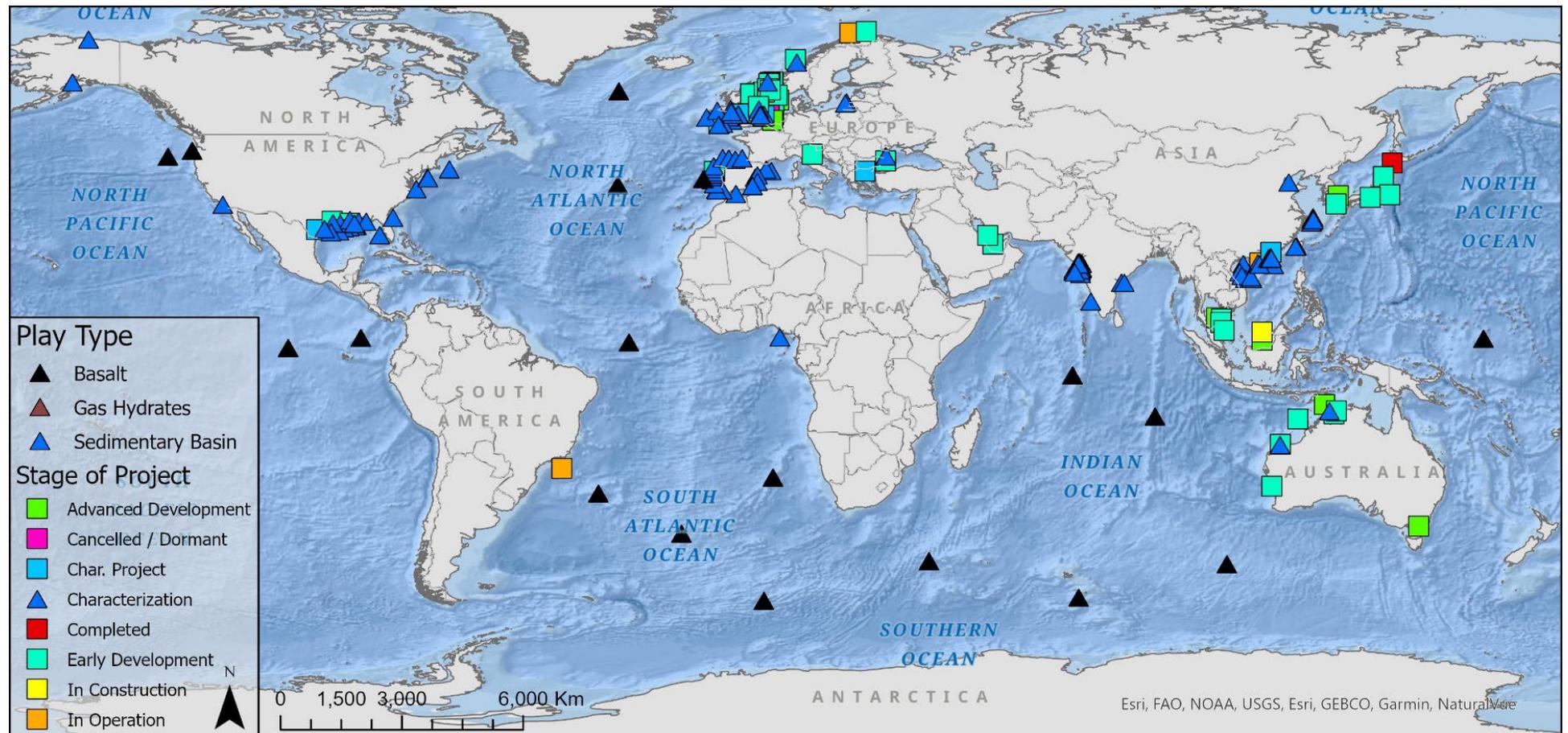


Offshore Geologic Carbon Storage Data Collection and International Project Inventory



Carbon Storage Data FWP, Task 4

Julia Mulhern
Geologist



NETL Carbon
Management
Review Meeting

Aug. 8, 2024

Disclaimer



This project was funded by the United States Department of Energy, National Energy Technology Laboratory, in part, through a site support contract. Neither the United States Government nor any agency thereof, nor any of their employees, nor the support contractor, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Acknowledgements: This work was funded with support through the National Energy Technology Laboratory's Carbon Storage Data Field Work Proposal 1022465.

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²NETL Support Contractor, 1450 Queen Avenue SW, Albany, OR 97321, USA

Carbon Storage Data FWP, Task 4.0: Data Science for Offshore CCS

2022	2023	2024	Value (2022–2024)
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- Compilation of key data resources on information supporting offshore CCS including geologic setting, infrastructure, policy
- Comprehensive, up-to-date review of international CCS efforts

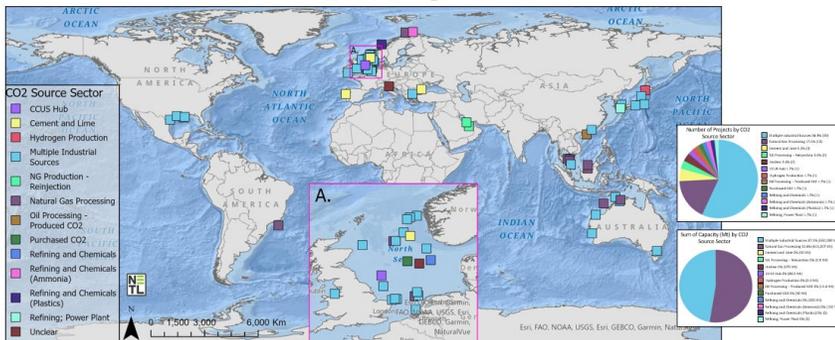
- Update and integrate available data into U.S. Offshore CCS evaluations
- Compile and release U.S. offshore CCS catalog and inventory

- Integrate additional data released from ongoing research and release U.S. offshore CCS open resource data collection
- Created web app in lieu of database for greater accessibility
- Share findings and products with stakeholders

End Product:
Accessible data collections covering both international CCS project products and data for **potential U.S. Offshore CCS**, accompanied by web user interfaces and technical reports **summarizing global offshore CCS efforts** to date

Inventory

Global Offshore GCS Projects by CO₂ Emission Source Sector



Data Catalog

Web App

Recent Offshore Geologic Carbon Storage (GCS) Products

Variety of Deliverables Launched and Ready to Use

Offshore GCS Data Collection

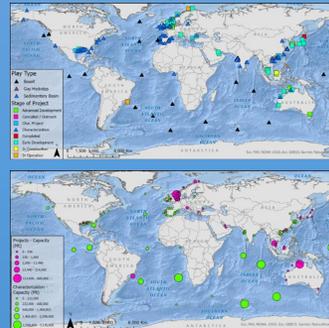
Data Collection Web App



Data Gaps Assessment Report

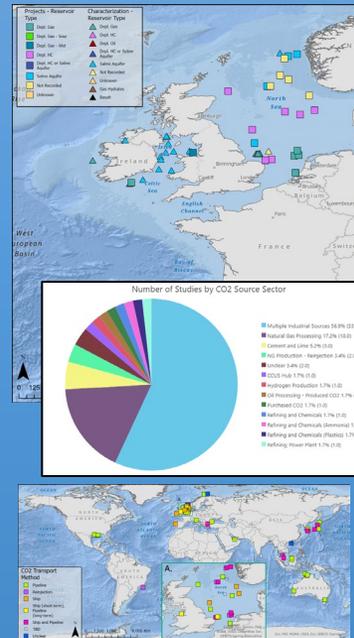


Inventory of Offshore Projects and Studies

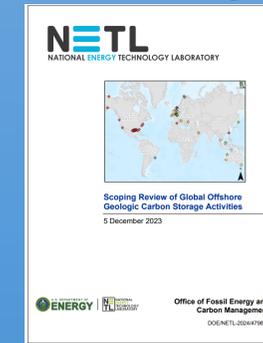


International Offshore GCS Inventory

Offshore Inventory Meta-Analysis



Inventory and Global Project Summary



Inventory Story Map

Country	Offshore Projects	Characterization	Early Development	Advanced Development	In Operation	Completed
United States	20	12	1	1	1	1
Netherlands	3	1	1	1	1	1
Japan	1	1	1	1	1	1
India	4	1	1	1	1	1
Spain	1	1	1	1	1	1
Malaysia	2	1	1	1	1	1
United Kingdom	3	2	1	1	1	1
Australia	3	2	1	1	1	1
Canada	2	1	1	1	1	1
Thailand	1	1	1	1	1	1
Taiwan	1	1	1	1	1	1
India	1	1	1	1	1	1
Spain	1	1	1	1	1	1
United Arab Emirates	1	1	1	1	1	1
Spain	1	1	1	1	1	1
Spain	1	1	1	1	1	1



Offshore Geologic Carbon Storage Data Collection

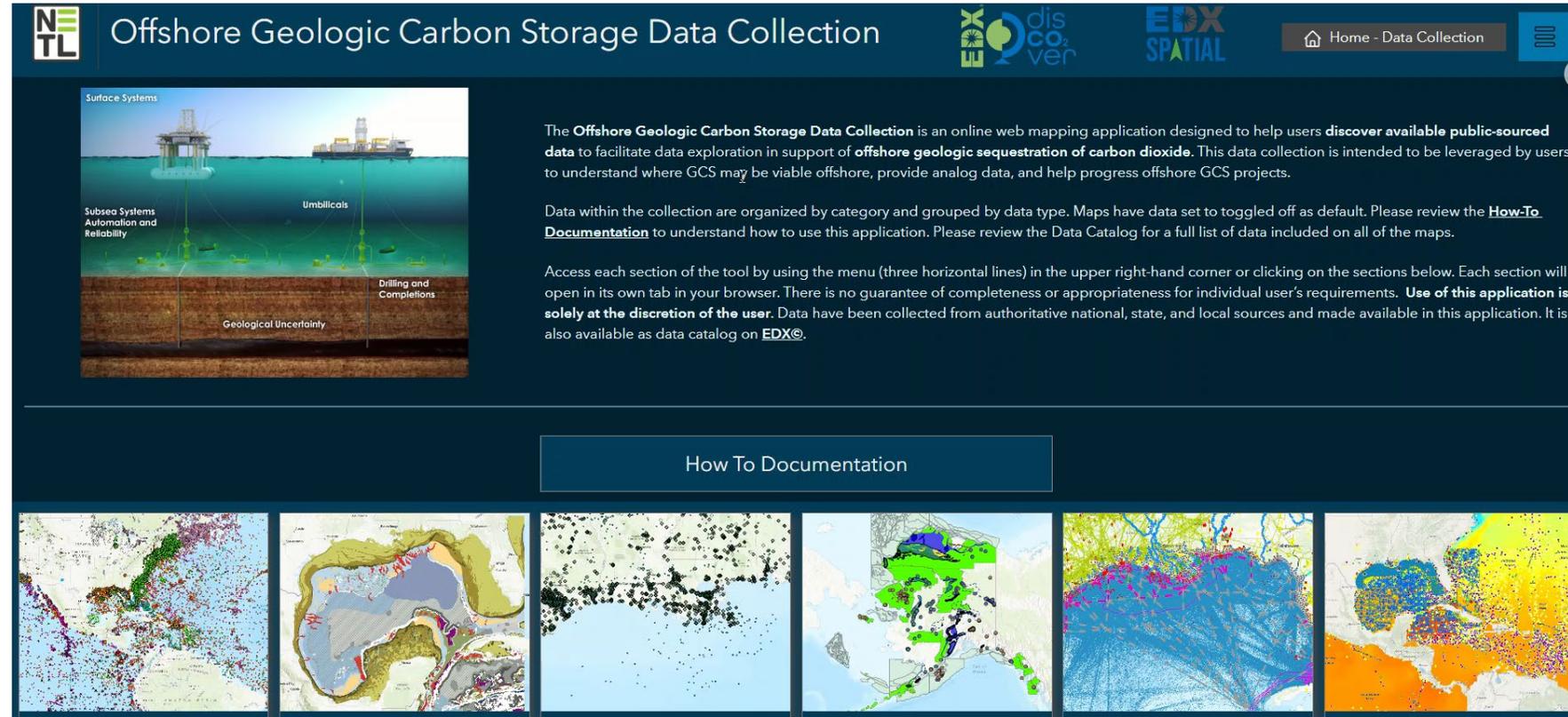
Interactive Web Application to Visualize Novel Data Collection

Nine interactive maps with categorized data

- Data collection aggregates publicly available, authoritative data into one location
- Data collection can be used to:
 - compare between data sets
 - Quickly visualize data
 - Support a variety of analysis



Data Collection
QR Code



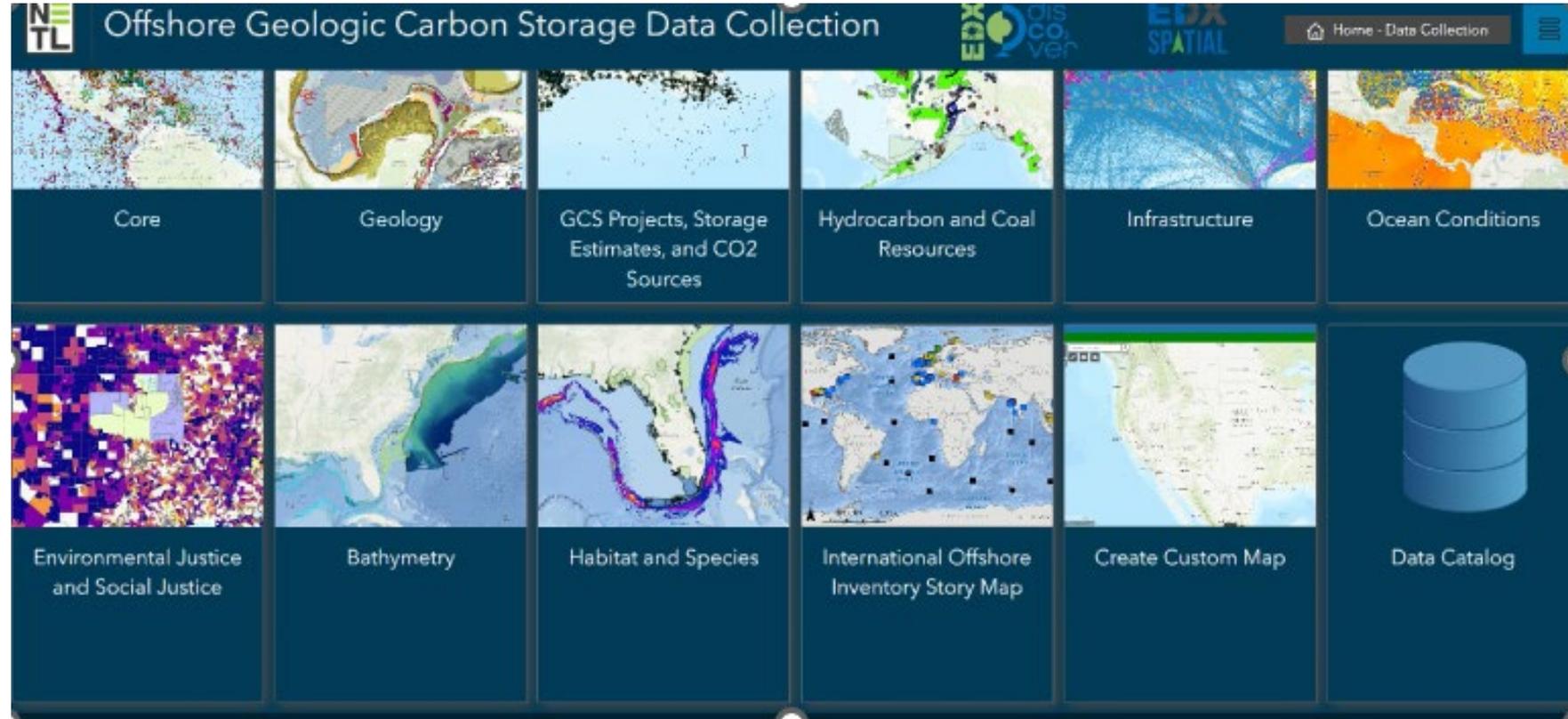
The screenshot shows the web application interface for the Offshore Geologic Carbon Storage Data Collection. The header includes the NETL logo, the title "Offshore Geologic Carbon Storage Data Collection", and navigation links for "EDX discover" and "EDX SPATIAL". A home button labeled "Home - Data Collection" is also present. The main content area features a diagram of offshore systems with labels: "Surface Systems", "Subsea Systems Automation and Reliability", "Umbilicals", "Drilling and Completions", and "Geological Uncertainty". To the right of the diagram is a descriptive paragraph about the application's purpose and data organization. Below the diagram is a "How To Documentation" button. At the bottom, there is a row of six thumbnail maps showing various data visualizations.

Offshore Geologic Carbon Storage Data Collection

Interactive Web Application to Visualize Novel Data Collection

Nine interactive maps with categorized data

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Data Collection
QR Code

Offshore Geologic Carbon Storage Data Collection

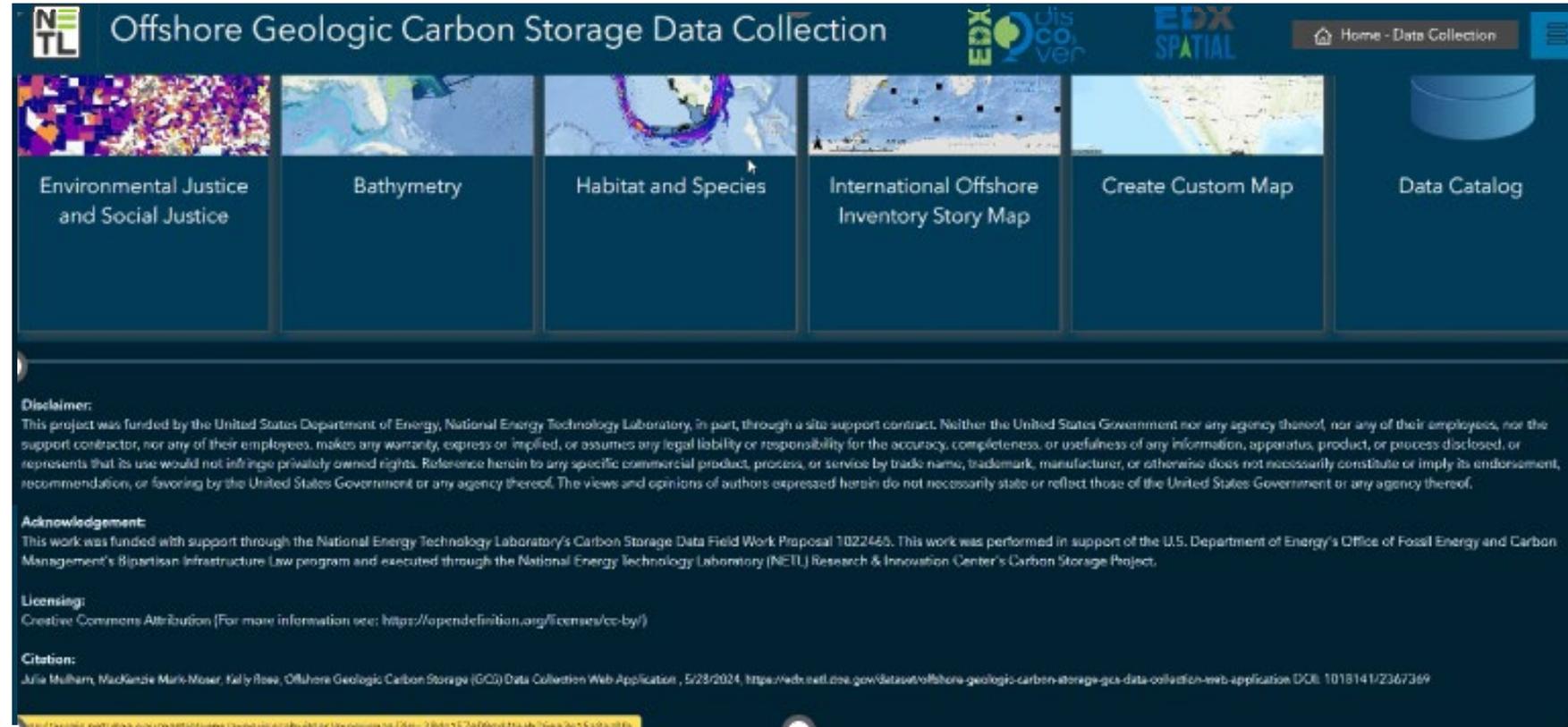
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Data Collection
QR Code

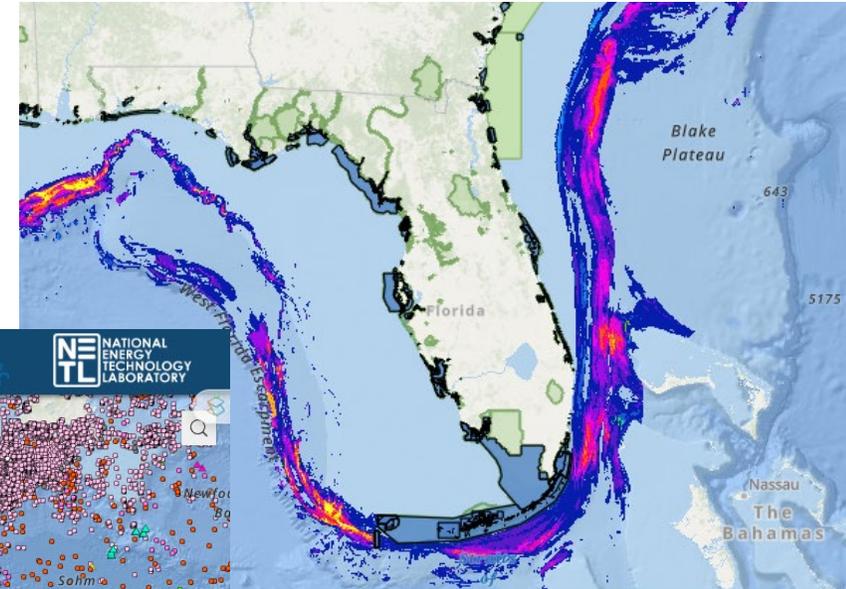
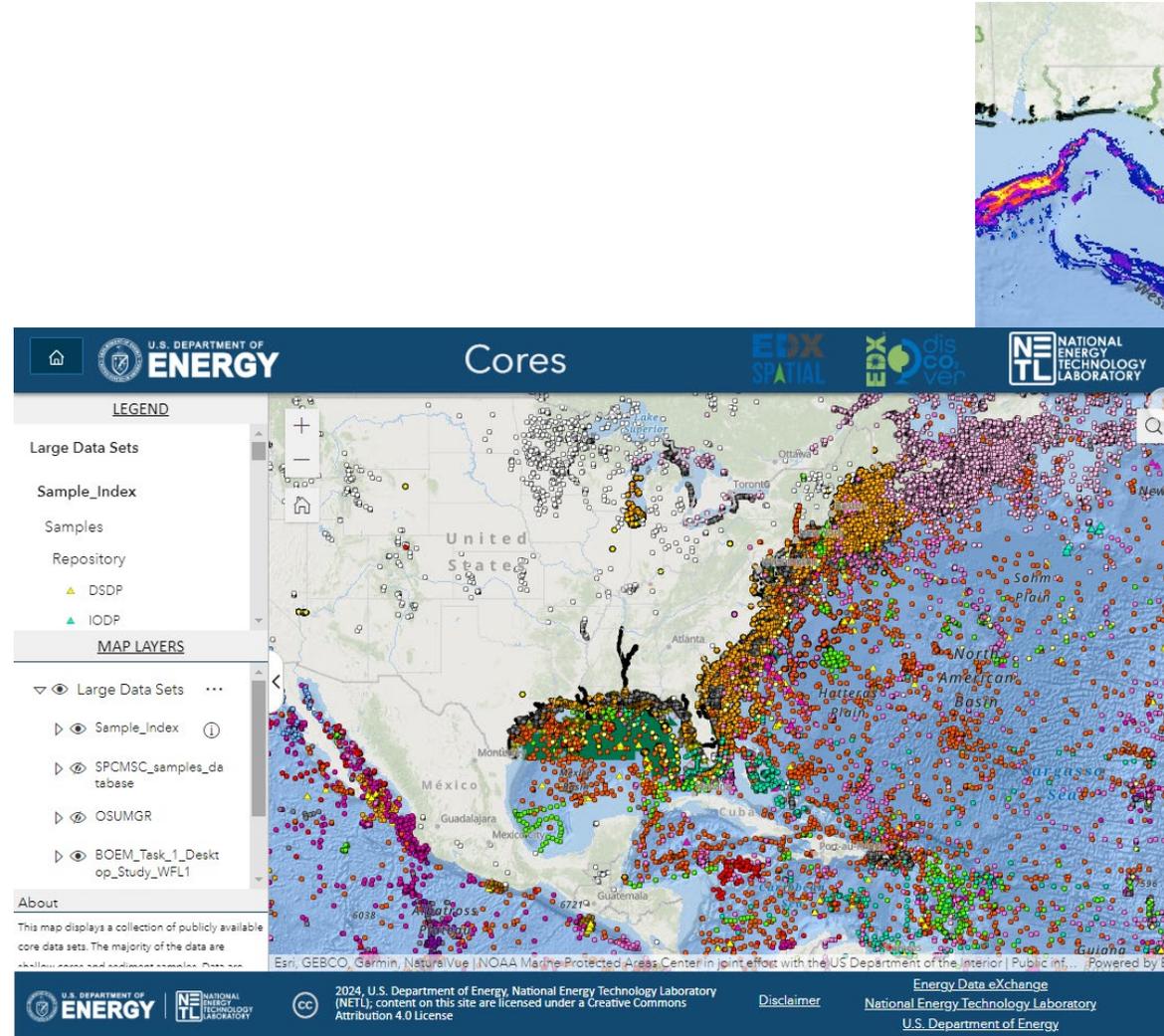


The screenshot shows the web application interface for "Offshore Geologic Carbon Storage Data Collection". The header includes the NETL logo, the title, and logos for EDX, Data Discover, and EDX SPATIAL. A navigation bar at the top right contains "Home - Data Collection" and a menu icon. Below the header is a row of six interactive map thumbnails: "Environmental Justice and Social Justice", "Bathymetry", "Habitat and Species", "International Offshore Inventory Story Map", "Create Custom Map", and "Data Catalog". Below the thumbnails is a disclaimer, an acknowledgement, a licensing section (Creative Commons Attribution), and a citation. The citation reads: "Julia Mulhern, MacKenzie Mark-Moser, Kelly Rose, Offshore Geologic Carbon Storage (GCS) Data Collection Web Application, 5/28/2024, <https://edx.netl.doe.gov/dataset/offshore-geologic-carbon-storage-gcs-data-collection-web-application>, DOI: 10.18141/2367369".

Interactive Maps Enable Quick Data Visualization

Web Hosted Maps Facilitate Data Access

- Each of the nine web maps have datasets aggregated by topic which can be toggled on and off
- The corresponding database can be used to sort and filter data for all nine maps



Coral Reefs and Fish Habitats

Sediment Cores

Interactive Web Maps Enable Data Visualization

Example showing layer groupings

MAP LAYERS

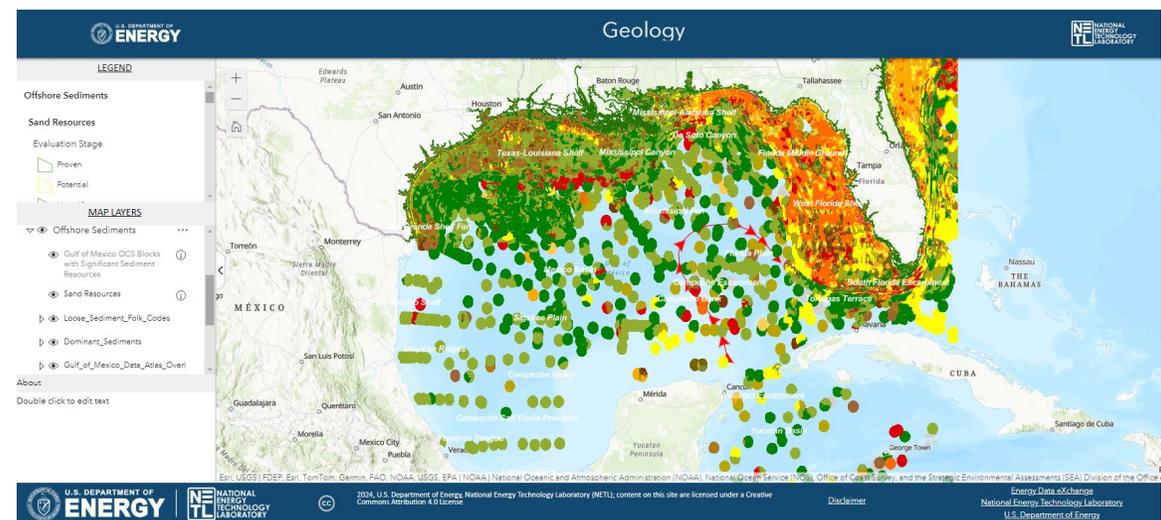
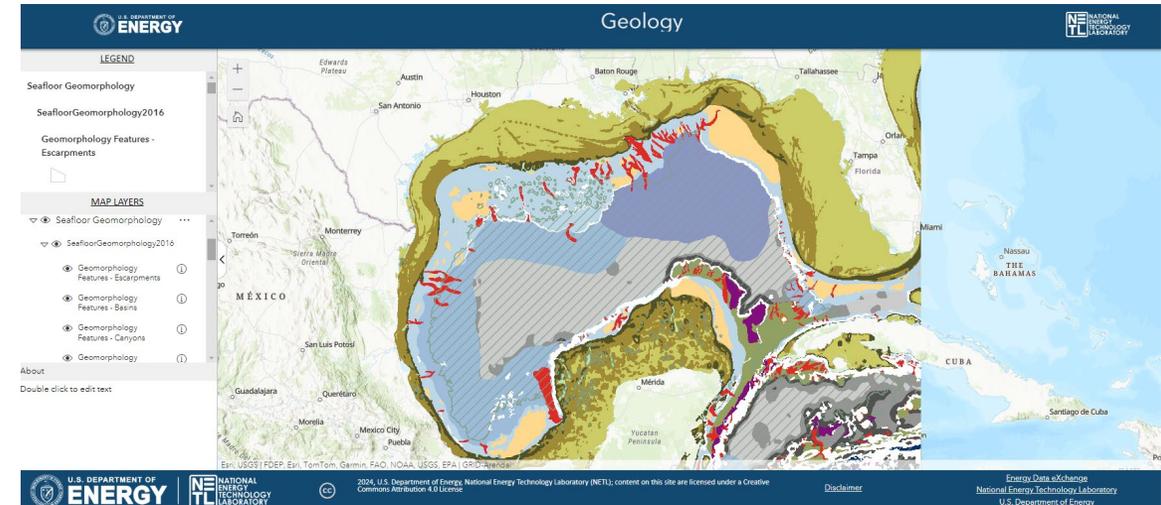
- ▶ Seismic Surveys
- ▶ Subsurface Geology
- ▶ Seafloor Geomorphology
- ▶ Offshore Sediments
- ▶ World Lithology
- ▶ Alaska Geology

MAP LAYERS

- ▼ Seafloor Geomorphology
 - ▼ SeafloorGeomorphology2016
 - Geomorphology Features - Escarpments
 - Geomorphology Features - Basins
 - Geomorphology Features - Canyons
 - Geomorphology

MAP LAYERS

- ▼ Offshore Sediments
 - Gulf of Mexico OCS Blocks with Significant Sediment Resources
 - Sand Resources
 - ▶ Loose_Sediment_Folk_Codes
 - ▶ Dominant_Sediments
 - ▶ Gulf_of_Mexico_Data_Atlas_Ov



Offshore GCS Data REST Service Catalog

Web Hosted Data Expedites Visualization and Utilization

- Excel sheet catalog for the Data Collection is easily searchable and allows users to link back to original data sources via REST Service landing pages and links.
- This enables quick and easy visualization of ever-green data sources.



Offshore Geologic Carbon Storage Data Collection

The **Offshore Geologic Carbon Storage Data Collection** is an online web mapping application designed to help users **discover available public-sourced data** to facilitate data exploration in support of **offshore geologic sequestration of carbon dioxide**. This data collection is intended to be leveraged by users to understand where GCS may be viable offshore, provide analog data, and help progress offshore GCS projects.

Data within the collection are organized by category and grouped by data type. Maps have data set to toggled off as default. Please review the [How-To Documentation](#) to understand how to use this application. Please review the Data Catalog for a full list of data included on all of the maps.

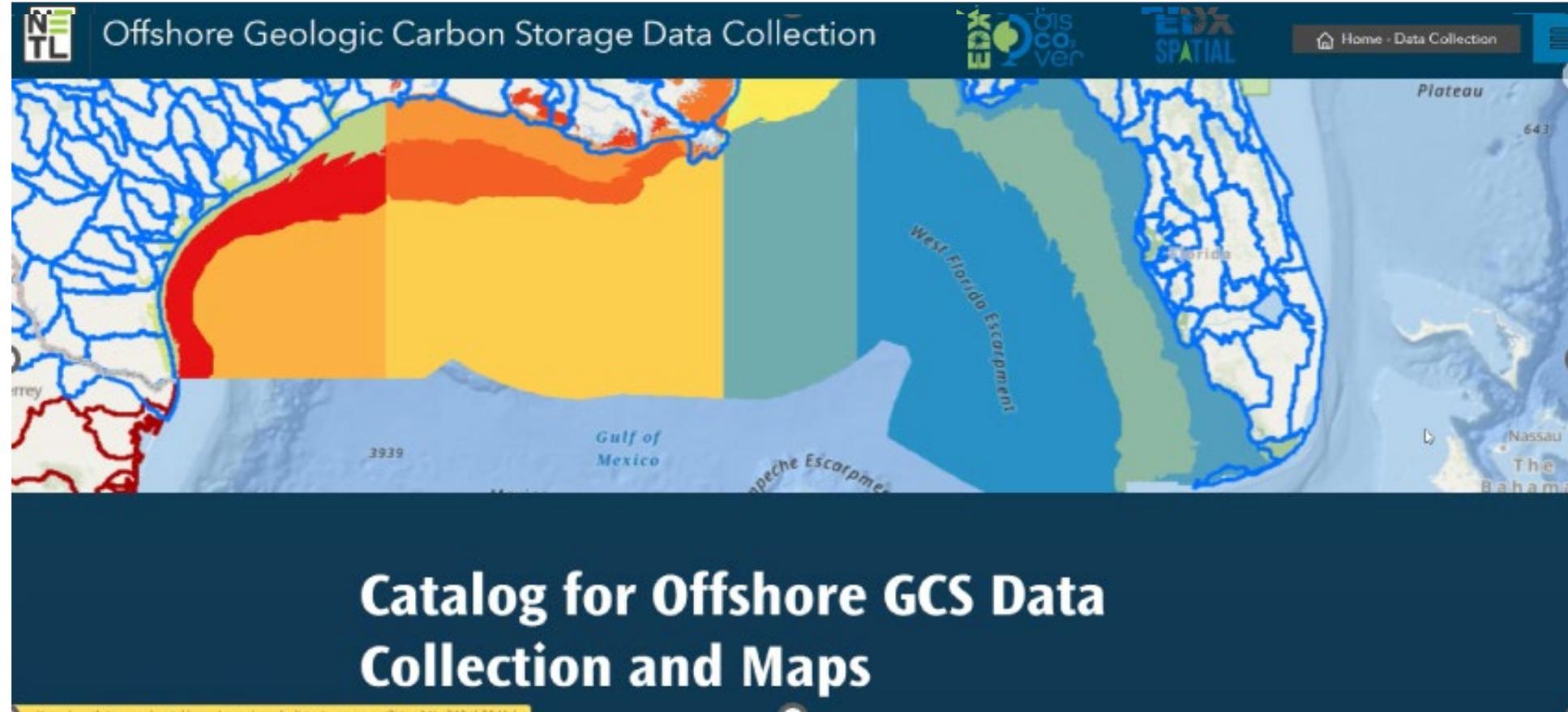
Access each section of the tool by using the menu (three horizontal lines) in the upper right-hand corner or clicking on the sections below. Each section will open in its own tab in your browser. There is no guarantee of completeness or appropriateness for individual user's requirements. **Use of this application is solely at the discretion of the user.** Data have been collected from authoritative national, state, and local sources and made available in this application. It is also available as data catalog on [EDX®](#).

[How To Documentation](#)

Offshore GCS Data REST Service Catalog

Web Hosted Data Expedites Visualization and Utilization

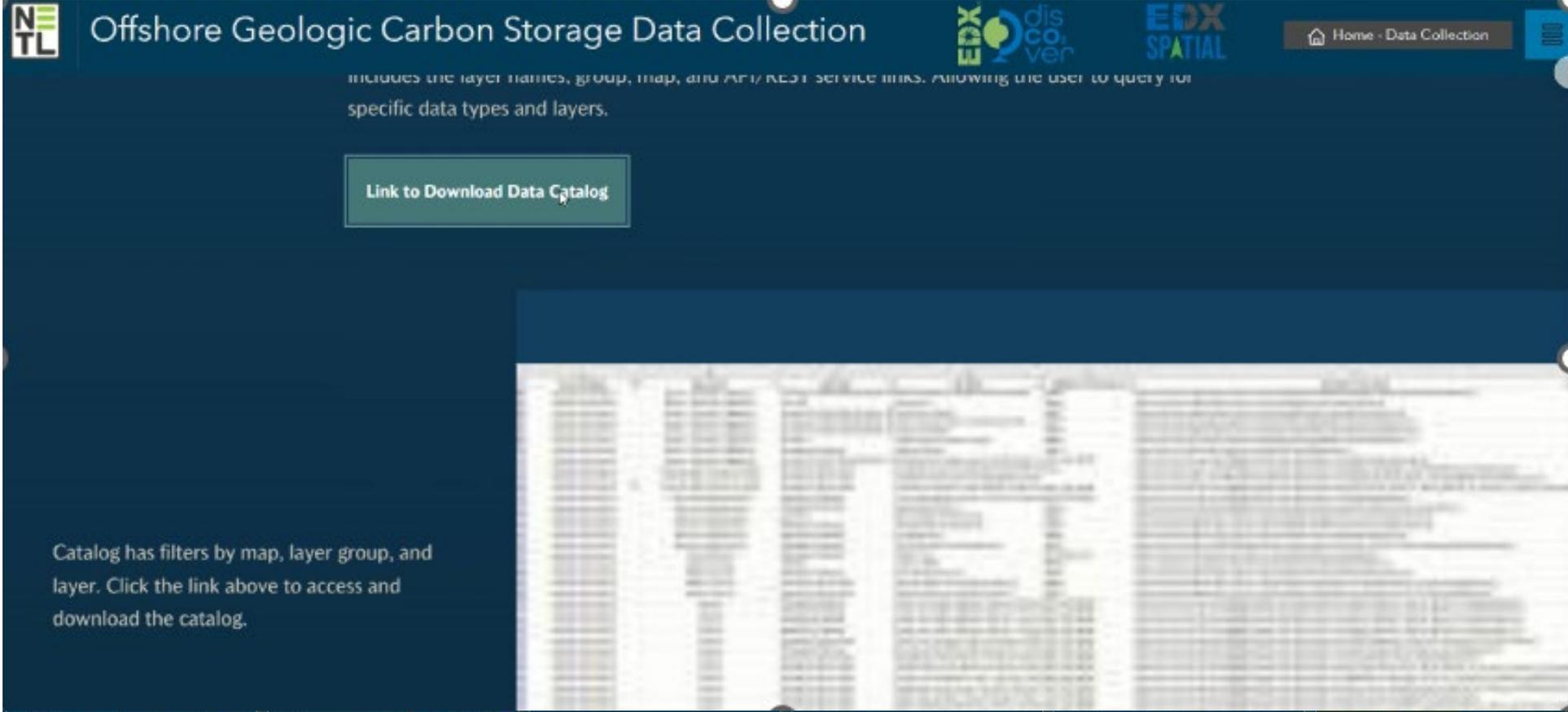
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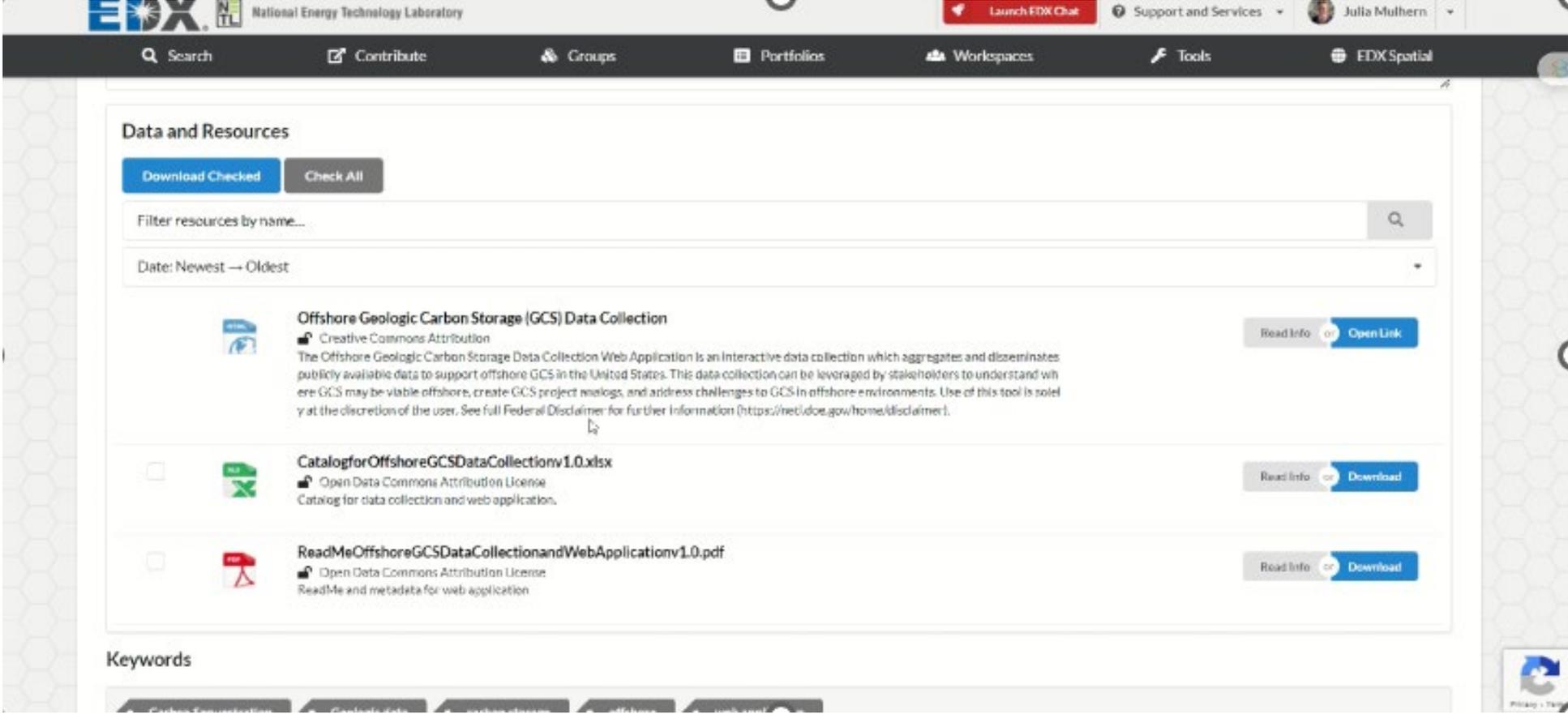


The screenshot shows the 'Offshore Geologic Carbon Storage Data Collection' web application. The header includes the NETL logo, the title 'Offshore Geologic Carbon Storage Data Collection', and logos for 'EDX discover' and 'EDX SPATIAL'. A navigation bar shows 'Home - Data Collection'. The main content area features a text block stating: 'includes the layer names, group, map, and API/REST service links, allowing the user to query for specific data types and layers.' Below this is a prominent button labeled 'Link to Download Data Catalog'. A blurred image of a data catalog table is shown in the lower right. At the bottom left of the screenshot, text reads: 'Catalog has filters by map, layer group, and layer. Click the link above to access and download the catalog.'

Offshore GCS Data REST Service Catalog

Web Hosted Data Expedites Visualization and Utilization

- Excel sheet catalog for the Data Collection is easily searchable and allows users to link back to original data sources via REST Service landing pages and links.
- This enables quick and easy visualization of ever-green data sources.



Offshore GCS Data REST Service Catalog



Web Hosted Data Expedites Visualization and Utilization

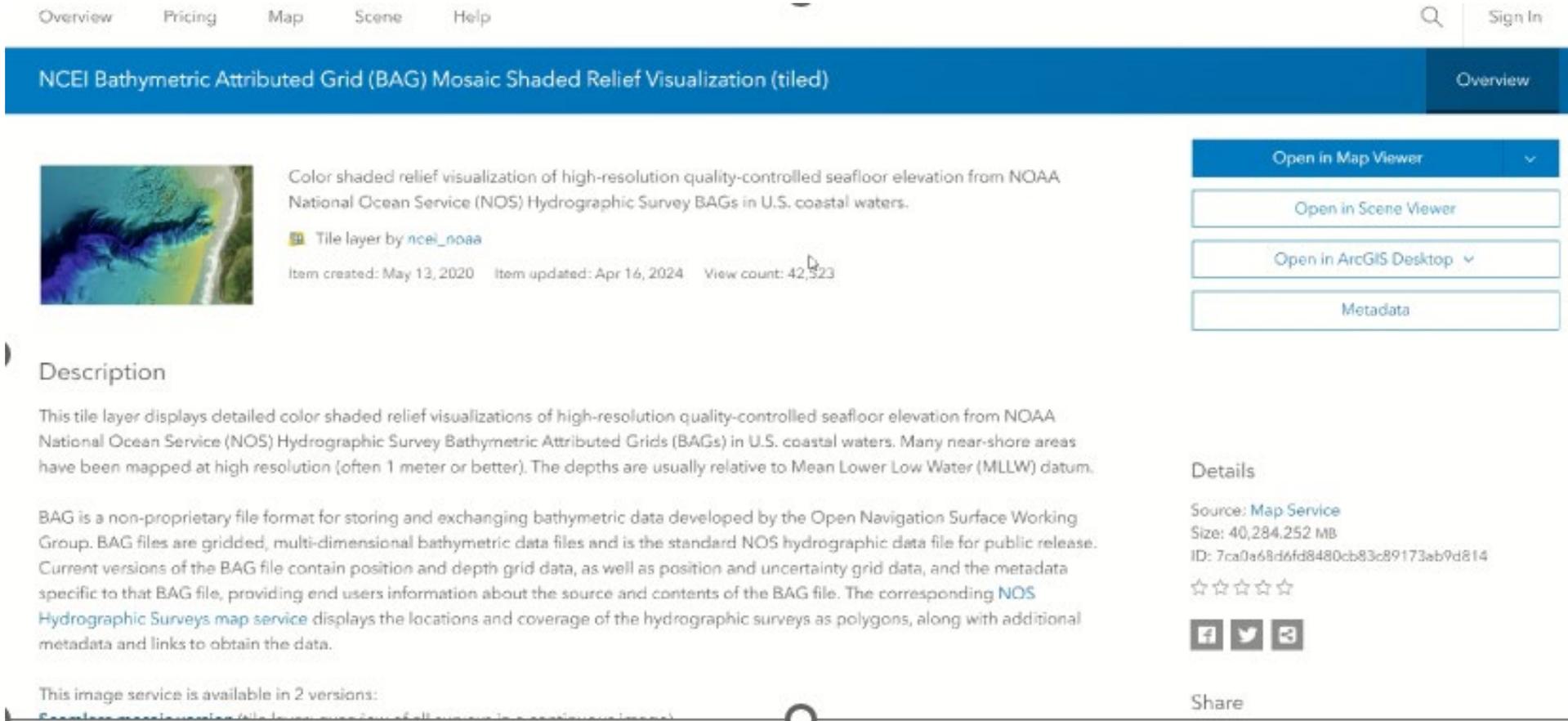
- Excel sheet catalog for the Data Collection is easily searchable and allows users to link back to original data sources via REST Service landing pages and links.
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Map Collection	Map Layers	Data Type	File Name	Database or Data Source	Data Source Web
	Contours	Bathymetry	Bathymetry Contours	NETL Offshore GoM	https://arcgis.netl.doe.gov/portal/home/item
	Contours	Bathymetry	Bathymetric Contours for Offshore California	NOAA	https://noaa.maps.arcgis.com/home/item.htm
	DEMs	Bathymetry	Atlantic Continental Margin Bathymetry	NOAA	https://noaa.maps.arcgis.com/home/item.htm
	DEMs	Bathymetry	Western Gulf of Maine Bathymetry	NOAA	https://noaa.maps.arcgis.com/home/item.htm
	DEMs	Bathymetry	NCEI Bathymetric Attributed Grid (BAG) Mosaic Shaded Relief Visualiza	NCEI_NOAA	https://www.arcgis.com/home/item.html?id=...
	Depth Boundaries	Water Depth	Depth_Boundaries	NETL_AIIM	https://arcgis.netl.doe.gov/portal/home/item
	Large Datasets	Core	NOAA Index to Marine Samples	NOAA	https://hub.arcgis.com/datasets/noaa-index-t
	Large Datasets	Core	SPCMSC Geologic Core and Sample Database	SPCMSC	https://www.arcgis.com/home/item.html?id=...
	Large Datasets	Core	BOEM Task 1 Desktop Study WFL1	BOEM	https://www.arcgis.com/home/item.html?id=...
	Large Datasets	Core	Marine Geology Repository	OSU_MGR	https://www.arcgis.com/home/item.html?id=...
	Location Specific Datasets	Core	Seabed Samples Irish Waters WGS84	INPCMAR/INSS	https://www.arcgis.com/home/item.html?id=...
	Location Specific Datasets	Core	Seafloor Sediment	California State Lands Cor	https://hub.arcgis.com/datasets/CSLC::seafloo
	Location Specific Datasets	Core	Desktop_Northeast_WFL1	BOEM	https://www.arcgis.com/home/item.html?id=...
	Location Specific Datasets	Core	Existing Geotechnical Data Coverage	BOEM	https://www.arcgis.com/home/item.html?id=...
	Location Specific Datasets	Core	Maryland Offshore Ocean Resources - Maryland Geological Survey Core	ArcGIS Online for Marylan	https://www.arcgis.com/home/item.html?id=...
	Boundaries	County Boundaries	US Counties and Offshore Regions	NETL Enterprise	https://arcgis.netl.doe.gov/portal/home/item
	Boundaries	Land Use	Submerged_Lands_Act_Boundary_Alaska	BOEM	https://www.arcgis.com/home/item.html?id=...
	Boundaries	Land Use	Outer Continental Shelf Lands Act 8(j) Zone Limit - Alaska Region	ESRI Federal Data	https://hub.arcgis.com/datasets/fedmaps::out
	Boundaries	Land Use	Submerged lands Act Boundary	NETL Offshore GoM	https://arcgis.netl.doe.gov/portal/home/item
	Boundaries	Land Use	BOEM GoM Planning Area Boundaries	NETL Offshore GoM	https://arcgis.netl.doe.gov/portal/home/item
	Boundaries	State Boundaries	Coastal States	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	County Boundaries	Coastal Counties	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Political Boundaries / Districts	Congressional Districts	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Political Boundaries / Districts	State Legislative Senate Districts	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Political Boundaries / Districts	State Legislative House Districts	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Land Use	Coastal Zone Management Act	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Federal Lands	U.S. State Submerged Lands	NOAA	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Land Use	Submerged Lands Act Boundary	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Land Use	COUREGS Demarcation Lines	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Land Use	Territorial Sea	BOEM	https://noaa.maps.arcgis.com/home/item.htm
	Boundaries	Land Use	Federal Coalitions Renewable Location Boundaries	BOEM	https://noaa.maps.arcgis.com/home/item.htm

Offshore GCS Data REST Service Catalog

Web Hosted Data Expedites Visualization and Utilization

- Excel sheet catalog for the Data Collection is easily searchable and allows users to link back to original data sources via REST Service landing pages and links.
- This enables quick and easy visualization of ever-green data sources.



The screenshot shows a web application interface for a REST Service Catalog. At the top, there are navigation tabs: Overview, Pricing, Map, Scene, and Help. A search icon and a 'Sign In' link are in the top right. The main content area features a blue header with the title 'NCEI Bathymetric Attributed Grid (BAG) Mosaic Shaded Relief Visualization (tiled)' and an 'Overview' button. Below the header is a thumbnail image of a color-shaded bathymetric map. To the right of the image, the description reads: 'Color shaded relief visualization of high-resolution quality-controlled seafloor elevation from NOAA National Ocean Service (NOS) Hydrographic Survey BAGs in U.S. coastal waters.' Below the description, it says 'Tile layer by ncei_noaa' and provides metadata: 'Item created: May 13, 2020', 'Item updated: Apr 16, 2024', and 'View count: 42,923'. On the right side of the interface, there are four buttons: 'Open in Map Viewer', 'Open in Scene Viewer', 'Open in ArcGIS Desktop', and 'Metadata'. Below these buttons is a 'Details' section with the following information: 'Source: Map Service', 'Size: 40,284,252 MB', and 'ID: 7ca0a68d6fd8480cb83c89173ab9d814'. There are also five star ratings and social media icons for Facebook, Twitter, and LinkedIn. At the bottom, there is a 'Share' button and a note: 'This image service is available in 2 versions: Seamless map service (tile layer, view only of full coverage in a continuous image)'.

Data Collection and Data Availability Report

Technical report which leverages Carbon Storage Technical Viability Approach Matrix as a framework for data gaps assessment by region

- Report documents how the web application was developed, detailing development process

NETL
NATIONAL ENERGY TECHNOLOGY LABORATORY

Offshore Geologic Carbon Storage Data Collection and Data Gaps Analysis
30 June 2024

U.S. DEPARTMENT OF ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY

Office of Fossil Energy and Carbon Management
DOE/NETL-2024/4804



Report
QR Code

Retention and Geomechanical Risk					
Sub-Cat	Components	Gulf of Mexico	Atlantic	Pacific	Alaska
Seals and Pressure	Proven/Demonstrated Effectiveness of Top Seal	Some aggregated well data and regional geologic interpolations of seal properties exist. Included in some interpretations of nationwide datasets.	Understanding of seals limited by sparse drilling and seismic data for the region.		Seals mapped in regions where oil and gas exploration has taken place.
	Top Seal Thickness and Spatial Variability				
	Top Seal Viability, Fracture Pressure, Lithology, Porosity, and Permeability				
	Secondary Confining Unit Presence and Viability				
	Bottom Seal, Downward Flow, and Induced Seismicity				
Trap	Pressure Communication with Reservoir	Aggregated data on traps available. Some information can be garnered from existing hydrocarbon field information.	Limited data on traps for the region based on limited subsurface mapping.		Some information can be garnered from existing hydrocarbon field information.
	Geological Trap Type and Certainty				
Faulting	Trap Viability and Previously Demonstrated Integrity	Mapped faults from USGS. Some earthquake occurrence data aggregated.	Mapped faults from USGS. Some earthquake occurrence data aggregated.	Mapped faults from USGS. Some earthquake occurrence data aggregated.	Mapped faults from USGS. Faults mapped for Alaska included in dataset.
	Fault Presence, Depth, Spacing, Magnitude, Status (Active vs. Inactive)				
	Fracture Type and Density				
	Fault Reactivation Likelihood with Increased Pressure				
	Fault Gouge and Cementation/Fault Seal Viability				
Earthquake Prevalence and Likelihood					

Data Gaps Assessment by Region Using CS TVA Matrix



Siting, Regulatory, and Jurisdictional Feasibility					
Sub-Cat	Components	Gulf of Mexico	Atlantic	Pacific	Alaska
Land Rights/ Use	Surface - Land Ownership and Access	Leases and boundaries included in dataset.			
	Subsurface Pore Space Rights				
Population and Habitats	Protected Areas and Sensitive Habitats	Lots of species and habitat data included. Census data available.	Some species and habitat data available. Census data available.		
	Population Density				
Jurisdiction	Jurisdictional Boundaries, Support, and Stability	Maps of tax credit eligibility distribution. County maps by various eligibility labels.			
	Governmental Policies and Incentives				
Regulatory	Maturity of Regulatory Framework	Class VI permit locations and status. Ongoing and historic GCS projects.			
	Maturity of CCS Activity in Area				

Reservoir Suitability					
Sub-Cat	Components	Gulf of Mexico	Atlantic	Pacific	Alaska
Reservoir Quality	Reservoir Porosity	Some aggregated well data and regional geologic interpolations for reservoir properties exist, primarily for the Gulf of Mexico.	A limited number of wells (~30) were drilled in the late 1970s and no drilling has taken place since then. Core data available for seafloor sediments.	Drilling data and information for coastal California are limited. Core data available for seafloor sediments.	Extensive well data for oil and gas regions is available. Core data available for seafloor sediments.
	Reservoir Permeability				
	Depositional Environment, Lithology, Grainsize, and Sorting				
	Diagenesis, Grain Scale Deformation, Secondary Alteration, Reservoir Fractures				
Reservoir Geometry	Reservoir Thickness Distribution, Spatial Extent, and Lateral Variability	Some mapped extent layers and interpreted well data exist with limited coverage. Seismic datasets are available. Some depth to reservoir top layers included.	Limited to no information available.	Data status uncertain but no data included in current collections.	Data likely exist are not currently included in collection.
	Reservoir Internal Variability, Geobody Architecture, and Net-to-Gross				
	Depth to Top of Formation				
Reservoir Conditions	Reservoir Temperature	Some aggregated well data and regional geologic interpolations for reservoir properties exist, primarily for the Gulf of Mexico.	Limited to no information available.	Data status uncertain but no data included in current collections.	Data likely exist are not currently included in collection.
	Reservoir Pressure				
	In-situ Fluids, Salinity, and CO ₂ Density				

Data Gaps Assessment by Region using CS TVA Matrix



Environmental Justice, Social Justice, and Community Impacts					
Sub-Cat	Components	Gulf of Mexico	Atlantic	Pacific	Alaska
Community Sentiment	Community Familiarity with Drilling Process	Social well-being and vulnerability data available. Maps of county types. Some information within publications available.	Nationwide Environmental Justice and Social Justice census datasets available; localized data on carbon storage impacts unknown.		
	Community Attitude Toward Industrial Development				
	Community Attitude Toward Climate Change and Net Zero Ambitions				
	Community Cohesiveness and Jurisdiction Authority				
Impact on Community	Environmental Impact of Operations	Existing infrastructure data available.	Nationwide Environmental Justice and Social Justice and census datasets available; localized data on carbon storage impacts unknown.		
	Infrastructure and Resource Impacts	Some pollution datasets available.			
	Workforce Development and Job Creation	Economics and trade data available.			

Hazards					
Sub-Cat	Components	Gulf of Mexico	Atlantic	Pacific	Alaska
Subsurface Hazards	Overburden Drilling Hazards	Some geologic layers are mapped and included. Overburden hazards can be interpreted from seismic.	Limited drilling has taken place in the region therefore subsurface hazards are relatively unconstrained.	Subsurface hazards are understood where drilling has taken place but more information is needed for unexplored areas.	Some geologic layers are mapped and included. Overburden hazards can be interpreted from seismic.
	Pre-existing Well Density, Depths, and Ages				
Surface Hazards	Depth and Certainty of Drinking Water Aquifers in Overburden	Hurricane paths available for the Gulf of Mexico. Wind speed data are included. Seafloor geomorphology and offshore sediments data available. Multiple types of infrastructure layers are available.	Multiple types of infrastructure layers are available.		
	Water Depth (if offshore)				
	Topography or Location Risks				
	Climate, Weather, and Met-ocean				
	Natural Hazards - Land Surface or Seafloor Hazards				
Infrastructure Hazards					

	Data are available
	Insufficient data available
	Limited or no data available within current collection.

Recent Offshore Geologic Carbon Storage (GCS) Products

Variety of Deliverables Launched and Ready to Use

Offshore GCS Data Collection

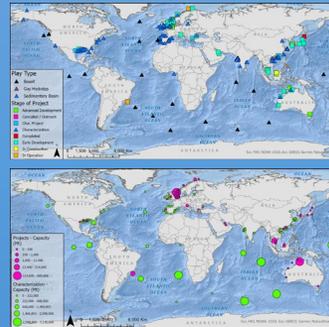
Data Collection Web App



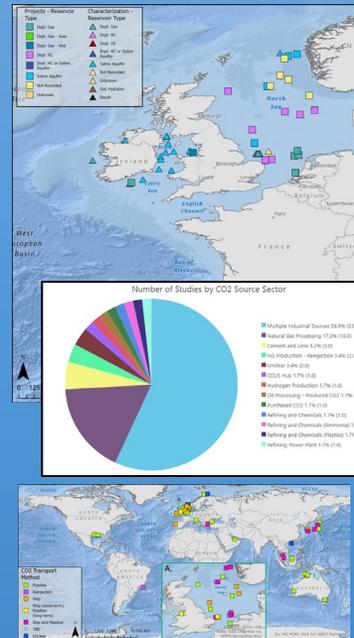
Data Gaps Assessment Report



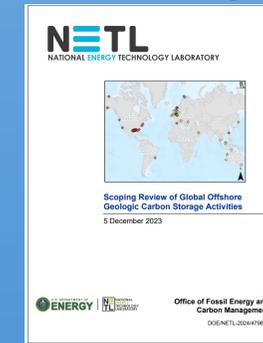
Inventory of Offshore Projects and Studies



Offshore Inventory Meta-Analysis



Inventory and Global Project Summary



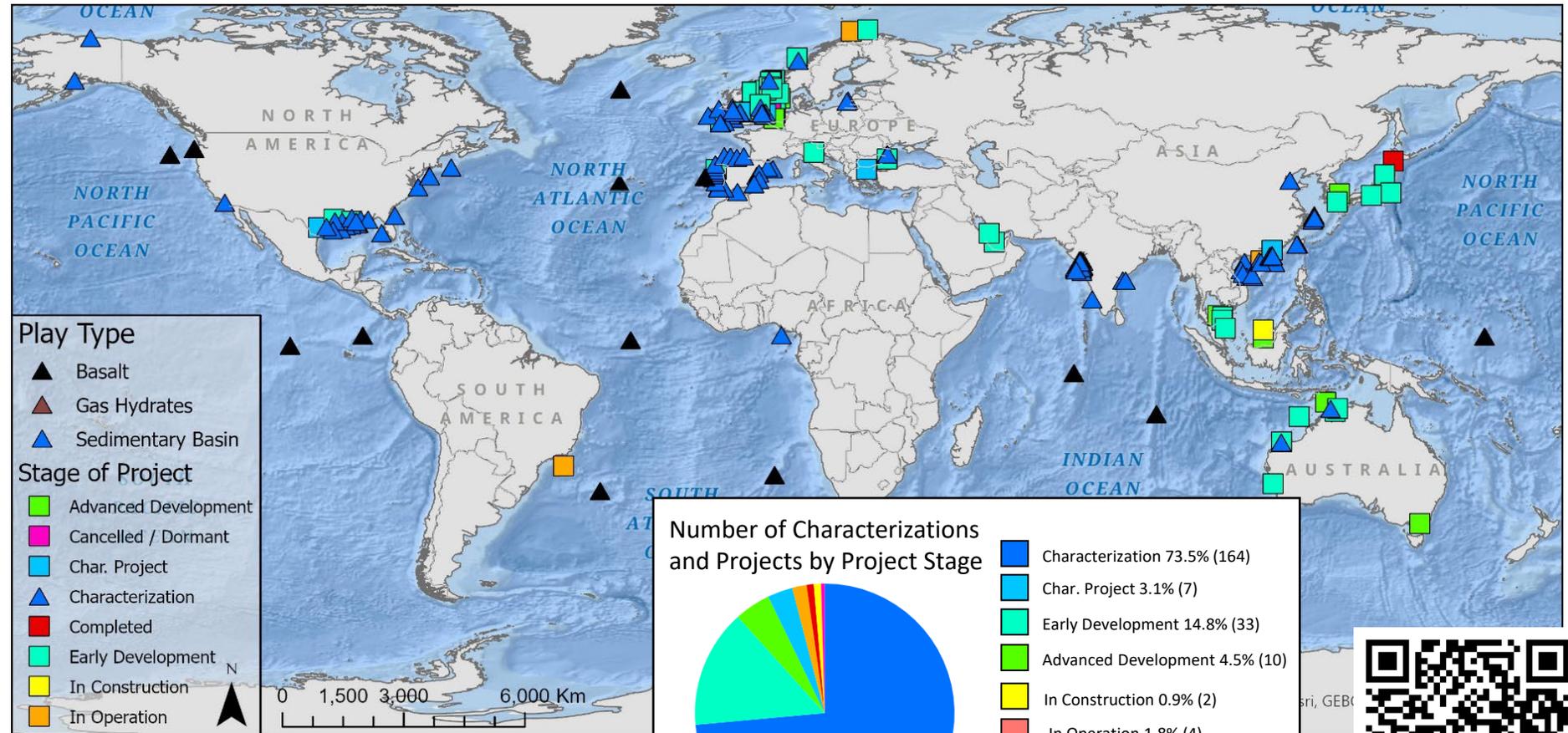
Inventory Story Map

Country	Offshore Projects	Onshore Projects	Early Development	Advanced Development	In Operation	In Closure	Cancelled
United States	20	1	0	0	0	0	0
Netherlands	3	0	0	0	0	0	0
Japan	1	0	0	0	0	0	0
India	4	0	0	0	0	0	0
Spain	1	0	0	0	0	0	0
Malaysia	2	0	0	0	0	0	0
United Kingdom	3	0	0	0	0	0	0
Australia	3	0	0	0	0	0	0
Canada	2	0	0	0	0	0	0
Thailand	1	0	0	0	0	0	0
Taiwan	1	0	0	0	0	0	0
India	1	0	0	0	0	0	0
Spain	1	0	0	0	0	0	0
United Arab Emirates	1	0	0	0	0	0	0
Spain	1	0	0	0	0	0	0
Spain	1	0	0	0	0	0	0

NETL's Offshore Geologic Carbon Storage Inventory

Global Project Inventory available online

- Initial inventory v1 focused on actualized projects is available online
- Ongoing work includes expanding inventory to >200 locations globally and adding characterization studies
- Additional attributes added to the inventory to enable meta-analysis and analog comparisons.



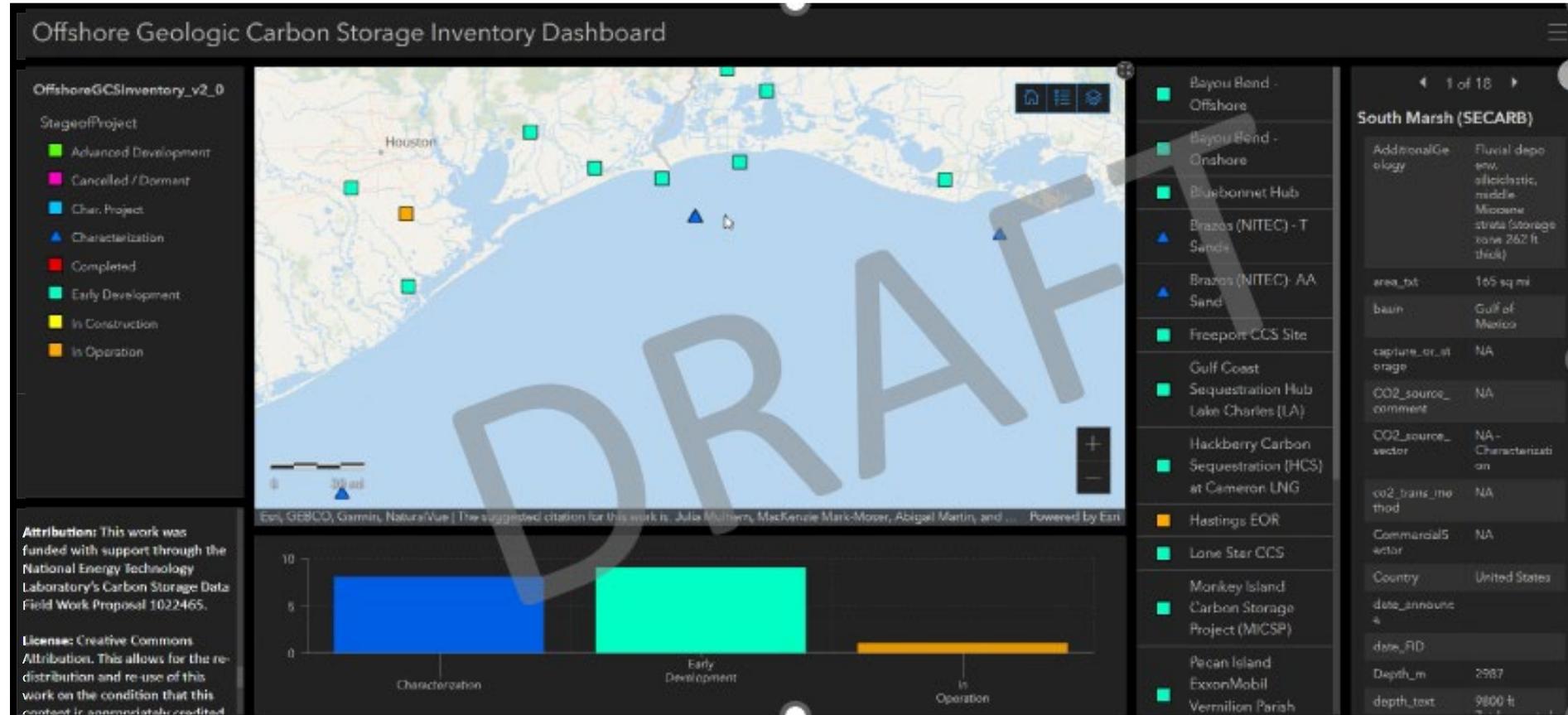
Inventory Version 1 available online



Upcoming Interactive Dashboard for Inventory

Dashboard will Enable Exploration of Inventory Using a Variety of Attributes

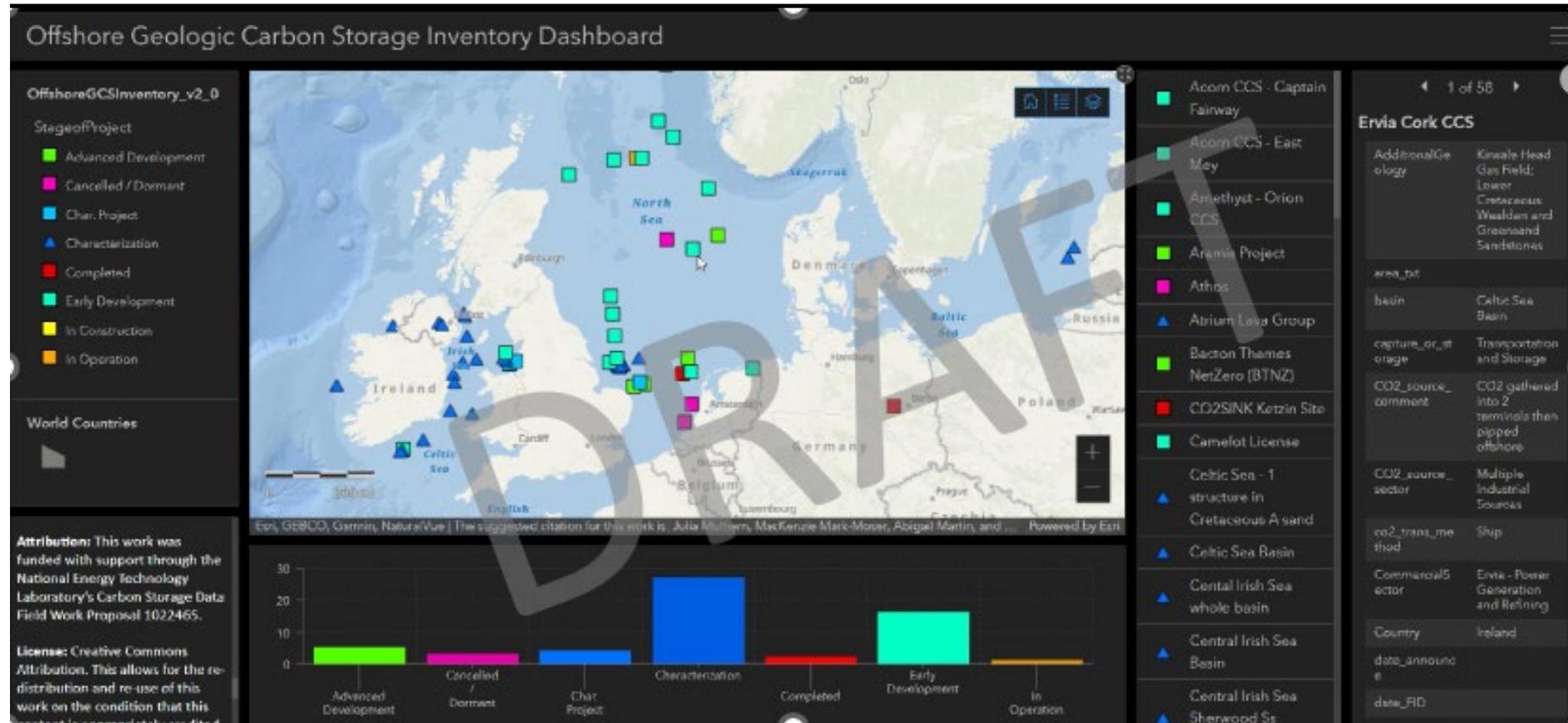
- Inventory will be published as an ArcGIS Enterprise layer with a REST API service link to allow access to an evergreen inventory version (September release).
- Attribute fields will be used to generate graphics with scale with map display to enable scalable comparisons and analysis on the fly (January release).
- Updates and additional information are welcome to ensure accuracy.
- Creating an email list to announce additional product releases.



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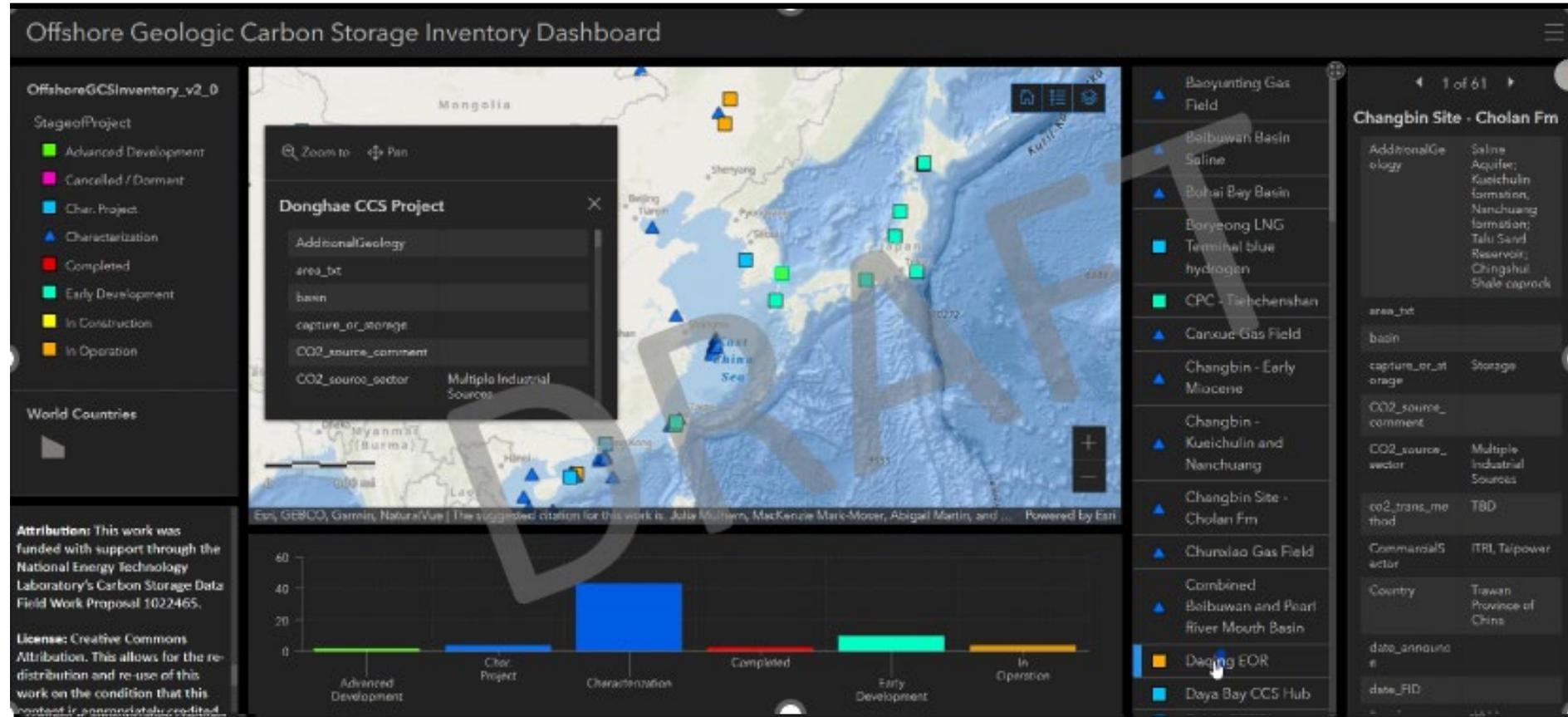
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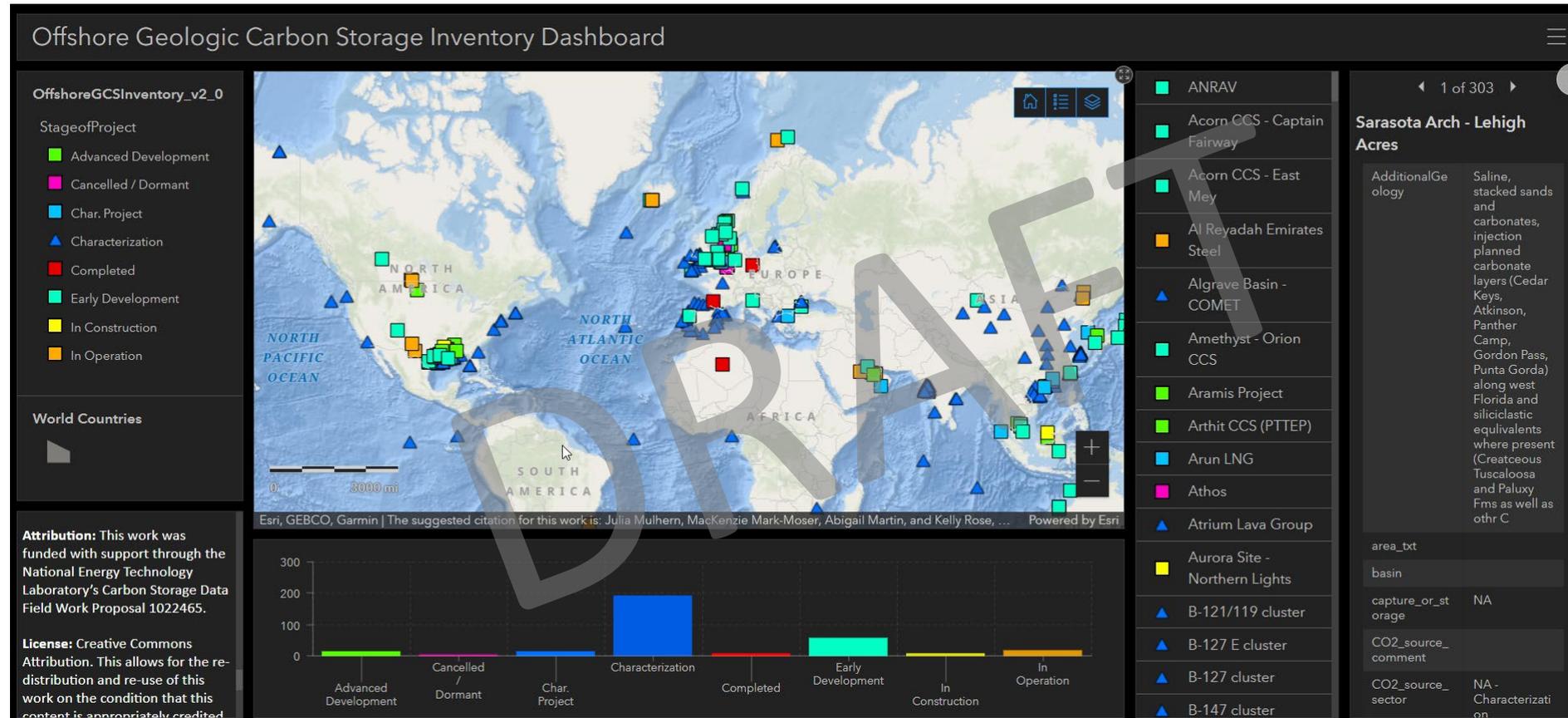
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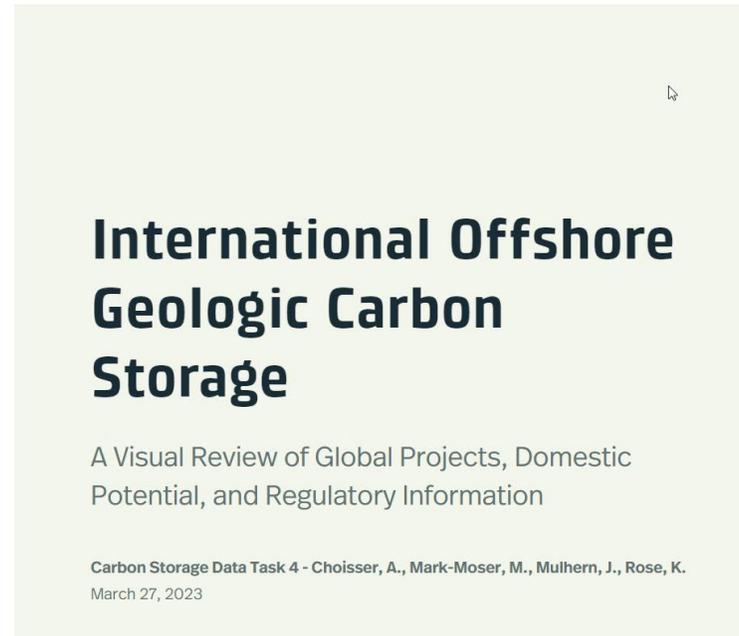


Offshore GCS StoryMap and Scoping Review Report

- **Story Map** provides review of global offshore GCS characterizations and operations, communicating progress, stages, locations
- **Report** summarizes global scoping and includes project descriptions and extensive references

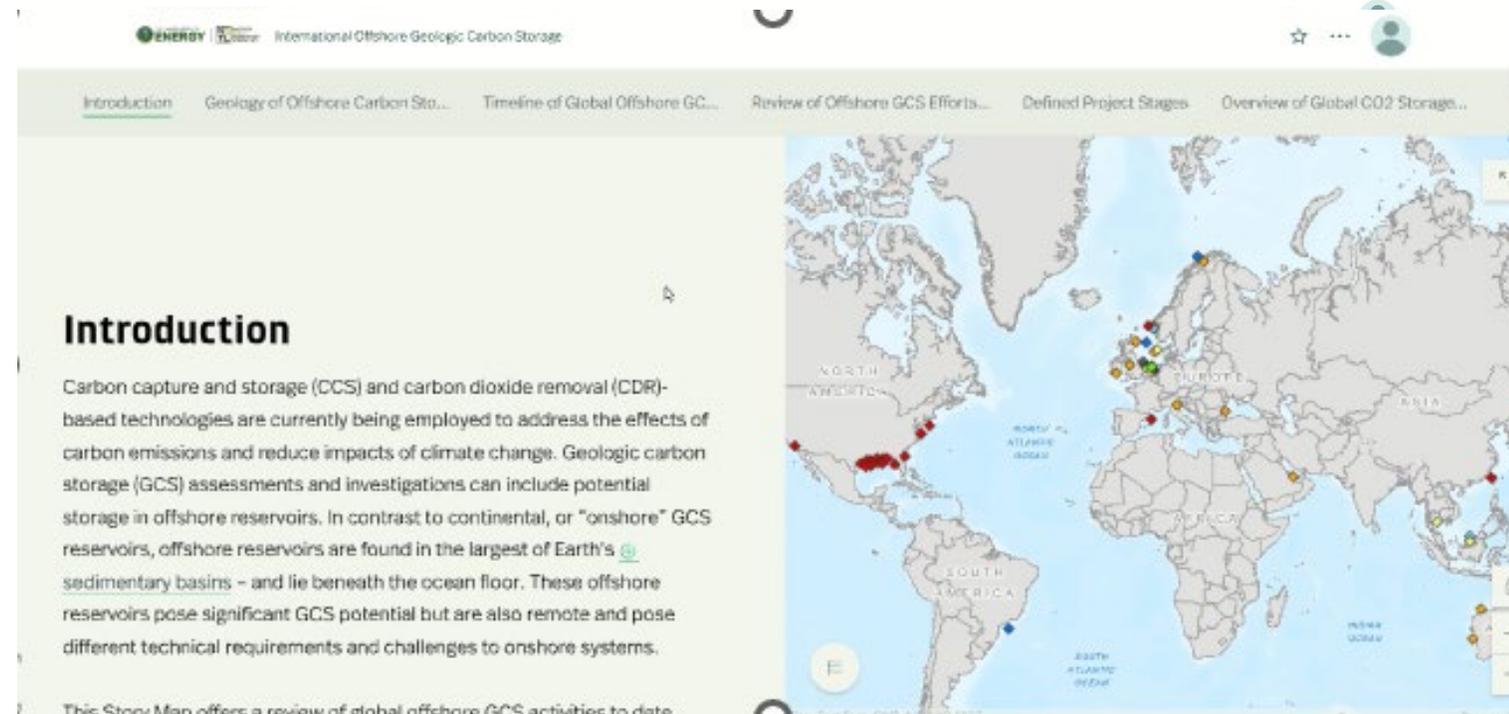


ENERGY | NETL | International Offshore Geologic Carbon Storage



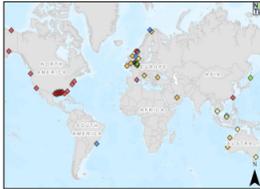
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Offshore GCS StoryMap and Scoping Review Report

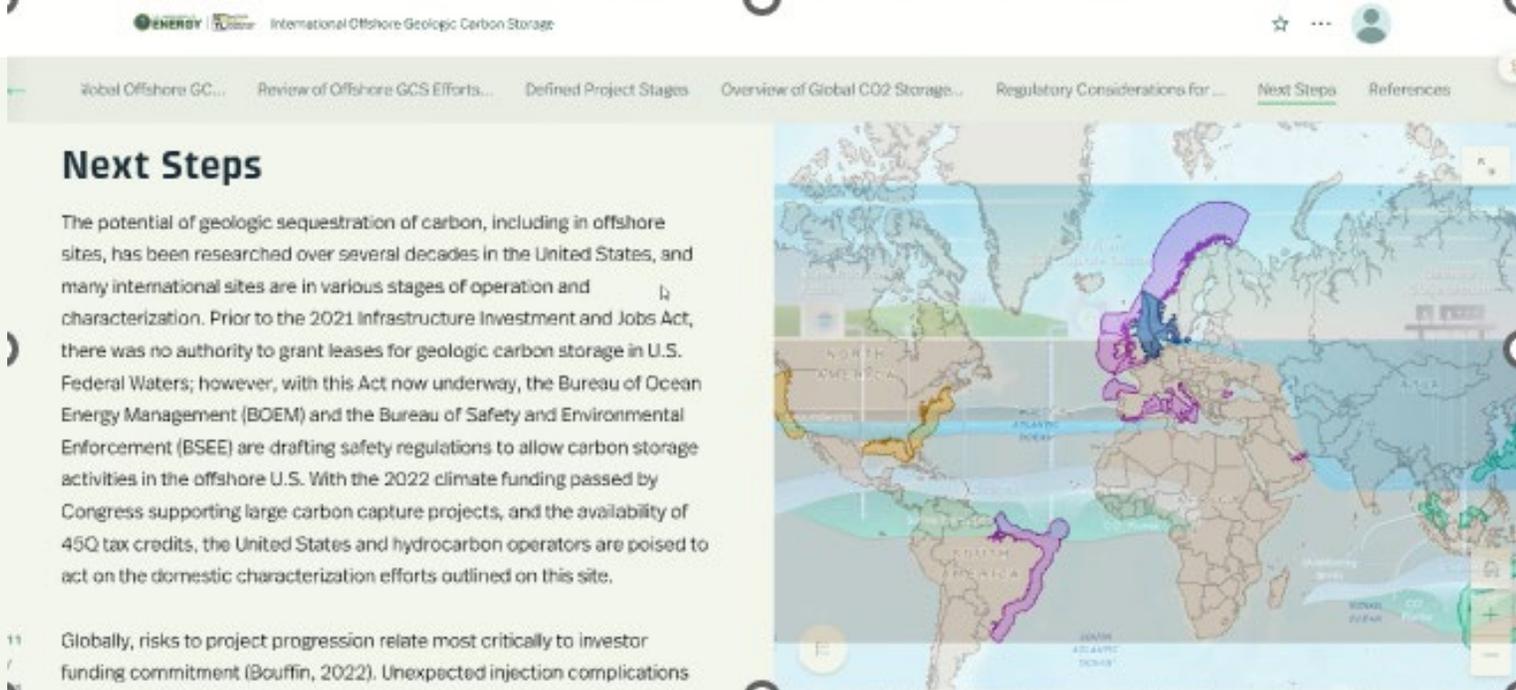
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Scoping Review of Global Offshore Geologic Carbon Storage Activities
5 December 2023



Office of Fossil Energy and Carbon Management
DOE/NETL-2024/4798



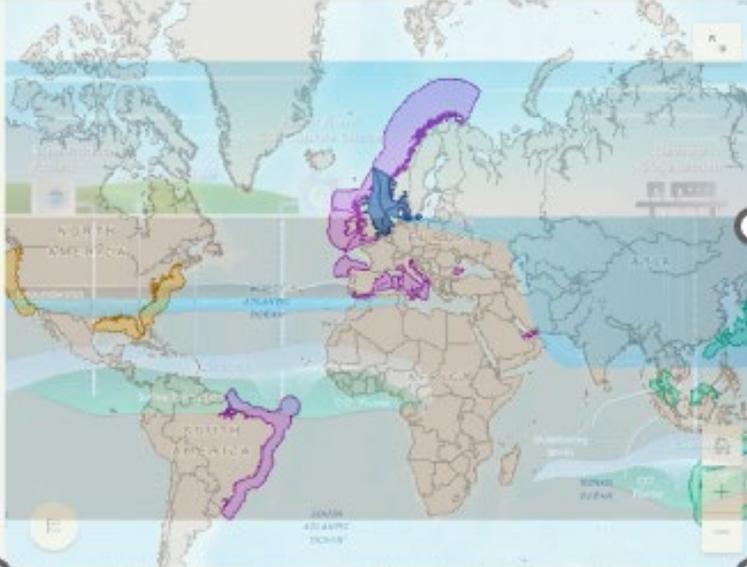
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Global Offshore GC... Review of Offshore GCS Efforts... Defined Project Stages Overview of Global CO2 Storage... Regulatory Considerations for... **Next Steps** References

Next Steps

The potential of geologic sequestration of carbon, including in offshore sites, has been researched over several decades in the United States, and many international sites are in various stages of operation and characterization. Prior to the 2021 Infrastructure Investment and Jobs Act, there was no authority to grant leases for geologic carbon storage in U.S. Federal Waters; however, with this Act now underway, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) are drafting safety regulations to allow carbon storage activities in the offshore U.S. With the 2022 climate funding passed by Congress supporting large carbon capture projects, and the availability of 45Q tax credits, the United States and hydrocarbon operators are poised to act on the domestic characterization efforts outlined on this site.

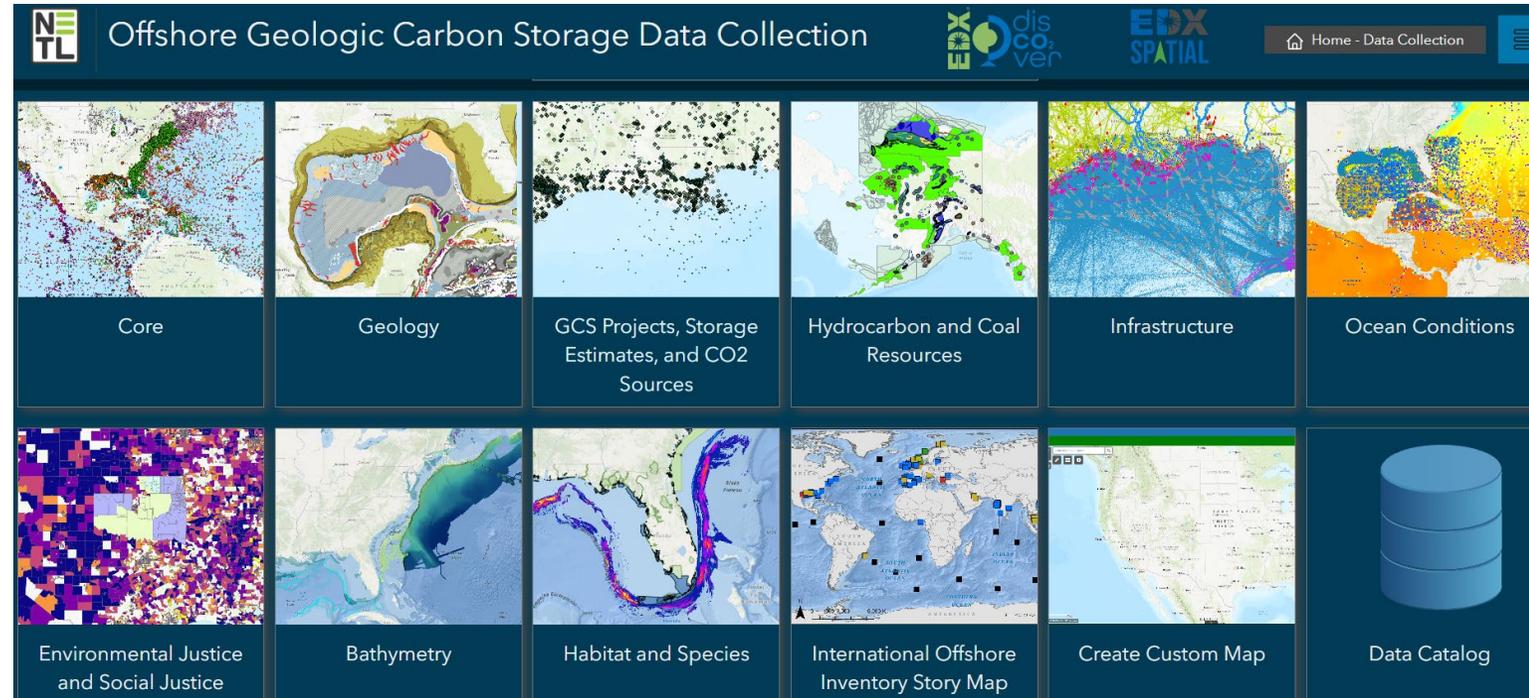
11 Globally, risks to project progression relate most critically to investor funding commitment (Bouffin, 2022). Unexpected injection complications



Progressing Offshore GCS Understanding

Utilizing Offshore GCS Data Collection and Inventory:

- Data availability and data gathering
- Offshore Cost Modeling
- Analog comparisons to leverage understanding
- Offshore transport analysis
- Input data for risk assessments
- Leveraging global learnings



Next Steps for this project:

- Inventory and Web Map in Enterprise (anticipated September 2024 release)
- Dashboard dev with attributes (anticipated December 2024 release)

Recent Offshore Geologic Carbon Storage (GCS) Products

Variety of Deliverables Launched and Ready to Use

Offshore GCS Data Collection

International Offshore GCS Inventory

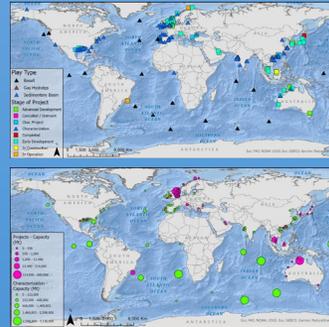
Data Collection Web App



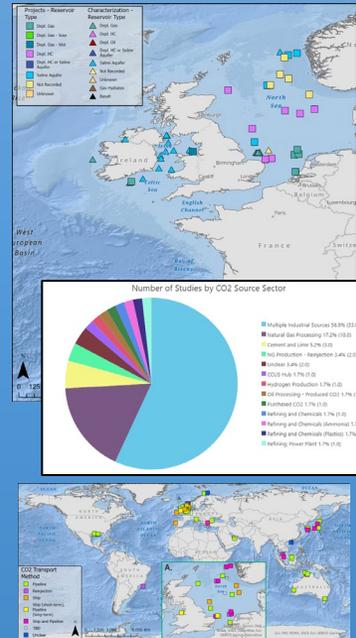
Data Gaps Assessment Report



Inventory of Offshore Projects and Studies



Offshore Inventory Meta-Analysis



Inventory and Global Project Summary



Inventory Story Map

Country	Offshore Projects	Onshore Projects	Early Development	Advanced Development	In Operation	Completed
United States	20	1	1	1	1	1
Netherlands	3	1	1	1	1	1
Japan	1	1	1	1	1	1
India	4	1	1	1	1	1
Spain	1	1	1	1	1	1
Malaysia	2	1	1	1	1	1
United Kingdom	3	1	1	1	1	1
Australia	3	2	1	1	1	1
Canada	2	1	1	1	1	1
Thailand	1	1	1	1	1	1
Taiwan	1	1	1	1	1	1
India	1	1	1	1	1	1
Spain	1	1	1	1	1	1
United Arab Emirates	1	1	1	1	1	1
Spain	1	1	1	1	1	1
Spain	1	1	1	1	1	1



List of References Related to this Project



Data Collection:

Mulhern, J.S., Mark-Moser, M., and Rose, K. Offshore Geologic Carbon Storage (GCS) Data Collection

Web Application, 5/28/2024, <https://edx.netl.doe.gov/dataset/offshore-geologic-carbon-storage-gcs-data-collection-web-application> DOI: 10.18141/2367369

Mulhern, J.S., Mark-Moser, M., and Rose, K., 2024. Offshore Geologic Carbon Storage Data Collection and Data Gaps Analysis. DOE.NETL-2024.4804; NETL Technical Report Series; U.S. Department of Energy, National Energy Technology Laboratory: Albany, OR, 2024; p 24. <https://doi.org/10.2172/2382659> <https://edx.netl.doe.gov/dataset/offshore-geologic-carbon-storage-data-collection-and-data-gaps-analysis-trs-report>

Inventory:

National Energy Technology Laboratory, Offshore Geologic Carbon Storage Inventory, 9/18/2023,

<https://edx.netl.doe.gov/dataset/offshore-gcs-data-inventory>, DOI: 10.18141/1963815

Choisser, A.C., Mark-Moser, M., Mulhern, J.S., and Rose, K. International Offshore Geologic Carbon Storage Story Map. United States: N. p., 2023. Web. doi:10.18141/1995986. <https://edx.netl.doe.gov/dataset/offshore-geologic-carbon-storage-story-map>

Choisser, A.; Mark-Moser, M.; Mulhern, J.; Rose, K. Scoping Review of Global Offshore Geologic Carbon Storage Activities; DOE.NETL-2024.4798; NETL Technical Report Series; U.S. Department of Energy, National Energy Technology Laboratory: Albany, OR, 2023; p 80. DOI: 10.2172/2279183 <https://edx.netl.doe.gov/dataset/scoping-review-of-global-offshore-geologic-carbon-storage-activities>

This talk:

Mulhern, J.S., Mark-Moser, M., and Rose, K. International Offshore Geologic Carbon Storage Data Collection, Web Application, Inventory, and Meta-analysis. 2024 FECM / NETL Carbon Management Research Project Review Meeting. Pittsburgh, PA. August 5-9, 2024. *Oral presentation*

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