

Modern Map Viewers at NOAA's National Centers for Environmental Information

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Introduction

NOAA's National Centers for Environmental Information (NCEI) hosts and provides public access to a wide range of environmental data, including coastal, oceanic, geophysical, and atmospheric data. NCEI has long made many of these datasets publicly-accessible through interactive mapping applications utilizing the legacy ArcGIS API for JavaScript 3.x and ArcGIS Server map services. NCEI is now working to modernize these web applications by taking advantage of ArcGIS Online (e.g. hosted feature layers and web maps/scenes) and the latest ArcGIS API for JavaScript 4.x. The new, easy-to-use map viewers are implemented using current well-supported web technologies such as React, TypeScript, and MUI. This poster covers four new web mapping applications developed over the past year: **Tsunami Events (1850-Present) Time-Lapse Animation**, **Trackline Geophysical Data Viewer**, **Ocean Exploration Data Atlas** (showcasing data from the NOAA Ship *Okeanos Explorer*), and **Historical Magnetic Declination Viewer**.

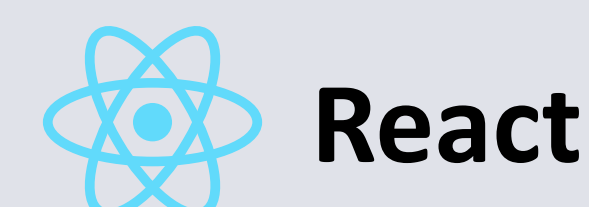
Technologies Used



Esri's application programming interface (API) for building rich, interactive mapping applications in both 2D and 3D. We are now using the latest 4.x version of the API, which has many advantages and performance improvements over previous versions of the API.



NOAA's instance of Esri's ArcGIS Online, a cloud-based software-as-a-service for hosting geospatial layers, web maps, and apps (including StoryMaps). We are increasingly utilizing **hosted feature layers**, which are high-performance and flexible, allowing us to take advantage of Esri's infrastructure for storing, querying, and visualizing data.



JavaScript library for building efficient user interfaces. An application is built up from a "tree" of modular components (using powerful JSX syntax). Utilizing the "virtual DOM", you manage the application state, then React determines when to render/update individual components in the browser.



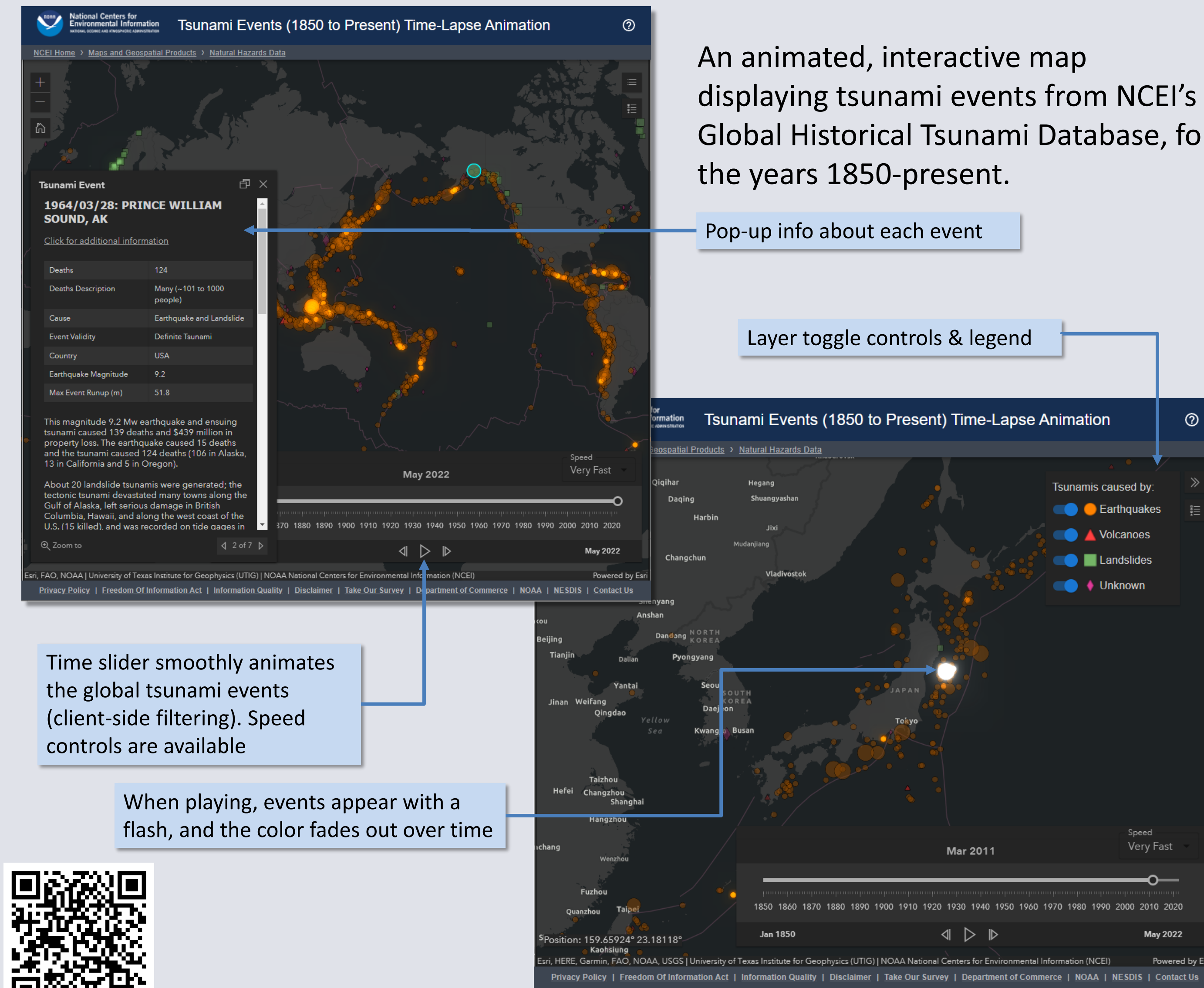
Popular collection of UI components for React. Makes it easy to build a beautiful, functional, user-friendly interface with buttons, menus, switches, select inputs, etc.



An extension of the JavaScript programming language that is strongly typed. By enforcing variable types, it improves consistency/robustness of the code, reducing mistakes made by the developer. Integrates well with editors (i.e. Visual Studio Code) with "intellisense" (code completion, parameter info, etc.)

Tsunami Events (1850 to Present) Time-Lapse Animation

<https://www.ncei.noaa.gov/maps/tsunami-events>



An animated, interactive map displaying tsunami events from NCEI's Global Historical Tsunami Database, for the years 1850-present.

Pop-up info about each event

Layer toggle controls & legend

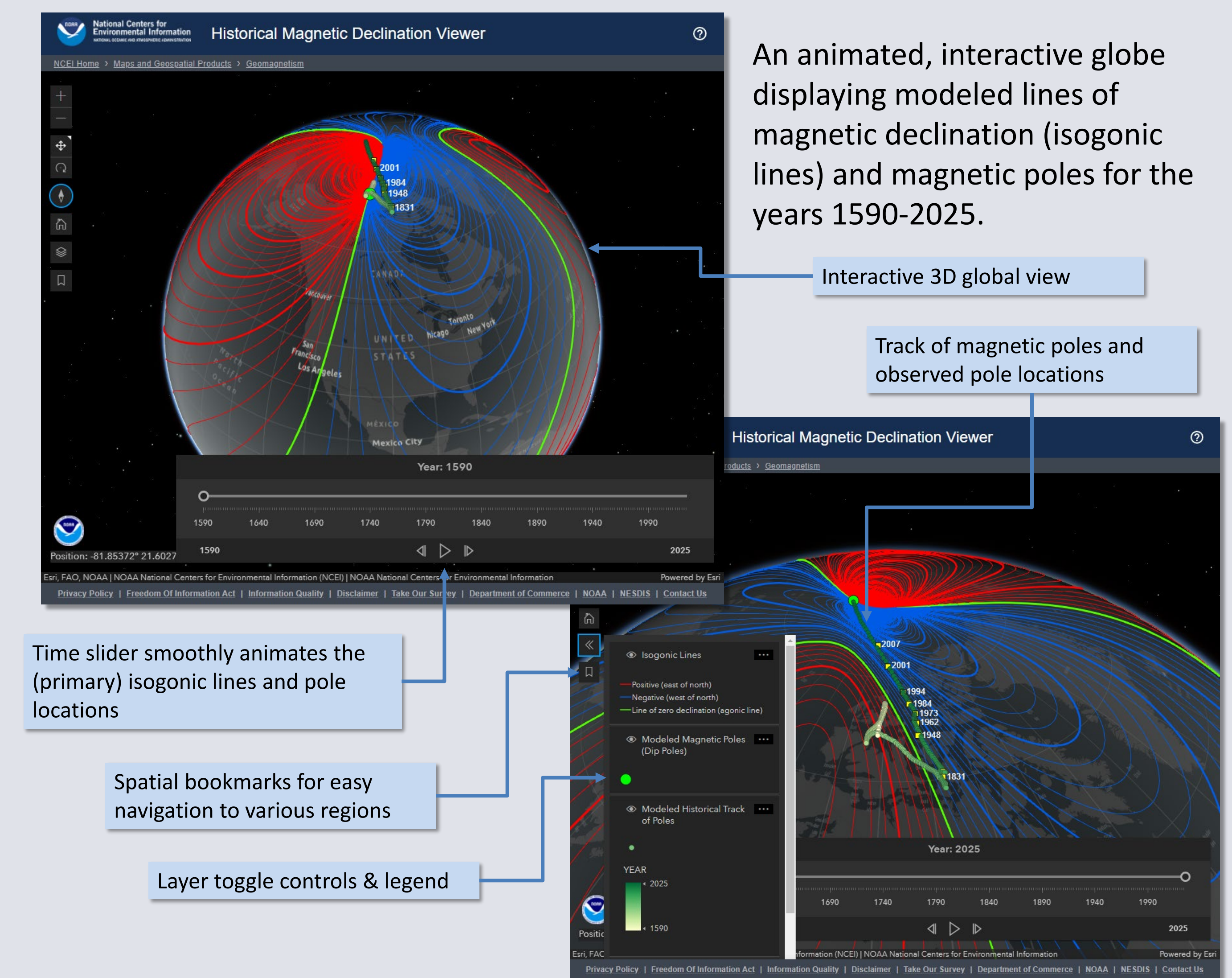
Time slider smoothly animates the global tsunami events (client-side filtering). Speed controls are available

When playing, events appear with a flash, and the color fades out over time



Historical Magnetic Declination Viewer

<https://www.ncei.noaa.gov/maps/historical-declination>



An animated, interactive globe displaying modeled lines of magnetic declination (isogonic lines) and magnetic poles for the years 1590-2025.

Interactive 3D global view

Track of magnetic poles and observed pole locations

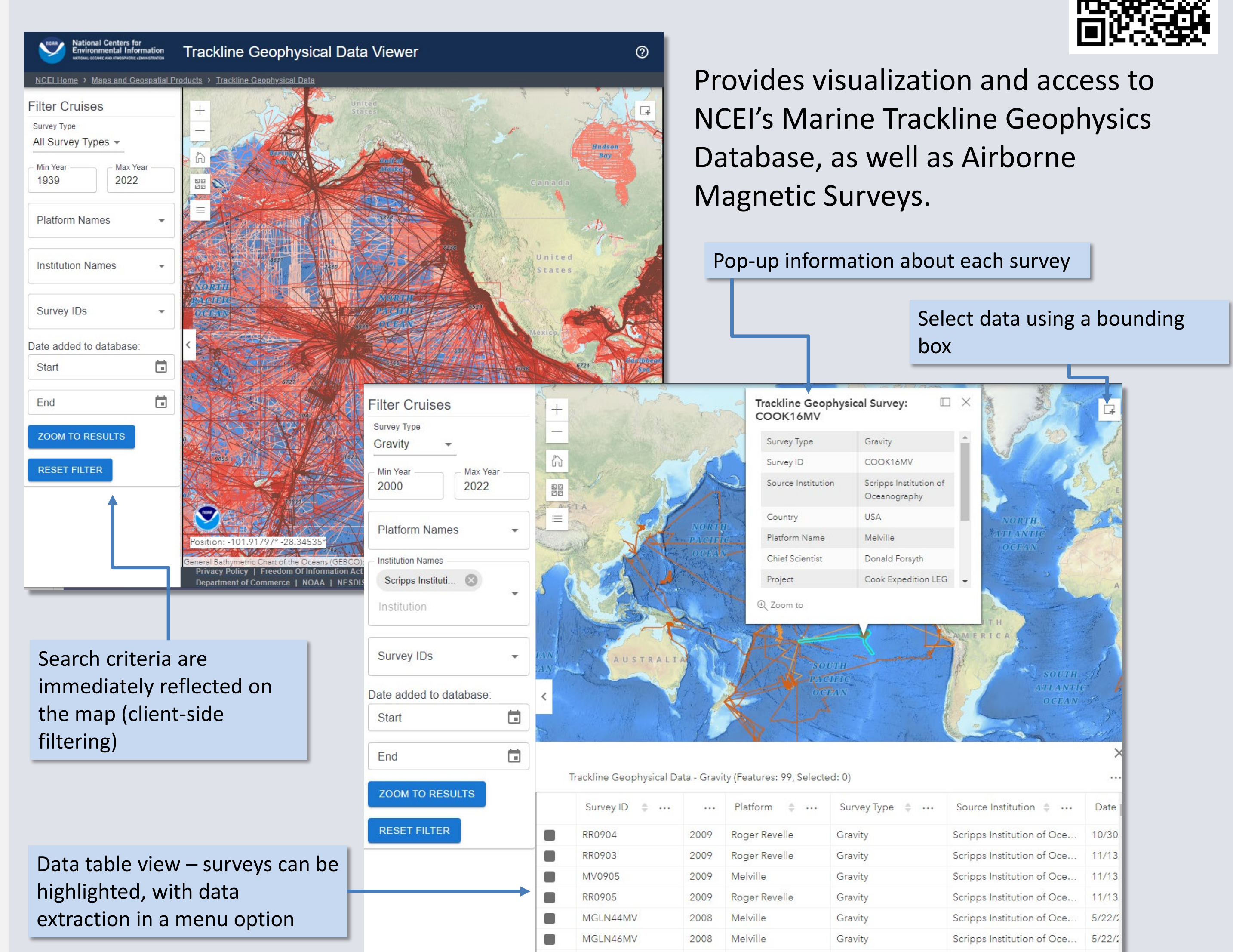
Time slider smoothly animates the (primary) isogonic lines and pole locations

Spatial bookmarks for easy navigation to various regions

Layer toggle controls & legend

Trackline Geophysical Data Viewer

<https://www.ncei.noaa.gov/maps/trackline-geophysics>



Provides visualization and access to NCEI's Marine Trackline Geophysics Database, as well as Airborne Magnetic Surveys.

Pop-up information about each survey

Select data using a bounding box

Search criteria are immediately reflected on the map (client-side filtering)

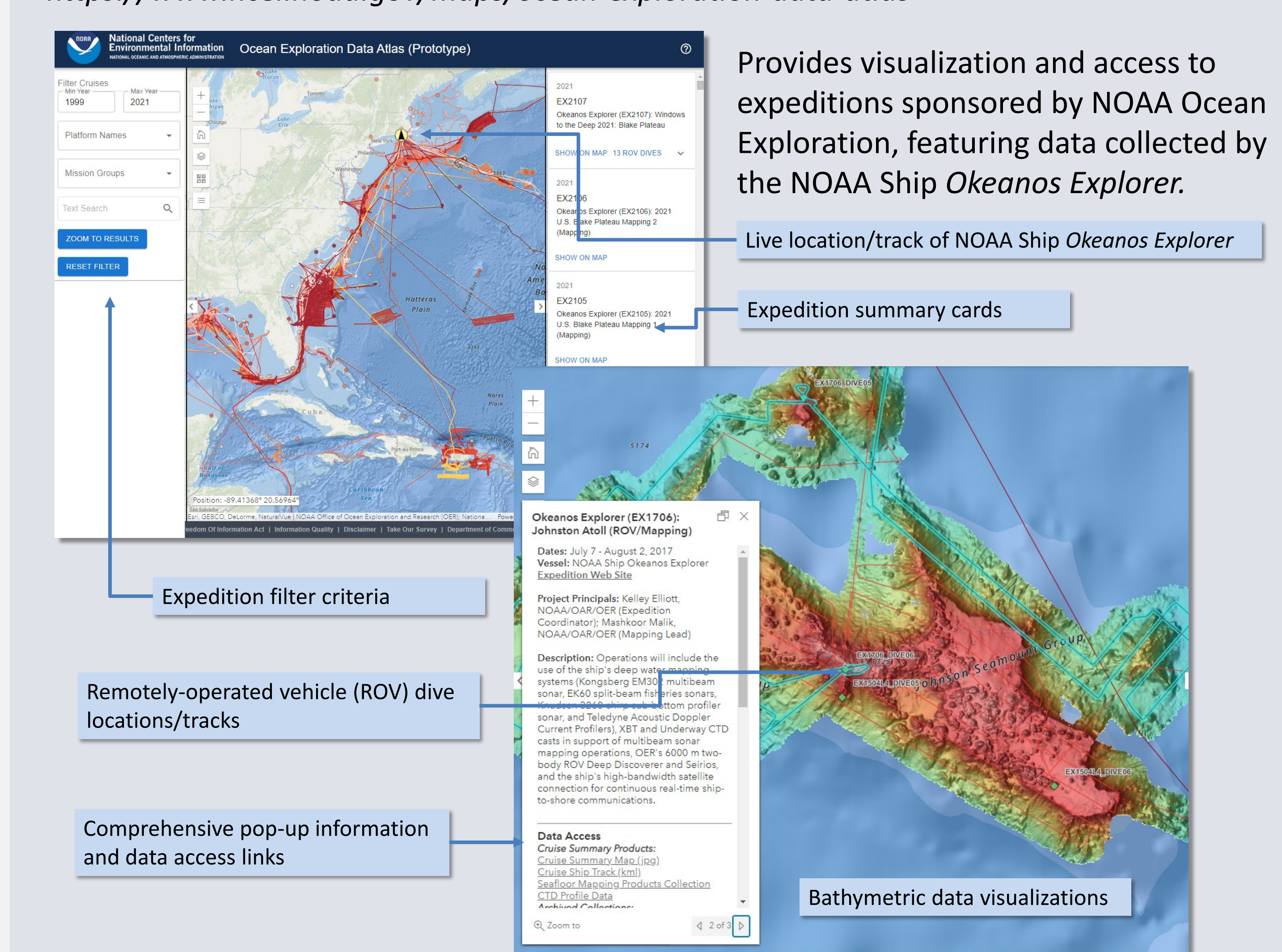
Data table view – surveys can be highlighted, with data extraction in a menu option



NOAA Ocean Exploration Data Atlas

Under development; future URL:

<https://www.ncei.noaa.gov/maps/ocean-exploration-data-atlas>



Provides visualization and access to expeditions sponsored by NOAA Ocean Exploration, featuring data collected by the NOAA Ship *Okeanos Explorer*.

Live location/track of NOAA Ship *Okeanos Explorer*

Expedition summary cards

Expedition filter criteria

Remotely-operated vehicle (ROV) dive locations/tracks

Comprehensive pop-up information and data access links

Bathymetric data visualizations