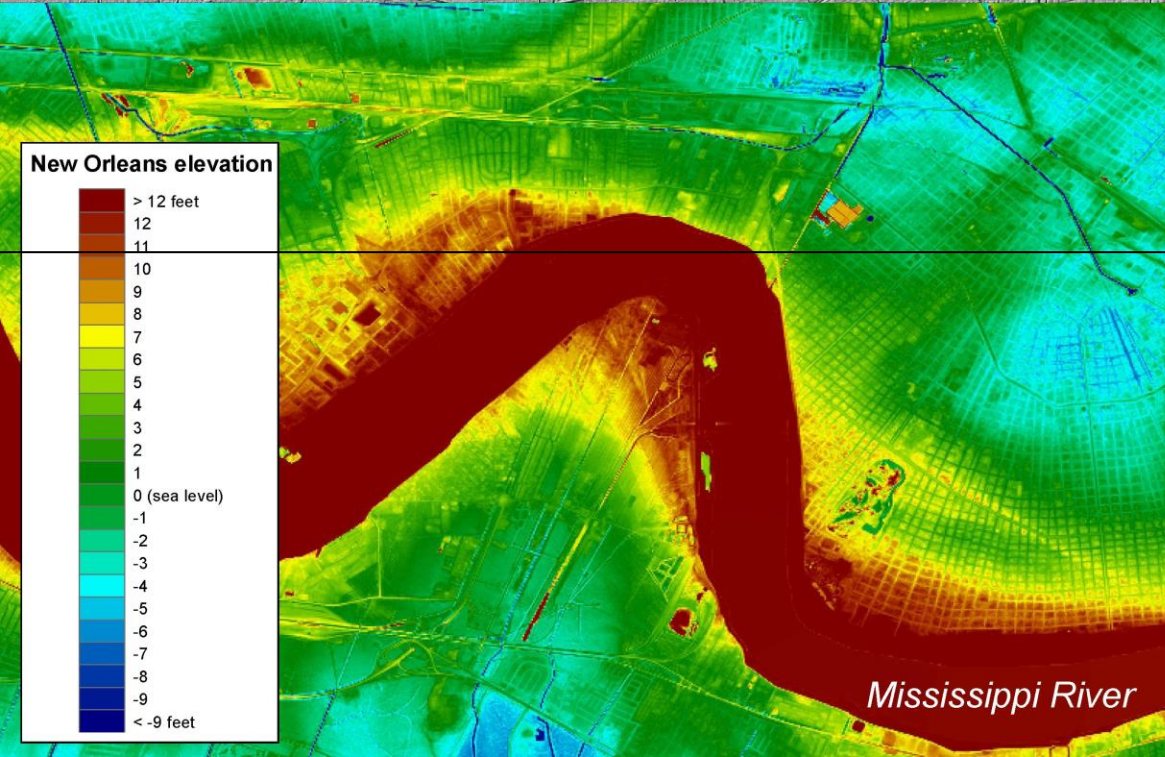
Puget Sound, WA

New Orleans, LA

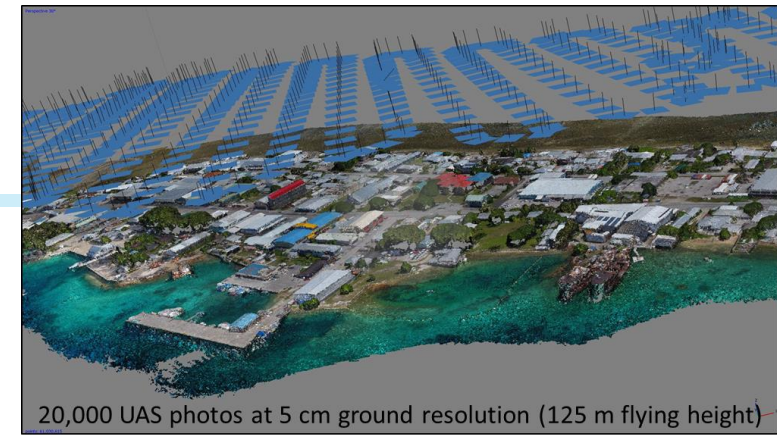
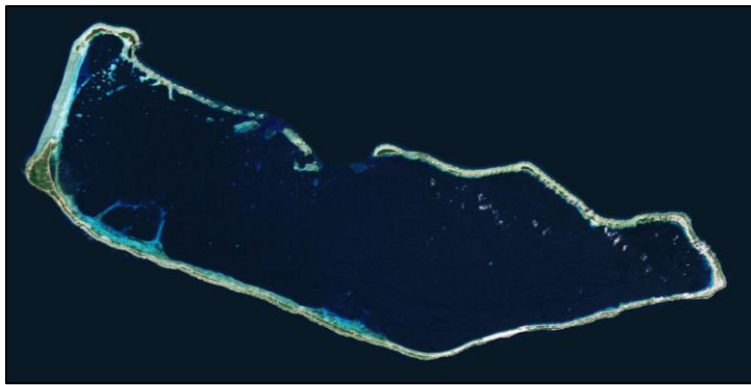


Relative Water Depth for the New Orleans Area

Estimated water depth based on a lake level of 2.37 feet recorded by gage 073802330 on 09-02-2005



Flood depth estimated from 10-m elevation data derived from 5-m lidar data collected in 2002.

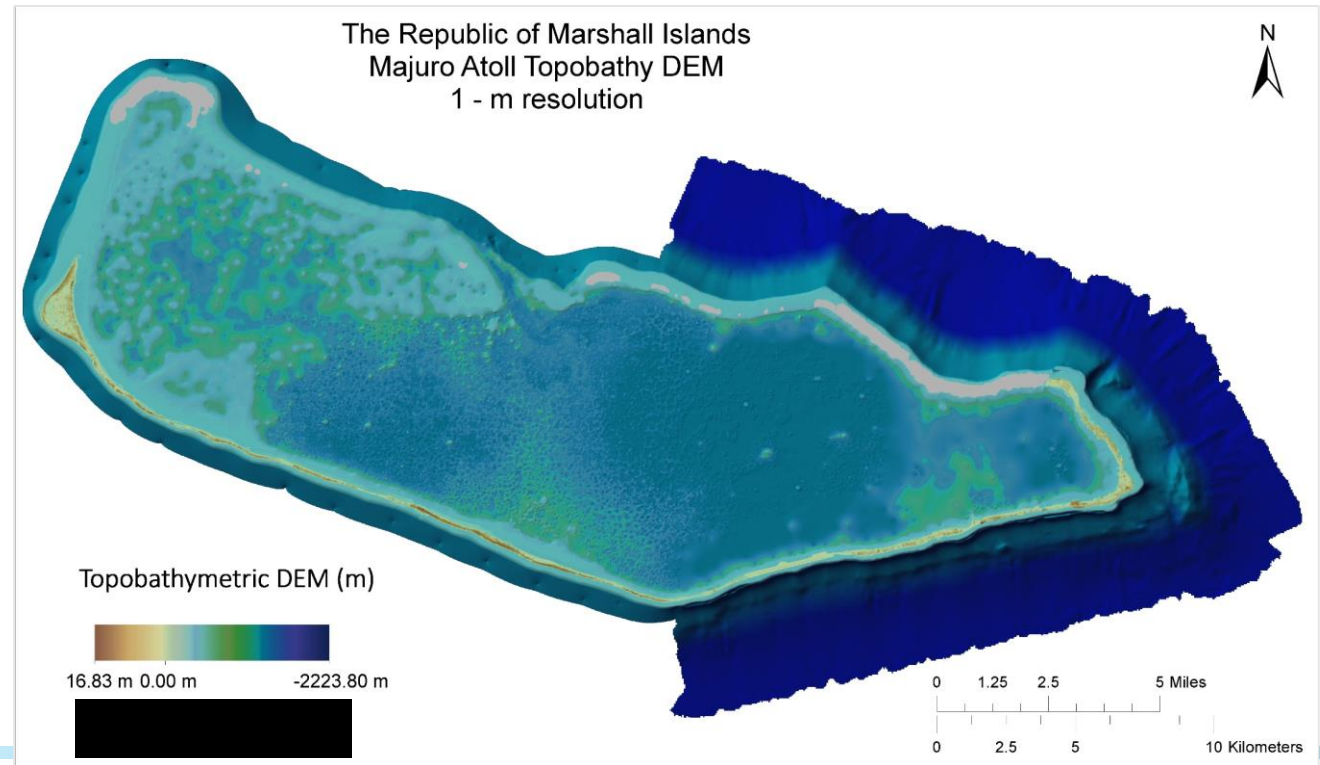
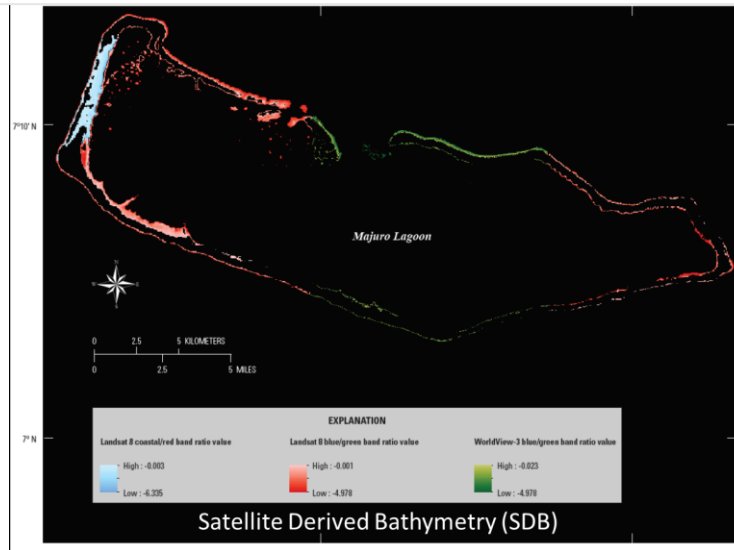


20,000 UAS photos at 5 cm ground resolution (125 m flying height)

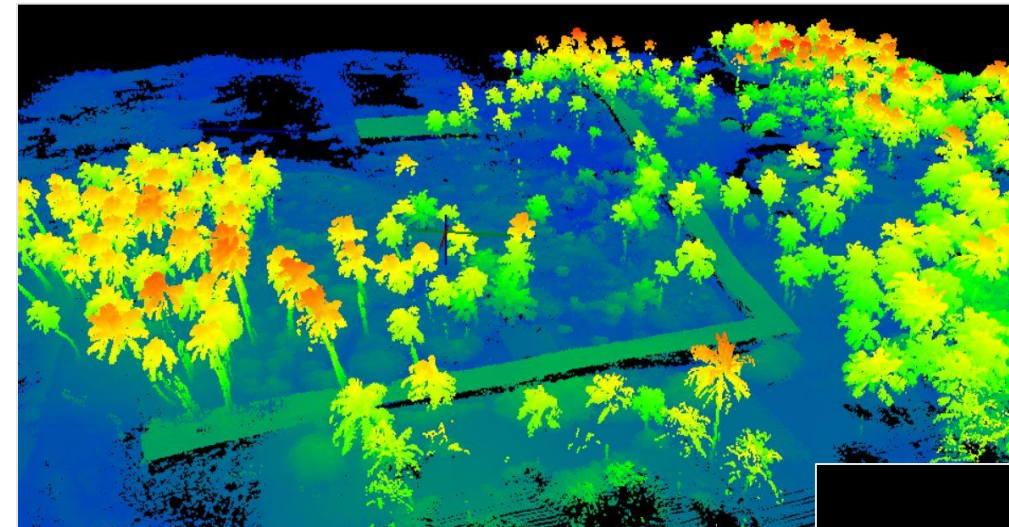
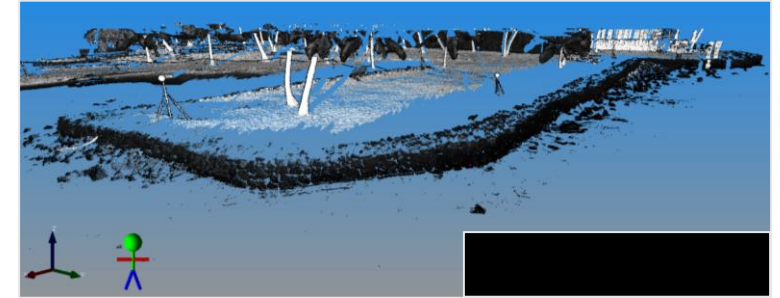
 remote sensing



Article
Inundation Exposure Assessment for Majuro Atoll, Republic of the Marshall Islands Using A High-Accuracy Digital Elevation Model



Supporting inundation preparedness in National Parks



Supporting sea-level rise preparedness in Hawaiian National Parks

Technical narrative

PI - Philip Thompson, Assoc. Director of UH Sea Level center, UH Mānoa

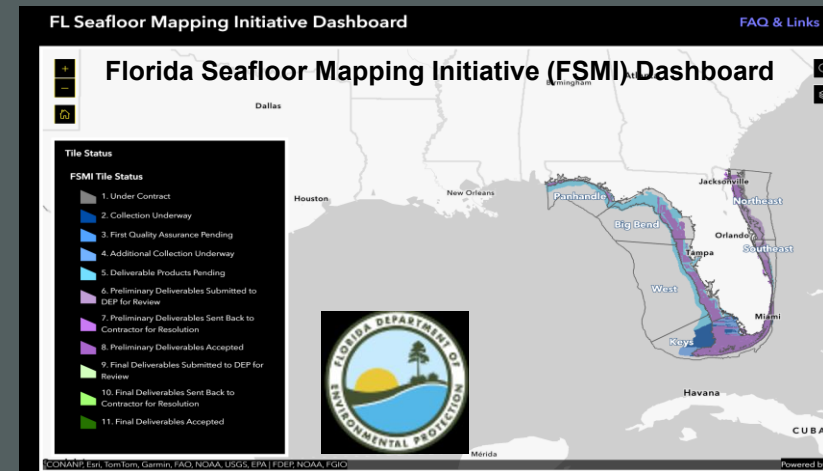
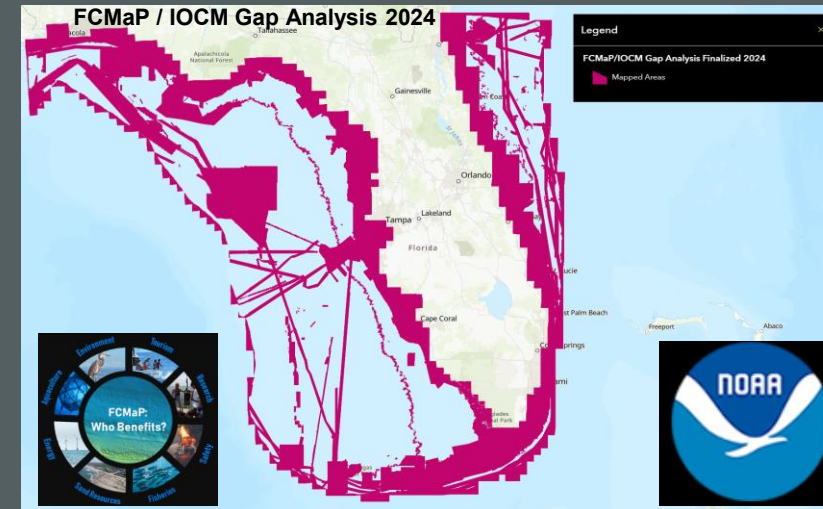


USGS CoNED: Regional Topobathymetric Elevation Model

– Statewide Florida Requirements / Pre-Processed Data

- Spatial Resolution: *1-Meter*
- Projection: UTM Zones 16 and 17 North
- Horizontal Datum: *North American Datum of 1983 (NAD83 2011)*
- Vertical Datum: *North American Vertical Datum of 1988 (NAVD88)*
 - *Geoid – Geoid18*

IWG-OCM Federal Data Repositories



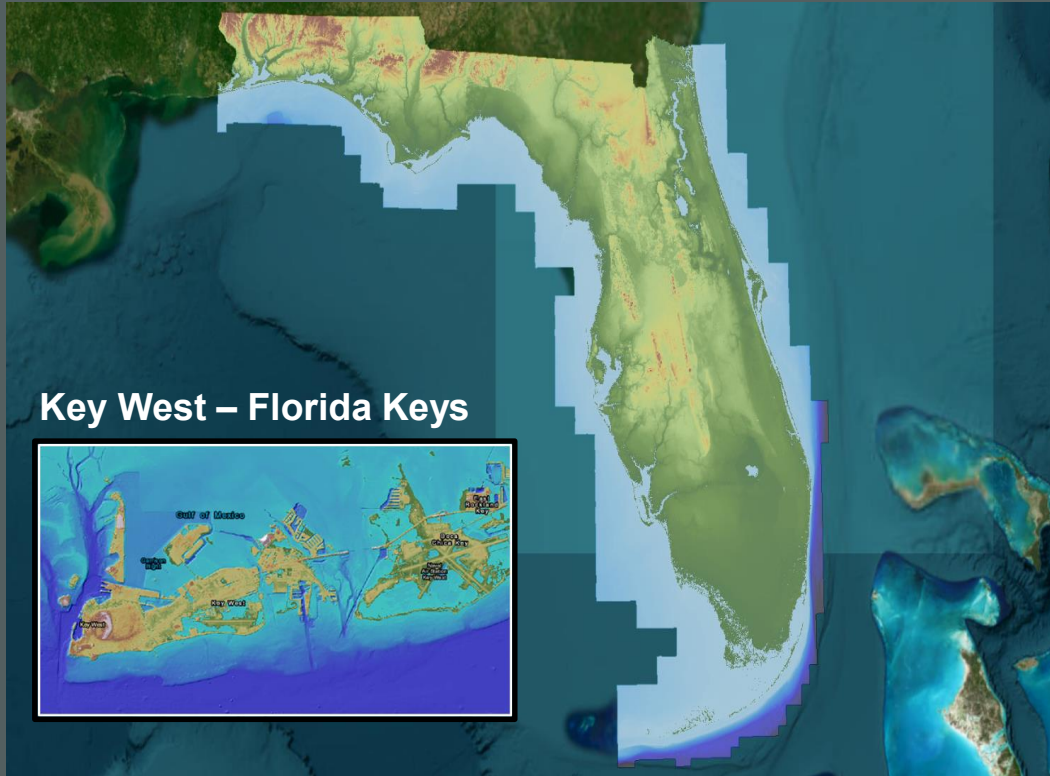
158 Geospatial Datasets have been pre-processed for the Florida CoNED TBDEM

195,800 km² of Topographic Lidar, Topobathymetric Lidar, and Bathymetry

Temporal Data Range: 2022 - 2004

USGS CoNED – Florida TBDEM Version-1 (Complete)

Florida - Version 1 (UTM Zones 16N/17N)



■ Highlights:

- Integrated topobathymetric lidar for pre & post hurricane surveys (NOAA/USACE)
- Includes bathymetry for Lake Okeechobee (USACE) / selected internal inland waterbodies
- Added new topo lidar from Florida DOT (Miami to Key West) and include topobathy products from the Southwest Florida Water Management District for rivers and reservoirs.

Florida Peninsular
(UTM17) Integration
December 19th, 2025

Legend

- Micro and Macro Re-blending Completed
- Traditional and Spatial Metadata Re-blending Completed

Micro and Macro Blending Completed:
204,400 km²

Spatial Metadata Blending Completed:
204,400 km²

Trad/Spatial Metadata Blending Completed:
204,400 km²

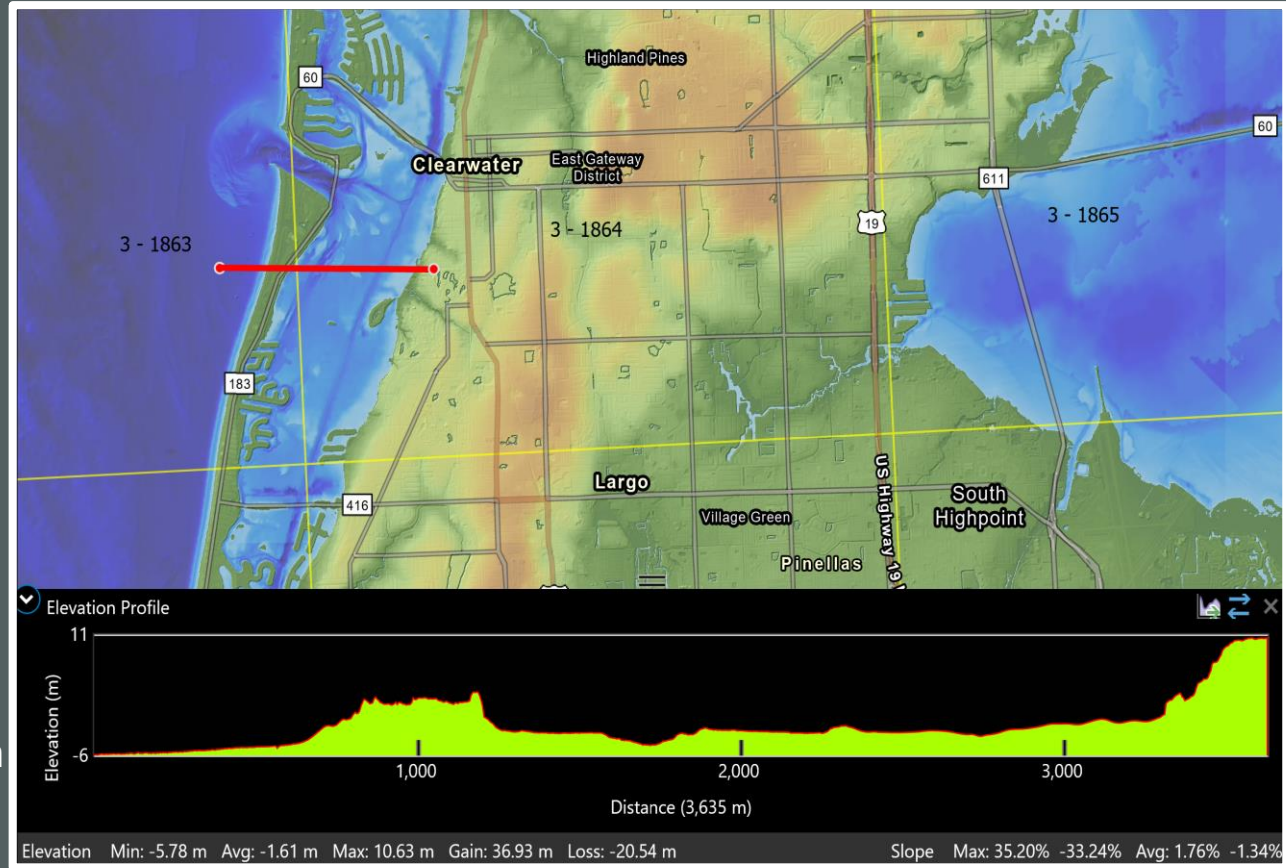


USGS CoNED – Florida (Tampa Bay)

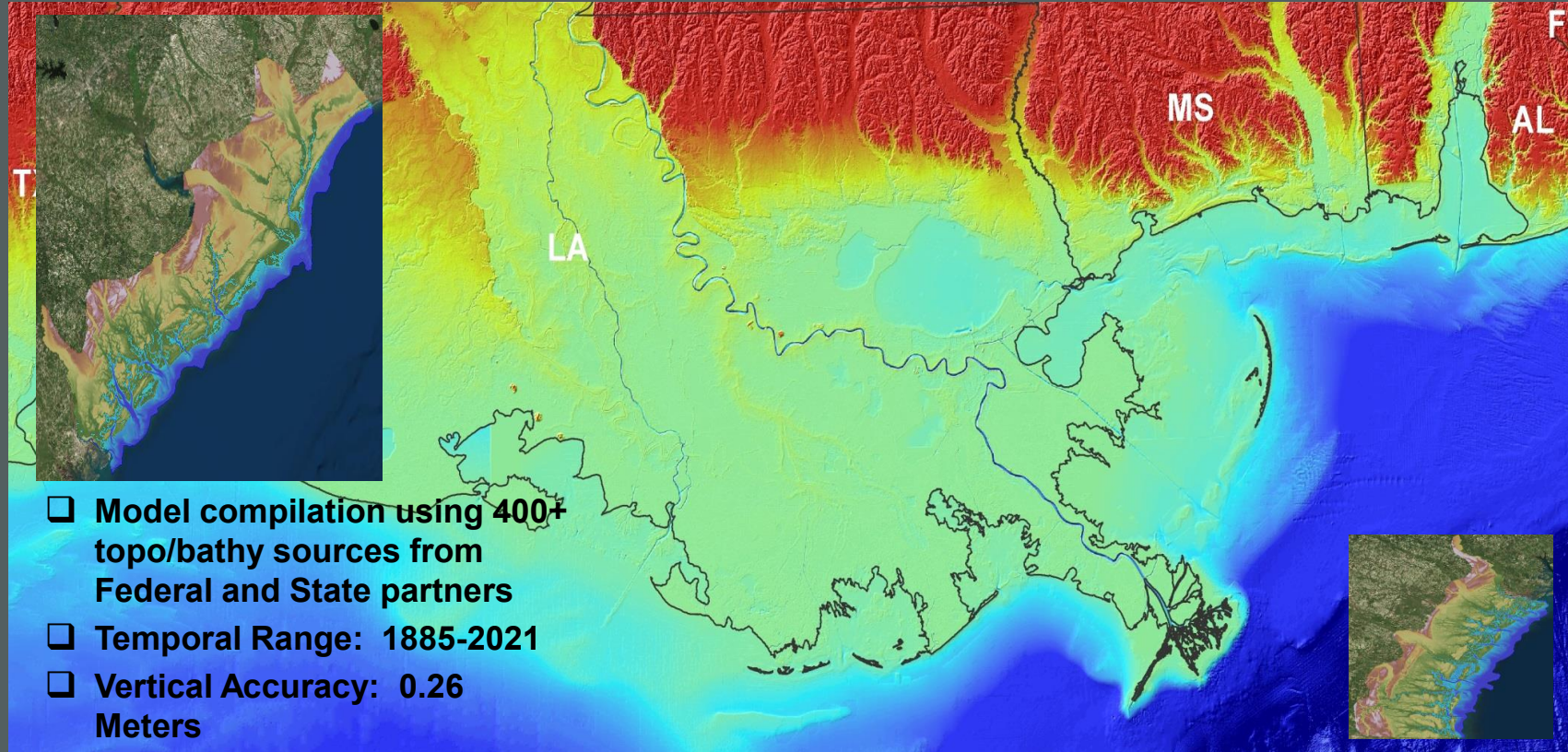
TBDEM (Blended Example)



Composite of sources based on topobathy lidar and traditional acoustic sonar technologies

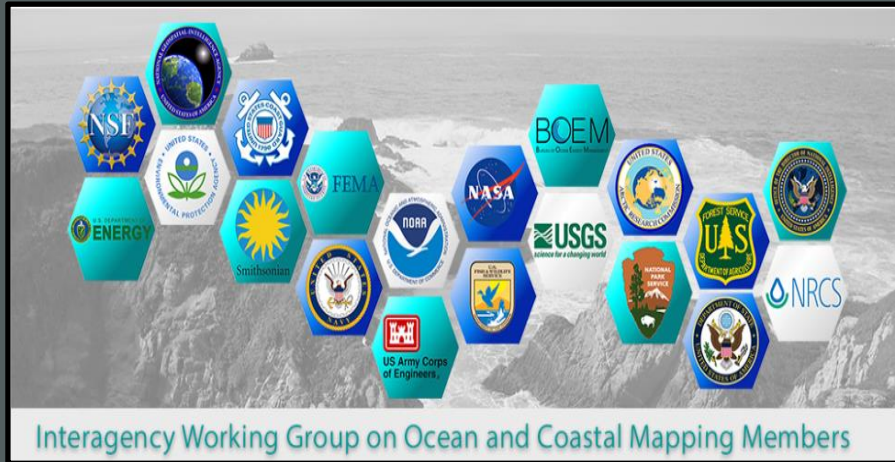


USGS CoNED (2022) – Northern Gulf of Mexico (NGOM2) Integrated Topobathymetric Elevation Model (1-Meter)



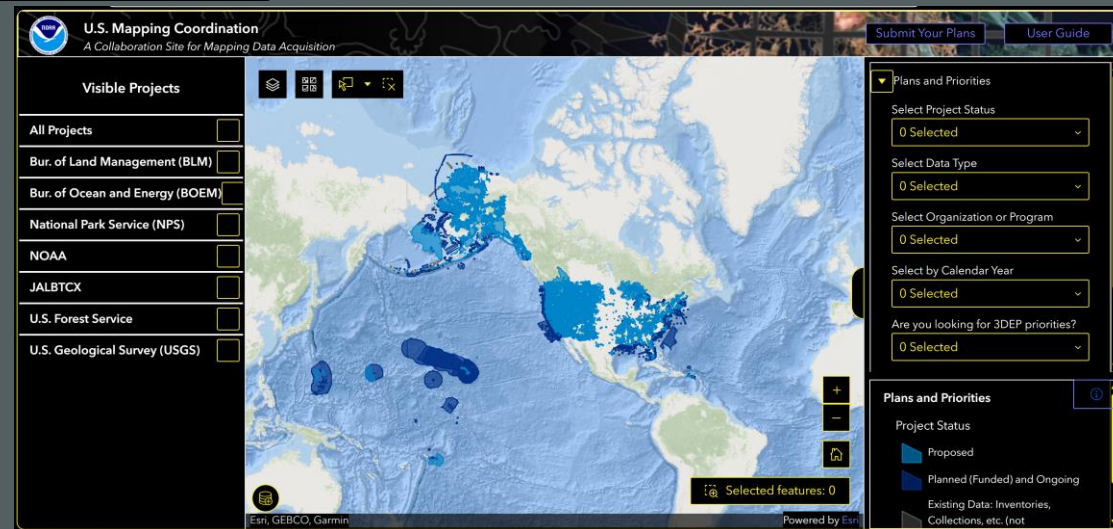
Interagency Working Group On
Ocean And Coastal Mapping

Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM): U.S. Mapping Coordination



Map Once, Use Many Times

- Data Sharing
- Mapping and Coordination
- Standards and Protocols
- Innovations



As Part of its Mission the USGS Contributes to a Robust Minerals Economy

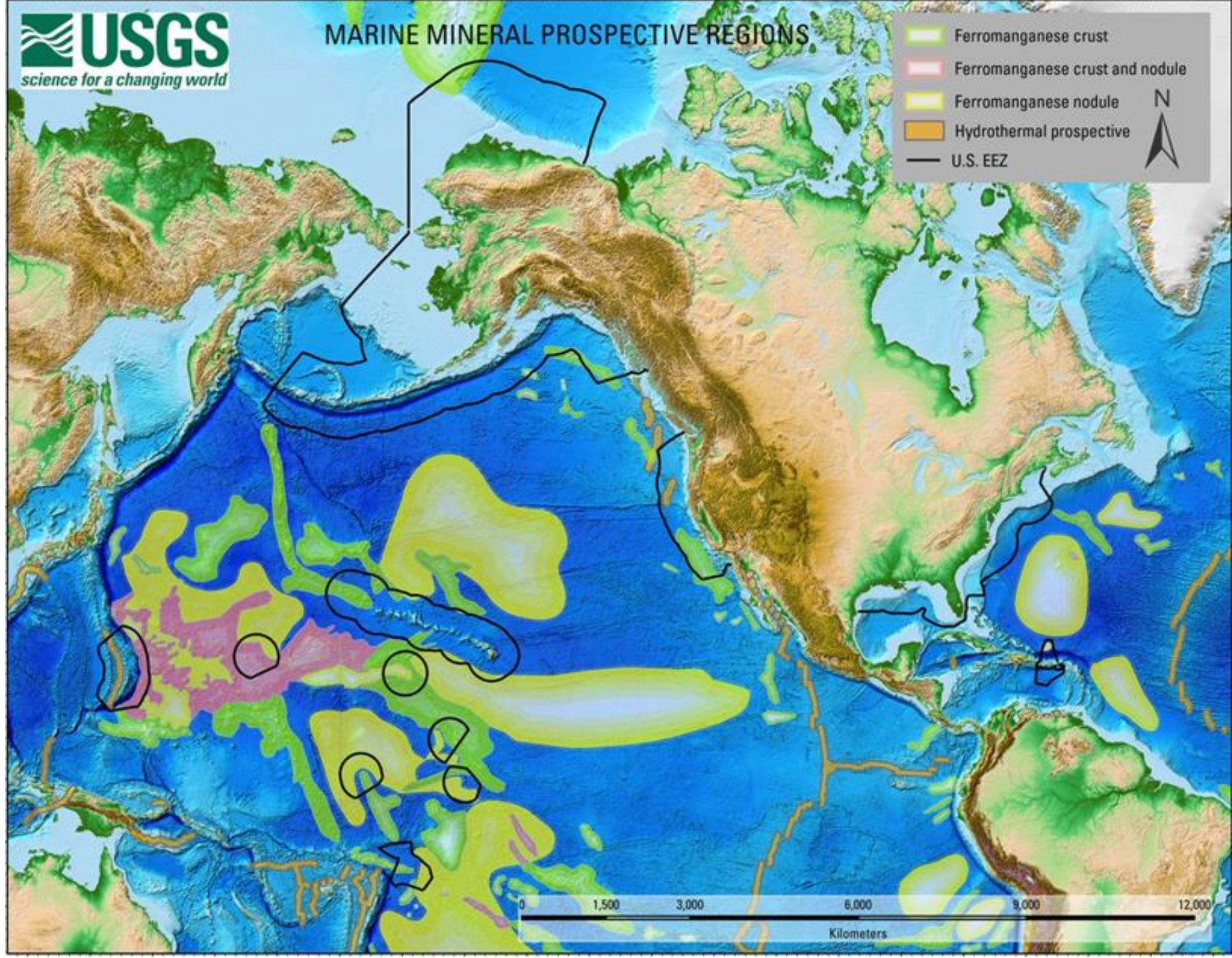


The Blue Economy Plays a Key Role in the Minerals Economy

Marine Minerals may be Mined in the Near Future

Locations in the Oceans Prospective for Marine Minerals

USGS (2025), Global Seabed Mineral Resources: Fact Sheet 2025-3017,
<https://pubs.usgs.gov/fs/2025/3017/fs20253017.pdf>

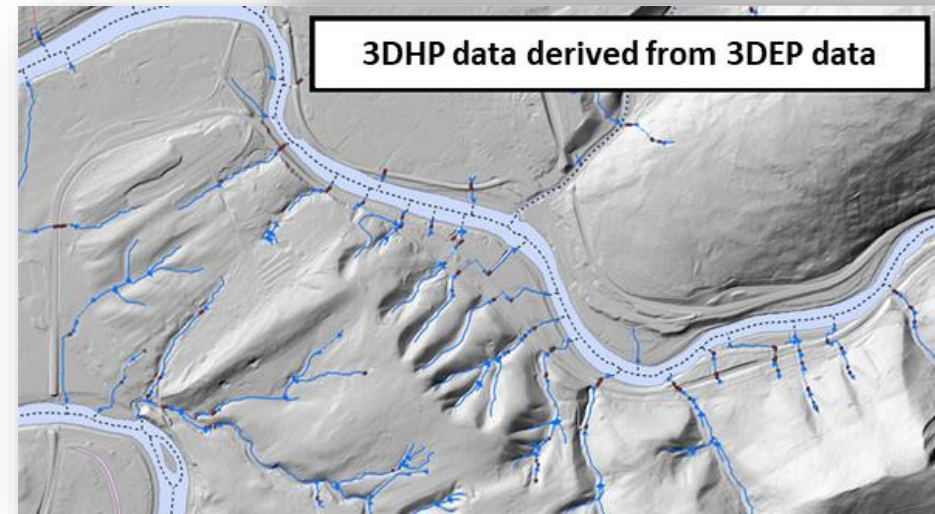


Alaska Mapping and Map Modernization

Supporting Executive Order 14153, Unleashing Alaska's Extraordinary Resource Potential

- The **Alaska Mapping Executive Committee (AMEC)**, co-chaired by DOI and NOAA, coordinates and promotes modernizing Alaska's statewide baseline geospatial data across Federal agencies and the State of Alaska
- Elevation base layer mapping is utilized for critical minerals resource research and mapping for the USGS Mineral Resources Program's Earth Mapping Resources Initiative (Earth MRI)
- Current and accurate mapping coordinated by AMEC, such as elevation, surface water, imagery, wetlands, vegetation, and more, are critical inputs for accessing and managing Alaska's resources, including oil, gas, and critical minerals
- Data are critical for aviation navigation and safety, minerals exploration, energy extraction, infrastructure development, and hazards mitigation
- AMEC is currently focused on improving hydrography, coastal shorelines, bathymetry, and vegetation mapping

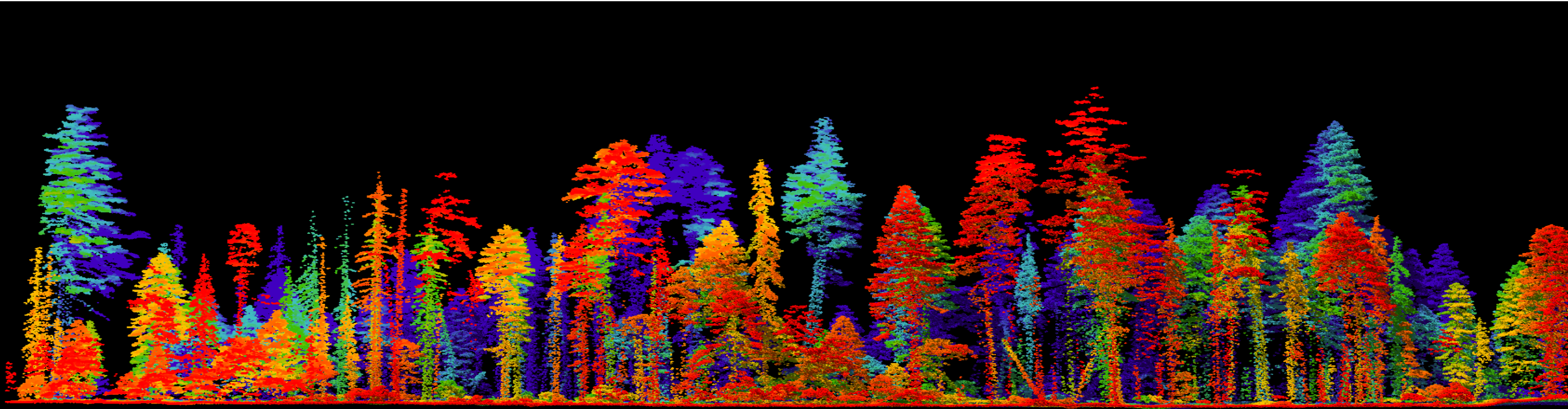
3D Elevation Program (3DEP) IfSAR data of Anchorage and the Chugach Mountains, AK



3DEP Interferometric Synthetic Aperture Radar (IfSAR) high-resolution elevation data acquisition was completed in FY 2019.

3DEP data are now being used to derive 3D Hydrography Program (3DHP) surface water data, which are currently complete or in work for 65% of the state.

Thank you!



3DEP Point Cloud Data
Yosemite National Park