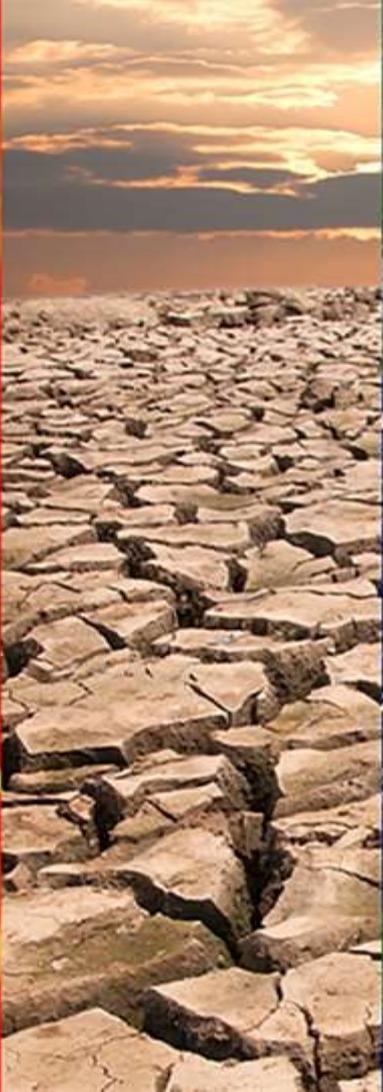




# The Modernized U.S. National Spatial Reference System – Aligning National Geospatial Data to the Globe

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FIG 2023 Working Week  
Orlando, FL





# NOAA and NGS

Our Nation's First Civilian Science Agency

**1807** - Survey of the Coast established



**1836** - U.S. Coast Survey



**1878** - U.S. Coast and Geodetic Survey



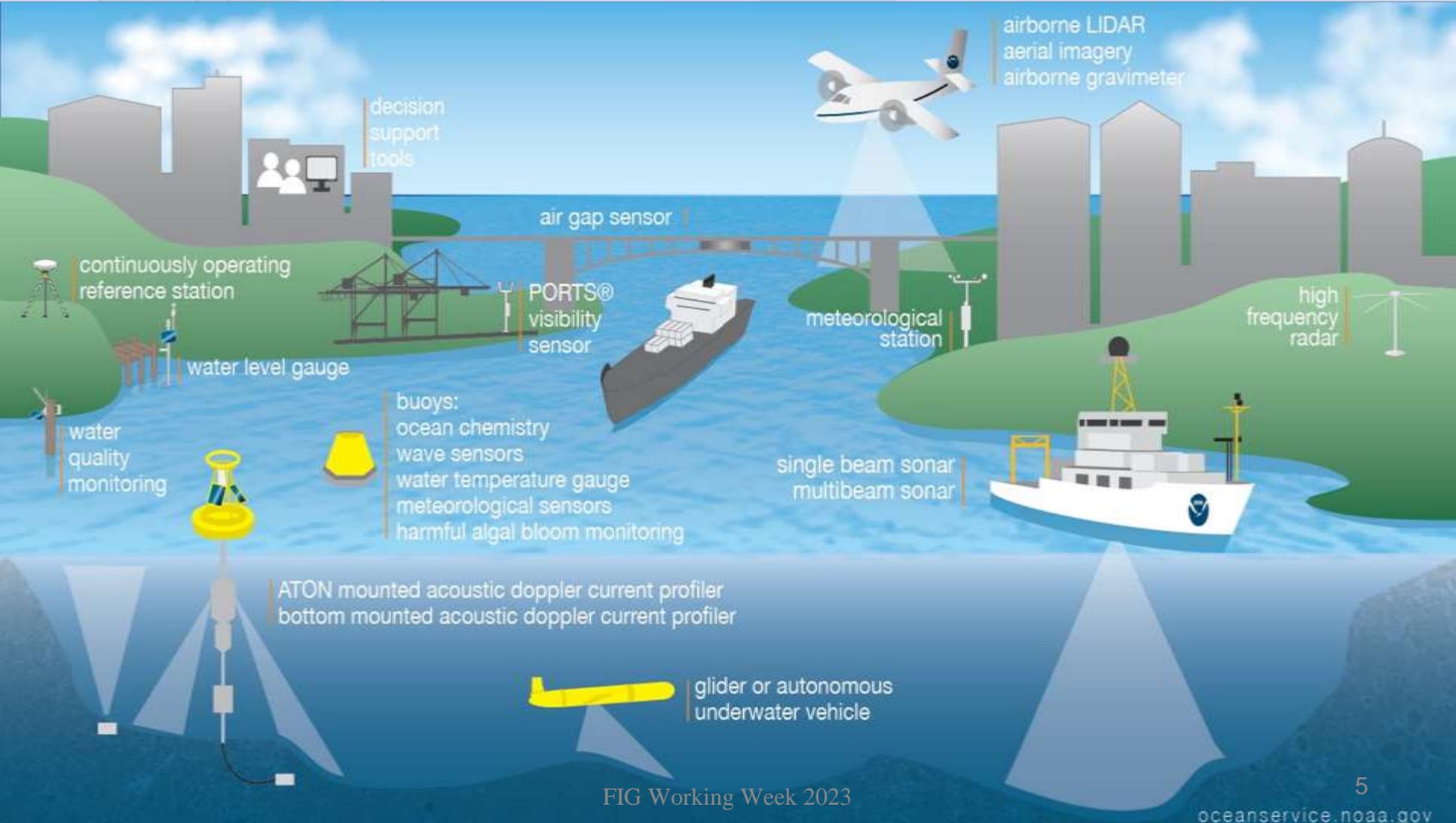
**1970** - NOAA is established



US Standard Datum 1900



Status of Horizontal Control 1983



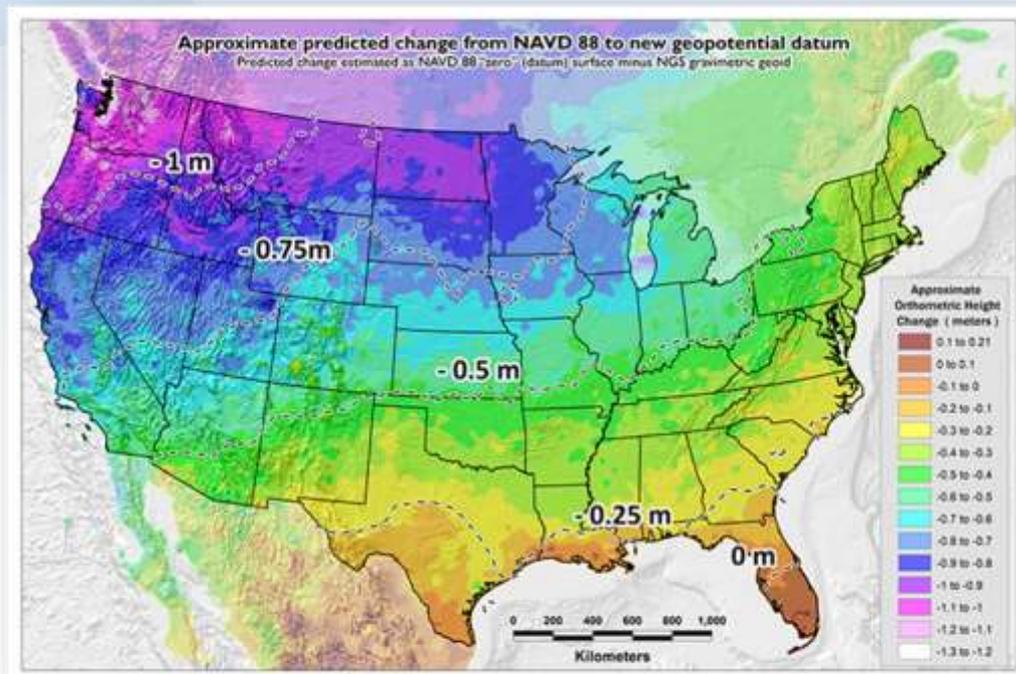
# Benefits of Modernizing the NSRS

## Why Modernize?

- **Current Datums** were defined *before* GPS technology and rely on physical survey marks in the ground

## Modernization will:

- Improve **accuracy, access, and alignment** of our positioning systems
- Changes coordinates up to 1-2 meters, depending on location

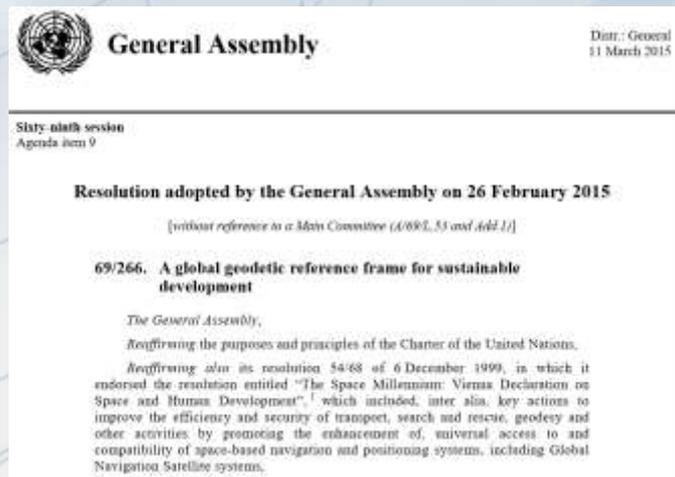


# Global Alignment of the NSRS

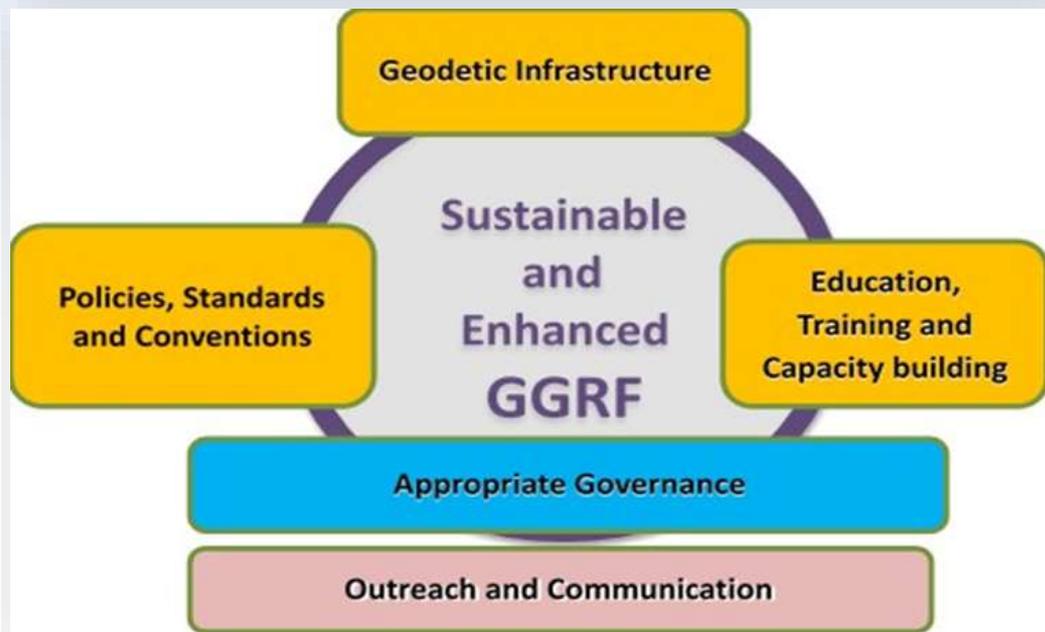
- Governance (United Nations)
- Standards (ISO)
- Infrastructure (IAG and IERS)

# International Alignment per the United Nations

## Global Geodetic Reference Frame



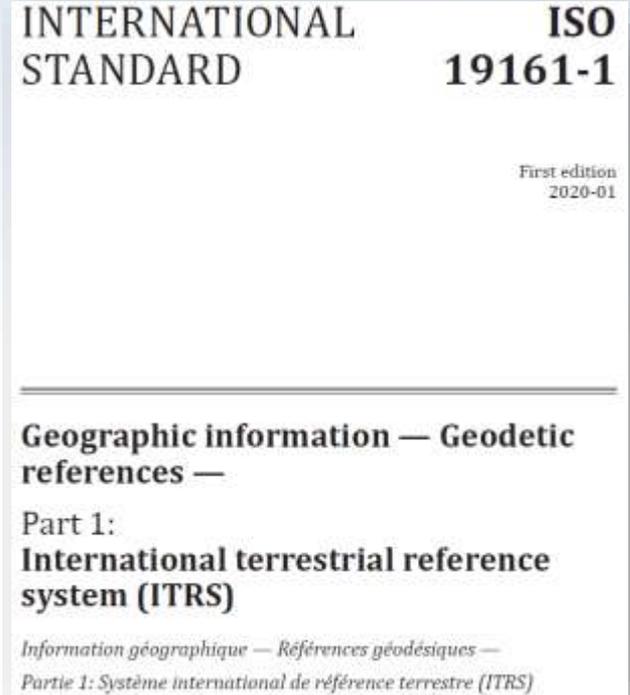
United Nations Resolution 69/266



[ggim.un.org/knowledgebase/KnowledgebaseArticle50334.aspx](http://ggim.un.org/knowledgebase/KnowledgebaseArticle50334.aspx)

# International Geospatial Standards

- Technical Committee 211  
*Standardization of digital geographic data*
- Many standards apply to all users ISO 19161 has specific application to NOAA's NGS
- Nations align national spatial reference systems to the International Terrestrial Reference System (ITRS)



# International Terrestrial Reference System

- A world spatial reference system co-rotating with the Earth
- Maintained by the International Association of Geodesy (IAG) and the International Earth Rotation and Reference Systems Service (IERS)
- An ITRF is a realization of that system at a given epoch
- Current realization is **ITRF2020**
- Provides a reference for GNSS satellite and receiver locations

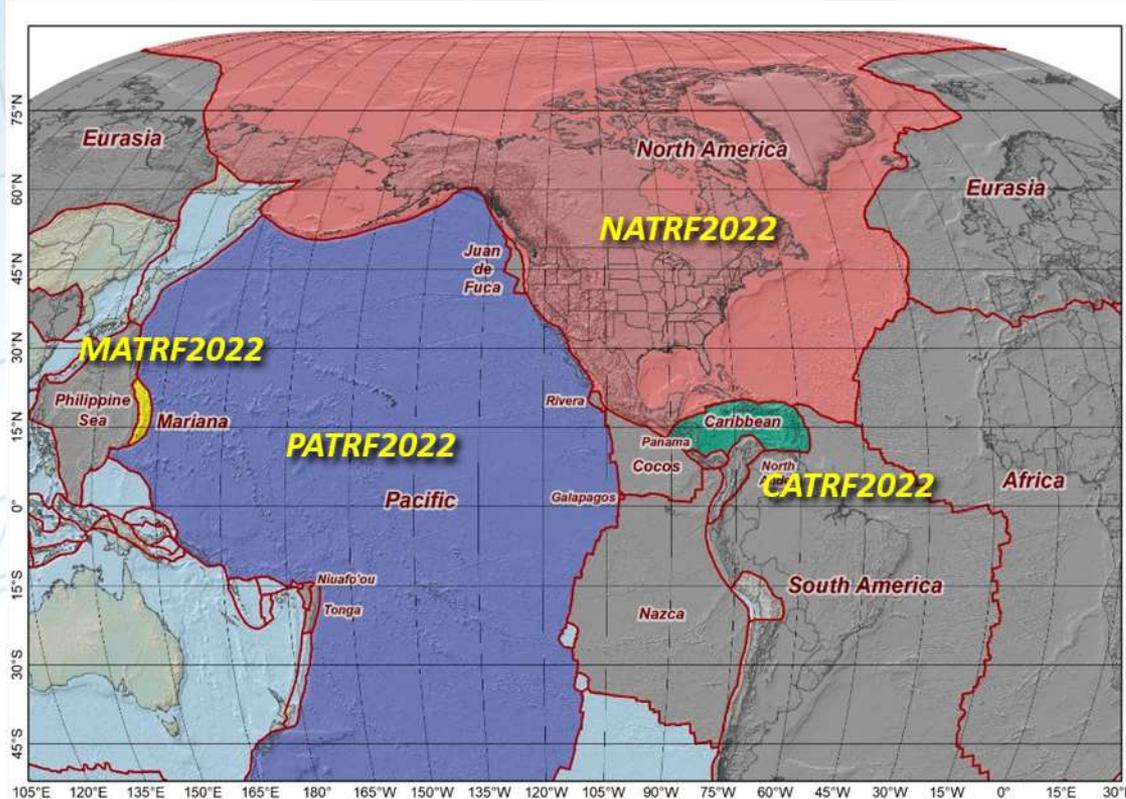
# NSRS Modernization

- Four terrestrial reference frames
- Geopotential datum
- Time-dependent coordinates
- Updated products and tools



geodesy.noaa.gov

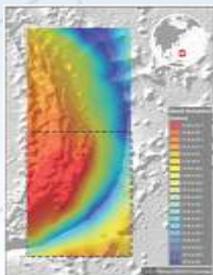
# Terrestrial Reference Frames



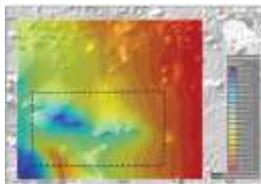
Tectonic plate based:

- North America
- Mariana
- Pacific
- Caribbean

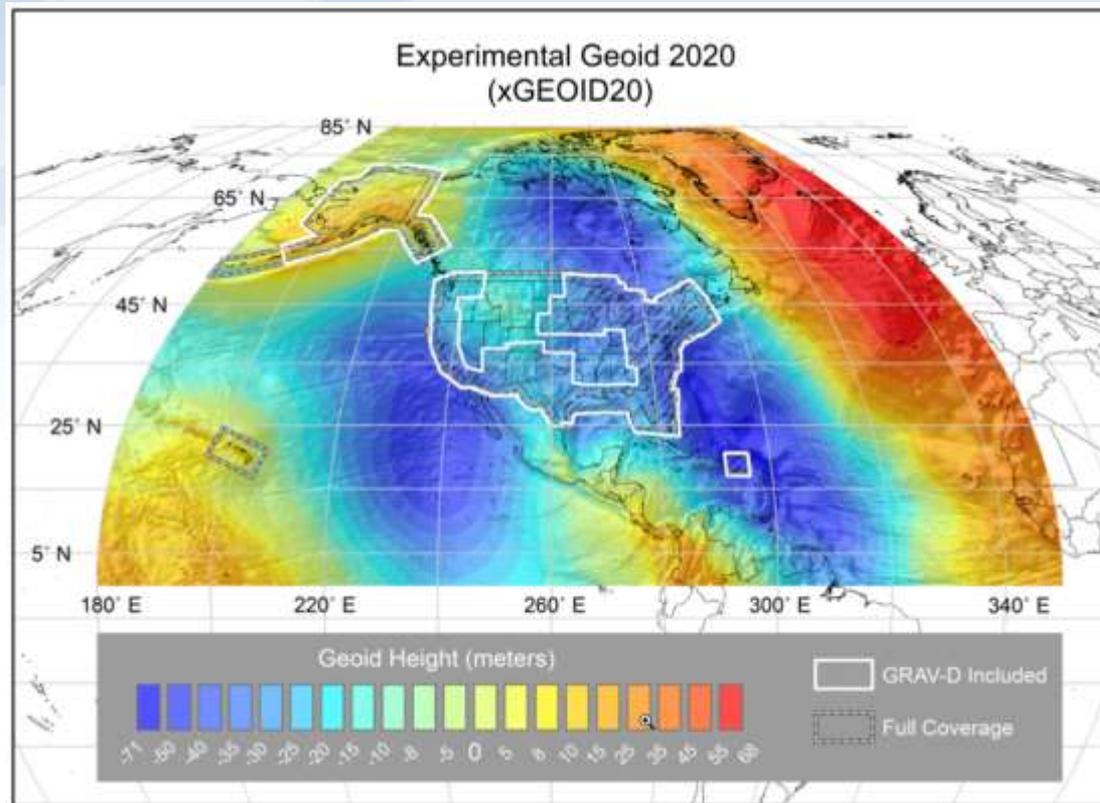
# Geopotential Datum



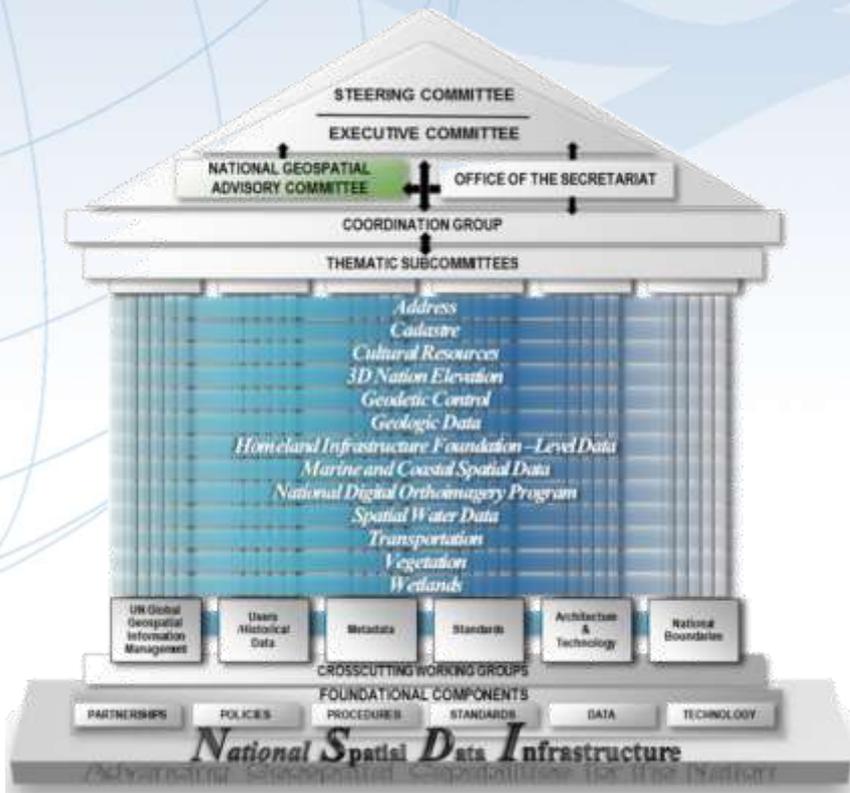
+ Guam/CNMI



+ American Samoa



# Federal Governance and Coordination



- Federal Geographic Data Committee (FGDC)
- Organized structure of Federal geospatial professionals and constituents
- Executive direction and oversight for Federal geospatial decisions and initiatives
- Geospatial Data Act of 2018 (GDA)
- Codifies the FGDC duties into law
- Stipulates adoption of international standards such as the ITRS

# Supports Safe and Efficient Commerce



# Improves Resilience



Land Surveying



Disaster Response



Levee Construction



Inundation Modeling

# Empowers Growth



# Informs Decision Making

- Align critical geospatial data assets within global data inventories
- Enable improved analysis and modeling of climate changes and impacts to society and the environment



# NGS @ FIG Day Agenda

## May 31 Technical Sessions

### 11:30 - 13:00 Practical implications of National Spatial Reference System (NSRS) Modernization

- Practical impacts of the modernized NSRS
- Canada's implementation of the modernized frames
- Changes Afoot: State Plane 2022 and Retirement of the U.S. Survey Foot
- Preparing for the Modernization of the NSRS
- Q&A

### 14:30 - 16:00 Update on the NOAA CORS Network and OPUS

- The NOAA CORS Network (NCN) Services
- Updating OPUS-S to Support Multi-GNSS
- OPUS-Projects 5: Supporting RTK for Establishment of Geodetic Control
- OPUS-Projects for Manager's Training - Transitioning from Instructor-led to Online, Self-paced instruction
- Augmenting Data exchange formats for OPUS of the future
- Q&A

### 16:30 - 18:00 Case studies of Surveys NGS does now and how they will change

- Implementing NGS OPUS Projects' GVX feature to align RTK vectors to the NSRS to establish Geodetic Control for FirstNet Indoor Mapping.
- IGLD: A case study for leveraging digital tools to enhance QA/QC on large scale static GNSS observation campaigns
- Geodetic Leveling in the Modernized NSRS
- NGS Field Operations: Modernizing in Many Ways
- Q&A
- Closing Remarks by Director of National Geodetic Survey

### June 22 Webinar 14:00 - 15:30 NGS Partner Panel Session: Discussion of the Benefits and Challenges of Transitioning to the Modernized NSRS

([geodesy.noaa.gov/web/science\\_edu/webinar\\_series/Webinars.shtml](https://geodesy.noaa.gov/web/science_edu/webinar_series/Webinars.shtml))