

**Presented at the FIG Working Week 2023,
28 May - 1 June 2023 in Orlando, Florida, USA**

OPUS Projects Manager's Training: Transitioning from Mandatory, Instructor-Led to Online, Self-Paced Instruction

FIG 2023

NGS Day

Erika Little, NGS Training Coordinator

OPUS Projects

- NGS has operated the **Online Positioning User Service (OPUS)** since March 2001, to provide end-users easy access to the National Spatial Reference System (NSRS) using GPS data.
- In 2011, **OPUS Projects** became available to the public.
 - OPUS Projects is a highly integrated tool for managing GPS campaigns, including initial observation metadata and positions, session solution statistics, and network adjustments.
 - Provides data visualization and project management aids.

OPUS Projects 5.1

National Geodetic Survey

NGS Home About NGS Data & Integrity Tools Surveys Science & Education Search

OPUS Projects provides simple management and processing tools for your survey projects involving multiple sites and multiple occupations. Advantages include:

- Customizable data processing via the PWGES software suite
- Visualization and management aids
- Adjustments tied to the National Spatial Reference System

Learn More:

- [What is OPUS Projects?](#) (video: 11:28)
- [Training videos and calendar](#)
- [User Guide](#)
- [WinDesc Tutorial Video](#)
- [OPS for GPS/BIM23](#)

If you're interested in submitting your projects results for publication in the NGS Integrated Database (IDB) and have not done so, please visit the [NGS Survey Project Proposal web site](#) to request a required project tracking number. In addition, for publication all survey marks must be described by creating description files in NGS software WinDesc.

NEW v5.1 UPGRADE COMPLETE

- Upload real time (RTK) and post-processed vectors via **GVM format**.
- Export adjustments to various geospatial formats.

See our [January webinar](#) for more information.

Workflow Recommendations:

- For projects you plan to submit to NGS, upload the description files prior to doing session processing.
- Clear your antenna cache first, if your project started in BETA or before v5.1 upgrade.

Create a new project.

Create **RESTRICTED** to trained project managers. If you have completed OPUS Projects training, you are registered and may create a new project. All others, see the [Training Schedule](#).

Configure, edit, and process individual network sessions.

Session Project Identifier

Session Keyword

Your Email: [Privacy Act Statement](#)

Training Requirement

- NGS has required **training of approximately 12 hours** to access OPUS Projects
 - This was due to its complexity, flexibility, and ability of users to select options that would likely produce unintended outcomes.
- **Since 2014 when training began to be tracked, NGS has conducted training for over 4,000 participants.**
 - Conducted by a staff of less than 20 instructors, with an average class size of approximately 20 students. These instructors are balancing OPUS Projects classes with many other responsibilities.

Date	Class Name	Registration Status	Trainer(s)	Audience	Classroom / Webinar
08/13/23 - 09/14/23	OPUS Projects Manager's training, Woodford, VA - NGS Testing and Training Center	Register	Charles Geoghegan and Benjamin Erickson, NGS	Open to all federal, state, local and private organizations	classroom
09/27/23 - 09/29/23	OPUS Projects Manager's training, webinar	Register	Dan Martini, Northeast Regional Geodetic Advisor	Open to all federal, state, local and private organizations	webinar
10/17/23 - 10/19/23	Geodetic Digital Leveling, Woodford, VA - NGS Testing and Training Center	Register	Charles Geoghegan and Benjamin Erickson, NGS	Open to all federal, state, local and private organizations	classroom
09/20/23	OPUS Projects Manager's training, webinar - more information coming soon	Specific Dates To Be Determined	Denis Riordan, Gulf Coast Regional Geodetic Advisor	Open to all federal, state, local and private organizations	webinar

Is Mandatory Training Still Necessary?

As OPUS Projects has matured, NGS began discussions about possibly removing the mandatory training requirement. **Why?**

- **OPUS Projects has become much more intuitive and the process has been significantly streamlined.** OPUS Projects now builds all of the important files for supporting data submittal, and it runs a number of quality control tests automatically, without requiring input or decisions from the user.
- **NGS has developed a User Guide** including both a “quick start” portion and significant details on how to use the software. The User Guide explains much of the content that has previously been covered by an instructor.

Is Mandatory Training Still Necessary?

- **Some organizations cannot afford the time/money for their employees to attend a 2-day course** to learn how to run software, or sometimes they are not interested in all of the facets of OPUS Projects and just want basic information.
- **The popularity of the instructor-led training has grown.** Classes frequently fill up, sometimes months in advance. It is anticipated that demand will continue to grow as OPUS Projects adds the capability to ingest RTK data. To adequately meet the demand of our constituents would require significantly more NGS staff time.
- Requiring training makes NGS a gatekeeper and a **barrier to the use of its own software.**

NGS Will Stop Requiring Mandatory Training when.....

1. **On-demand training videos** are available on the NGS website. Users can view the videos at times convenient to them.
1. **Tutorial lessons** and an **example data set** are posted to the NGS website. Users can download the data set to work through an example within OPUS Projects, following the tutorials to ensure they understand key concepts.

NGS Will Stop Requiring Mandatory Training when.....

3. **Update to the User Guide** to include content on OPUS Projects 5 and how to work with GNSS vectors processed outside OPUS Projects is made available.
 - ***Done!***
3. **Users have an easy-to-understand way to self-register and access training materials** - users do not have to be registered by NGS to 'Create a Project'.

Draft Training Materials Landing Page

The screenshot displays the National Geodetic Survey (NOS) website. At the top, the NOS logo and the text "National Geodetic Survey Positioning America for the Future" are visible. A navigation menu includes links for "NOS Home", "About NOS", "Data & Imagery", "Tools", "Surveys", and "Science & Education". A search bar is located on the right side of the menu.

The main content area is divided into several sections:

- NOS Training and Training Center:** A sidebar menu with links for Home, Upcoming Classes, Past Classes, Video Library, Webinar Series, Online Lessons, Other Training Resources, Contact Us, Lodging and Directions, and IS2 Program. Below this menu is a "Subscribe for training notifications" button.
- OPUS Projects Training Materials:** A central section with a sub-header "OPUS Projects Training Materials". It contains a paragraph: "These resources will provide guidance and practice materials to learn how to most effectively use OPUS Projects. If you have questions about using OPUS Projects, please contact your **Regional Geodetic Advisor**". Below this are three boxes:
 - OPUS Projects Training Videos:** "A series of narrated videos describing each step of using OPUS Projects."
 - OPUS Projects Tutorial:** "Sample projects data and a series of step-by-step instructions to practice using OPUS Projects."
 - OPUS Projects User Guide:** "Highly detailed instructions of **how to use OPUS Projects**, and how to analyze the results."
- Overview of OPUS Projects Process:** A section with five boxes detailing the process steps:
 - Project Planning:**
 - Using the NOS Map (Basic Tutorial, Advanced Tutorial)
 - Creating Description Files with WinDesc
 - Field Reconnaissance and Planning
 - Developing a Survey Schedule
 - Project Proposal and Execution:**
 - The Survey Proposal (S33)
 - Field Logs
 - Project Creation/Upload:**
 - Manager's Page Overview
 - Creating a Project and Modifying Project Preferences
 - Uploading RINEX Files
 - Uploading OPUS Vectors
 - Uploading Descriptors, Field Logs, and Photos
 - Project Analysis:**
 - Preparing for Session Processing
 - Session Processing
 - Session Solutions
 - Analyzing Network Adjustments and Determining Constraints
 - Submitting Project to NOS:**
 - Project Report - Writing and Uploading
 - Review and Submit to NOS

At the bottom of the page, a footer contains links for "NOS Home", "NOS Employees", "Privacy Policy", "Feedback", "Disclaimer", "USA.gov", "Ready.gov", "Site Map", and "Contact Webmaster".

For more information, please see **FIG paper number 12005: OPUS-Projects for Managers Training: Transitioning from Mandatory Instructor-Led to Online, Self-Paced**

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What's Next?

- Instructor-led training, both online and in-person, will still be offered regularly. It just will not be mandatory.
- These materials should be online and available by the end of September 2023.
- Refresh cycle established as OPUS Projects undergoes updates.

Educational resources currently available in Spanish or French

- Videos
- Online Lesson
- Program and Project Descriptions

Educational Videos

Partnership with the University Corporation for Atmospheric Research's (UCAR) COMET Program

geodesy.noaa.gov

The screenshot shows the NOAA National Geodetic Survey website. At the top left is the NOAA logo. The main header reads "National Geodetic Survey" with the tagline "Positioning America for the Future" below it. A navigation bar contains links for "NGS Home", "About NGS", "Data & Imagery", "Tools", "Sun vs", "Science & Education", and "Search". The "Science & Education" link is circled in blue. A dropdown menu is open from this link, listing various resources: "Datums and Reference Frames", "New Datums", "Geoid Models", "Conferences/Training", "Upcoming and Recent NGS Presentations", "Educational Videos" (circled in blue), "Online Lessons", "Webinar Series", "Presentation Library", "Publication Library", "Ecosystems and Climate", and "Applications of Geodesy". Below the navigation bar is a large banner for "NSRS Modernization" with the text "Catch up on the latest developments regarding NSRS Modernization". At the bottom of the page, there are six icons representing different services: "Process GPS Data (OPUS)", "NGS Data Explorer", "Looking for Bench Marks", "Conversion & Transformation (NCAT)", "NOAA CORS Network", and "New Datums". There is also a "Popular Links" section with "New Visitor" and a "Stay Informed: Subscribe" button with a red envelope icon. At the very bottom, there are three boxes for "Storm Imagery", "State Plane Coordinates", and "News Bulletins".

Educational Videos

Partnership with the University Corporation for Atmospheric Research's (UCAR) COMET Program

Most Viewed on COMET YouTube channel (through 5/9/2023)

What are Geodetic Datums? 190,031

Best Practices for Minimizing Errors During GNSS Data Collection 92,927

Precision and Accuracy in Geodetic Surveying 72,944

These two videos now available in Spanish!

The screenshot shows the National Geodetic Survey website. At the top, there is a navigation bar with links for Home, About NGS, Data & Imagery, Tools, Surveys, and Science & Education. Below the navigation bar, there is a section titled "Video Library" which contains a grid of video thumbnails. Each thumbnail has a play button icon and a title. The titles of the videos include: "What are Geodetic Datums?", "How Were Geodetic Datums Established?", "What is the Status of Today's Geodetic Datums?", "What's Next for Geodetic Datums?", "Precision and Accuracy in Geodetic Surveying", "Two Right Feet? U.S. Survey Feet vs. International Survey Feet", "Geospatial Infrastructure for Coastal Communities: Informing Adaptation to Sea Level Rise", "Best Practices for Minimizing Errors during GNSS Data Collection", "The Importance of Accurate Coastal Elevation and Shoreline Data", "NOAA's VDatum Tool: Transforming Heights Between Vertical Datums", "Geodetic Control in Land Surveying: Active vs. Passive", and "Location Science Improves Everyday Life".

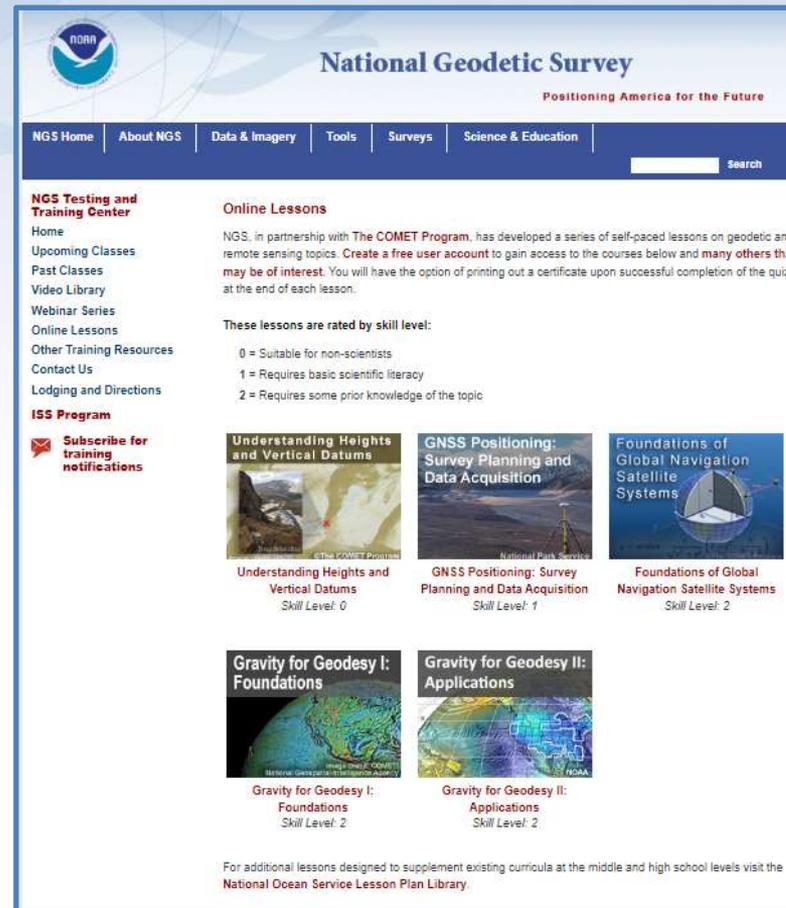
Online Lessons

Partnership with the University Corporation for Atmospheric Research's (UCAR) COMET Program

The screenshot shows the NOAA National Geodetic Survey website. At the top left is the NOAA logo. The main header reads "National Geodetic Survey" with the tagline "Positioning America for the Future". A navigation bar contains links for "NGS Home", "About NGS", "Data & Imagery", "Tools", "Sun vs", "Science & Education", and "Search". The "Science & Education" link is circled in blue. Below the navigation bar is a large banner for "NSRS Modernization" with the text "Catch up on the latest developments regarding NSRS Modernization". A dropdown menu is open under "Science & Education", listing various resources: "Datums and Reference Frames", "New Datums", "Geoid Models", "Conferences/Training", "Upcoming and Recent NGS Presentations", "Educational Videos", "Online Lessons" (circled in blue), "Webinar Series", "Presentation Library", "Publication Library", "Ecosystems and Climate", and "Applications of Geodesy". Below the banner is a section titled "NSRS Modernization" with a sub-header "NOAA's National Geodetic Survey (NGS) provides the framework for all positioning...". This section features six icons with corresponding text: "Process GPS Data (OPUS)", "NGS Data Explorer", "Looking for Bench Marks", "Conversion & Transformation (NCAT)", "NOAA CORS Network", and "New Datums". At the bottom, there are sections for "Popular Links" (with a "New Visitor" indicator), "Stay Informed: Subscribe" (with a red envelope icon), and three grey boxes labeled "Storm Imagery", "State Plane Coordinates", and "News Bulletins".

Online Lessons

- Take anywhere from 45 minutes to 2 hours to complete
- All lessons allow the user to receive a certificate *if* a quiz is passed
- Currently 5 lessons available



The screenshot displays the NOAA National Geodetic Survey website. At the top, the NOAA logo and the text "National Geodetic Survey" and "Positioning America for the Future" are visible. A navigation menu includes "NGS Home", "About NGS", "Data & Imagery", "Tools", "Surveys", and "Science & Education". A search bar is located on the right. The main content area is titled "Online Lessons" and includes a brief description of the program, a list of skill levels (0, 1, 2), and five lesson cards: "Understanding Heights and Vertical Datums", "GNSS Positioning: Survey Planning and Data Acquisition", "Foundations of Global Navigation Satellite Systems", "Gravity for Geodesy I: Foundations", and "Gravity for Geodesy II: Applications". A footer note mentions the National Ocean Service Lesson Plan Library.

NGS Testing and Training Center
Home
Upcoming Classes
Past Classes
Video Library
Webinar Series
Online Lessons
Other Training Resources
Contact Us
Lodging and Directions
ISS Program
✉ **Subscribe for training notifications**

Online Lessons
NGS, in partnership with **The COMET Program**, has developed a series of self-paced lessons on geodetic and remote sensing topics. **Create a free user account** to gain access to the courses below and **many others that may be of interest**. You will have the option of printing out a certificate upon successful completion of the quiz at the end of each lesson.

These lessons are rated by skill level:
0 = Suitable for non-scientists
1 = Requires basic scientific literacy
2 = Requires some prior knowledge of the topic

Understanding Heights and Vertical Datums
Skill Level: 0

GNSS Positioning: Survey Planning and Data Acquisition
Skill Level: 1

Foundations of Global Navigation Satellite Systems
Skill Level: 2

Gravity for Geodesy I: Foundations
Skill Level: 2

Gravity for Geodesy II: Applications
Skill Level: 2

For additional lessons designed to supplement existing curricula at the middle and high school levels visit the **National Ocean Service Lesson Plan Library**.

- *Understanding Heights and Vertical Datums* lesson
 - Available in **French** and **Spanish**

The screenshot shows the NOAA National Geodetic Survey website. The main navigation bar includes links for NGS Home, About NGS, Data & Imagery, Tools, Surveys, and Science & Education. A search bar is located on the right. The page title is "National Geodetic Survey" with the tagline "Positioning America for the Future".

The main content area features a sidebar on the left with links: Home, Upcoming Classes, Past Classes, Video Library, Webinar Series, Online Lessons, Other Training Resources, Contact Us, and Lodging and Directions. Below these is the "ISS Program" and a "Subscribe for training notifications" button.

The main content area displays the lesson "Understanding Heights and Vertical Datums". It includes a thumbnail image of a landscape with a river and a person, and a description: "Description: Aimed at scientists, engineers, modelers and other technical users of GIS/mapping applications, this lesson provides a basic understanding of different vertical datums, how they are defined, some of their strengths and weaknesses and how to choose the appropriate datum for a given application. The lesson starts with basic definitions of height and vertical datums and guidance on choosing and working with the appropriate datum for a given situation. It then provides a conceptual introduction to ellipsoidal, geopotential and tidal datums including appropriate uses, examples and pros and cons." The skill level is 0 and the completion time is .75 - 1.00 h.

A language selection menu is located on the right side of the page, with "Français | Español" circled in green. Below the lesson description is a blue button labeled "START LESSON".

At the bottom of the page, it says "Website Owner: National Geodetic Survey / Last modified by NGS Infocenter May 09 2023" and a footer with links: NGS Home, NGS Employees, Privacy Policy, Feedback, Disclaimer, USA.gov, Ready.gov, Site Map, and Contact Webmaster.

Program and Product Descriptions Available in Spanish

- National Spatial Reference System
- Online Positioning User Service
- Gravity for the Redefinition of the American Vertical Datum (GRAV-D)
- Emergency Response Imagery

The screenshot shows the NOAA National Geodetic Survey website with the following content:

- Navigation:** Home, About NGS, Data & Imagery, Tools, Surveys, Science & Education, Search.
- About Us:** What we do, GNSS & GPS Data, Remote Sensing, Land Surveying, Geodesy, Training & Education, Datums & Transformations, Activities in my area, Applications of Geodesy, Mission & Strategic Plan, NGS Facts, Policies, Programs & Products, NGS History, FAQs, Contact Us.
- Program and Product Descriptions:**
 - National Spatial Reference System:** NGS defines consistent reference frames for civilian mapping applications. (PDF, 880 KB) [in Español]
 - Continuously Operating Reference Stations (CORS):** NGS processes continuous GPS data and publishes accurate coordinates. (PDF, 818 KB)
 - Online Positioning User Services (OPUS):** Submit your GPS data, and NGS will send you a solution. (PDF, 1.4 MB) [in Español]
 - Airport Surveys:** NGS partners with the Federal Aviation Administration (FAA) to ensure safe take-offs and landings. (PDF, 800 KB)
 - Shoreline Mapping:** NGS defines the National Shoreline, critical to property boundaries and nautical charting. (PDF, 427 KB)
 - GPS Satellite Orbits:** NGS contributes to the global effort of computing precise satellite orbits. (PDF, 852 KB)
 - Vertical Datum Transformation Tool (VDAT):** Designed to transform coordinates between geopotential, and local vertical datums. (PDF, 897 KB)
 - Gravity for the Redefinition of the American Vertical Datum (GRAV-D):** The project collects gravity data, will help improve future geoid models, and ultimately replace NAVD 83. (PDF, 487 KB) [in Español]
 - Emergency Response Imagery:** Post-event imagery is quickly made available online to support emergency response efforts. (PDF, 558 KB) [in Español]
 - Ecosystem & Climate Operations:** Geodetic tools and guidelines are adapted to help manage, protect and restore ecosystems. (PDF, 712 KB)

Your Input is always welcome on:

- Topics
- Content
- Delivery methods

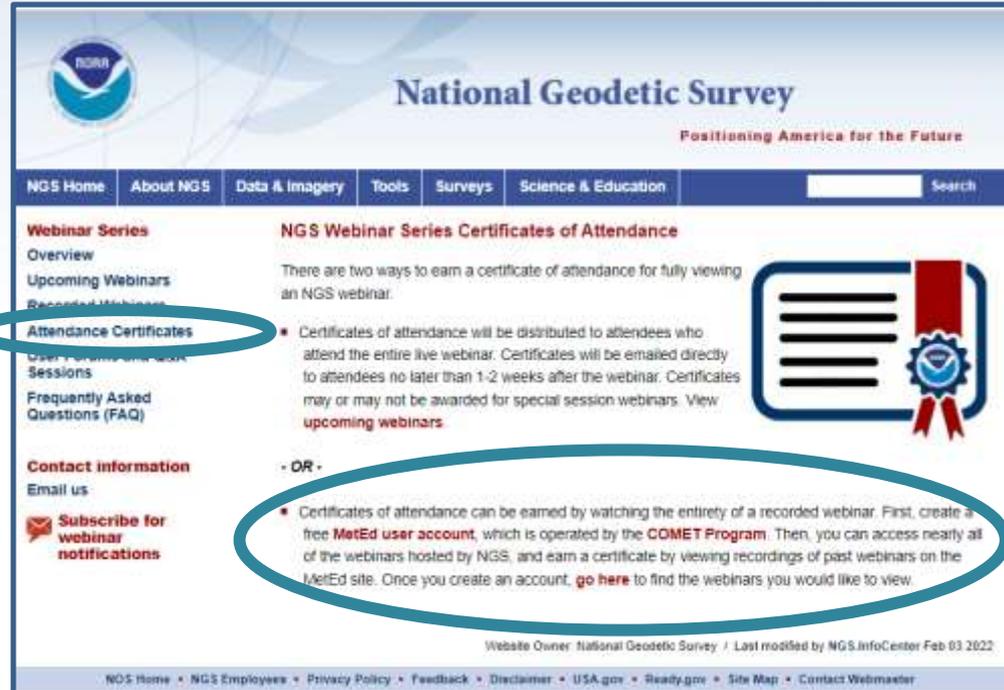
Send to ngs.training@noaa.gov

Thank you!

- End of presentation - Back up slides if extra time

New Tool to Earn Webinar Certificates on Your Schedule

- Can't make a webinar during the scheduled time? A recorded version is always available on the NGS website.
- But NOW you can earn a certificate for viewing a **recorded** webinar.



National Geodetic Survey
Positioning America for the Future

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education

Webinar Series
Overview
Upcoming Webinars
Recent Webinars
Attendance Certificates
User Forums and Work Sessions
Frequently Asked Questions (FAQ)

NGS Webinar Series Certificates of Attendance

There are two ways to earn a certificate of attendance for fully viewing an NGS webinar.

- Certificates of attendance will be distributed to attendees who attend the entire live webinar. Certificates will be emailed directly to attendees no later than 1-2 weeks after the webinar. Certificates may or may not be awarded for special session webinars. View [upcoming webinars](#).

- OR -

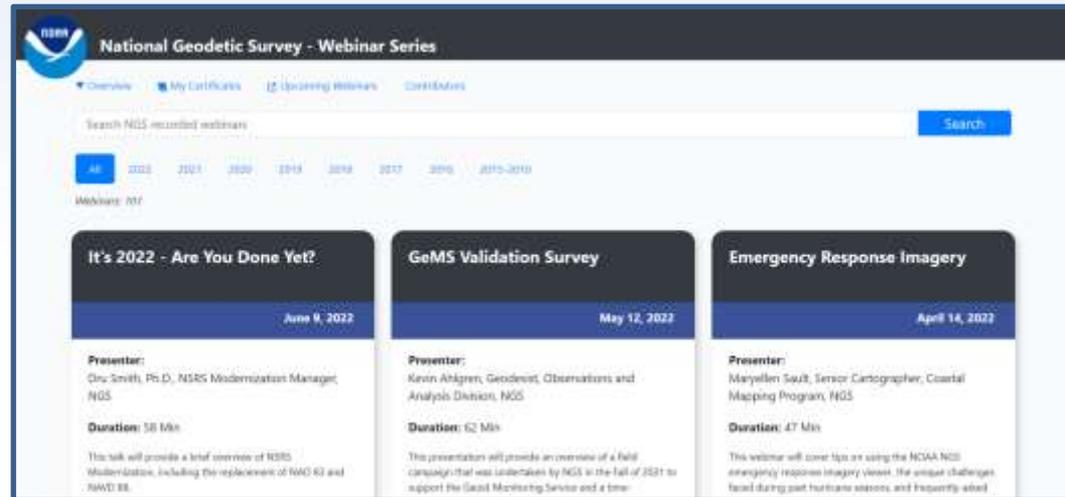
- Certificates of attendance can be earned by watching the entirety of a recorded webinar. First, create a free **MetEd user account**, which is operated by the **COMET Program**. Then, you can access nearly all of the webinars hosted by NGS, and earn a certificate by viewing recordings of past webinars on the MetEd site. Once you create an account, [go here](#) to find the webinars you would like to view.

Website Owner: National Geodetic Survey / Last modified by NGS.InfoCenter Feb 03 2022

NGS Home • NGS Employees • Privacy Policy • Feedback • Disclaimer • USA.gov • Ready.gov • Site Map • Contact Webmaster

New Tool to Earn Webinar Certificates on Your Schedule

- NGS again worked with the COMET MetEd program to develop a tool through which you can earn a certificate by viewing recordings of past webinars.
- Over 100 recorded webinars available.



New Tool to Earn Webinar Certificates on Your Schedule

- Great search function to find webinars on a certain topic.
- If you are in the education field, you could assign these as pre-requisites, class work, extra credit, etc.

The screenshot displays the NOAA National Geodetic Survey Webinar Series website. The search bar contains the text "state plane" and is highlighted with a red oval. Below the search bar, the results show a list of webinars, with the first result "State Plane 2022: Where Things Stand and the Road Ahead" highlighted with a red oval. The date "December 9, 2021" is also highlighted with a red oval. The presenter information "Michael Dennis, PhD, Geodesist, Observations and Analysis Division, NOS" and the duration "59 Min" are visible for this webinar. Other webinars listed include "State Plane 2022: The Shape of Things to Come" (June 11, 2020) and "Be a Part of the Change: A Guide to Customizing State Plane for 2022" (October 10, 2019).

New Tool to Earn Webinar Certificates on Your Schedule

- Once you watch the entirety of a webinar, you can download a Certificate of Attendance.



New Tool to Earn Webinar Certificates on Your Schedule



The screenshot displays the NOAA National Geodetic Survey Webinar Series interface. At the top left is the NOAA logo. The header reads "National Geodetic Survey - Webinar Series". Below the header is a navigation link "← Back to All Webinars". The main section is titled "My Certificates" and lists three completed webinars, each with a "View Certificate" button:

Webinar Title	Action
Geodesy Fundamentals	View Certificate
Vertical Datum Changes for Floodplain Mapping	View Certificate
Github and NGS APIs	View Certificate

COMET MetEd will store all earned certificates.