

BOEM Outer Continental Shelf Sub-Seabed Geologic CO₂ Sequestration Research

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The Outer Continental Shelf Lands Act

- Under the Outer Continental Shelf Lands Act (OCSLA), the Department of the Interior (DOI), Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) have authority for authorizing and regulating the development of mineral resources and certain other energy and marine related uses on the OCS.



The Outer Continental Shelf

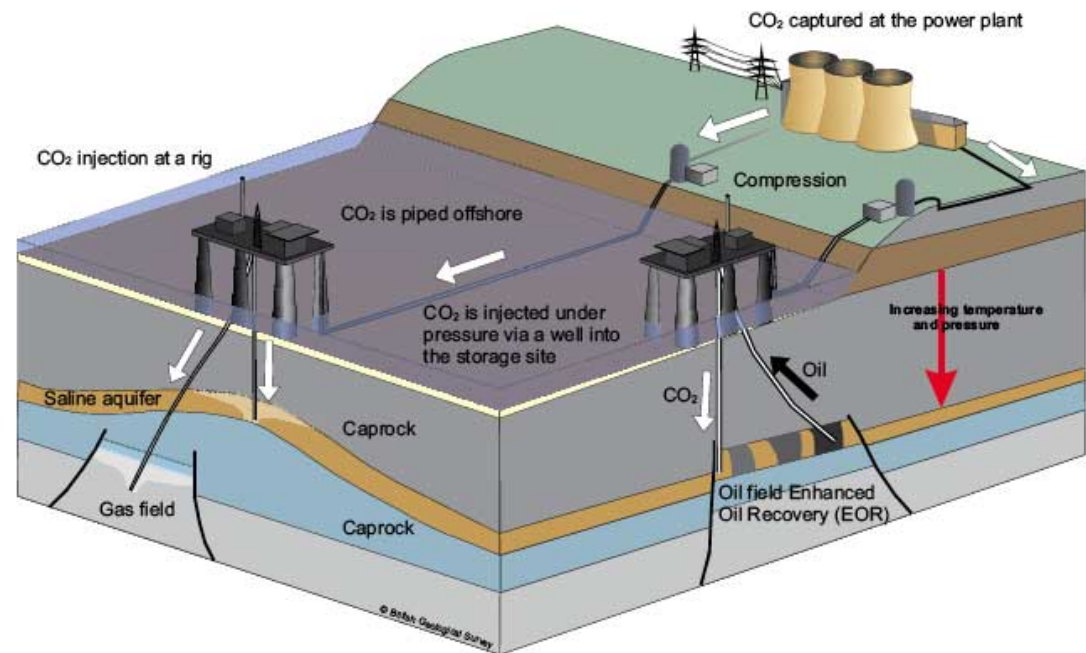
- The OCS includes an area consisting of 1.7 billion acres of submerged lands, subsoil, and seabed, lying between the seaward extent of the States' submerged lands and the seaward extent of Federal jurisdiction.
- For most areas, Federal jurisdiction begins 3 nautical miles from the shore baseline. However, for the State of Texas and the Gulf coast of Florida, Federal jurisdiction begins 9 nautical miles from the baseline and for the State of Louisiana Federal jurisdiction begins 3 imperial nautical miles from the baseline.



OCS Planning Areas

OCSLA and CO₂

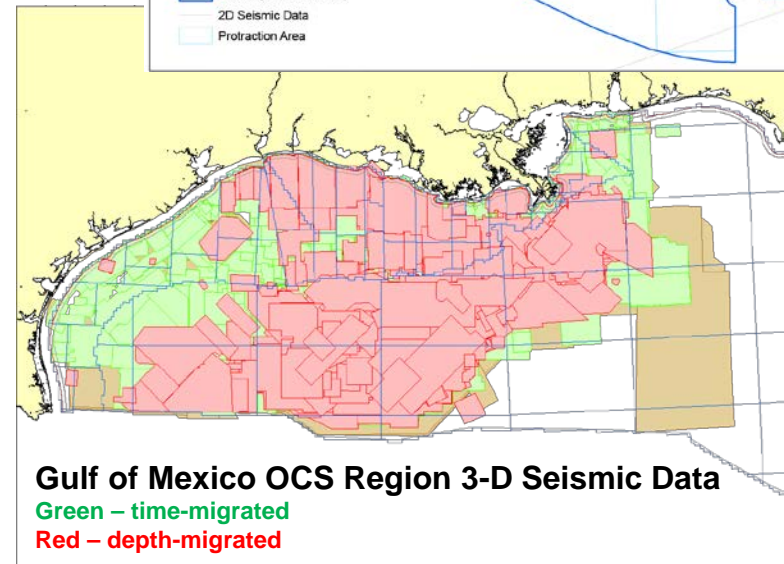
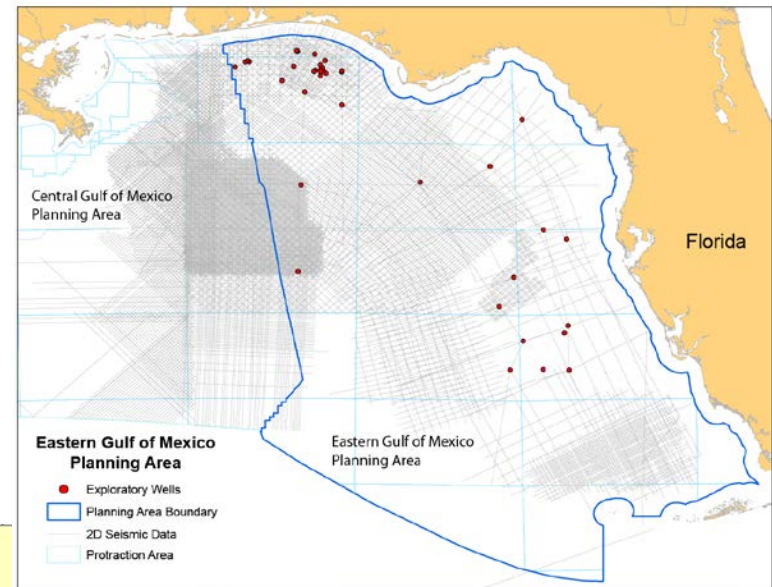
- DOI has statutory authority under the OCSLA to permit the use and sequestration of CO₂ for EOR activities on existing oil and gas leases on the OCS.
- DOI has the statutory authority to permit the sequestration of CO₂ for certain types of projects.



<http://www.scotland.gov.uk/publications/2009/04/28114540/4>

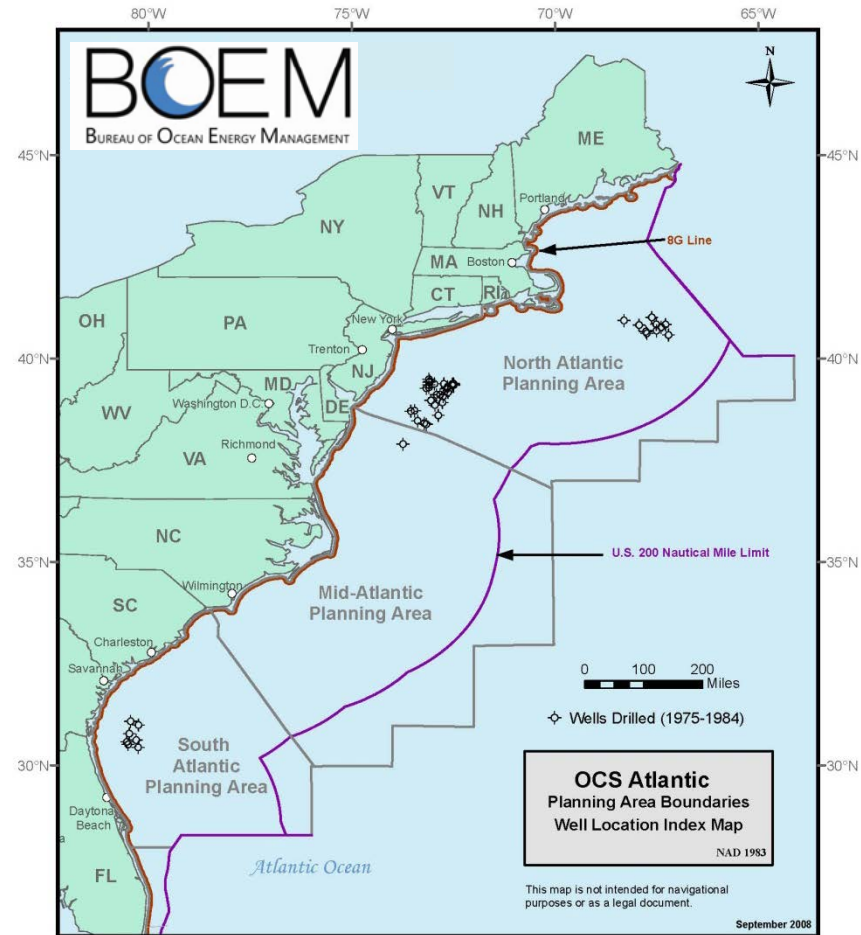
Obtaining OCS Geological and Geophysical Data

- **G&G data varies spatially and temporally by OCS Region**
- **Release only non-proprietary data**
 - **Seismic data becomes public after 25 years**
 - **Most well data becomes public after 2 years**
 - **30 CFR 550.197**



BOEM OCS Geological Data

- General Well Data
- Well Logs
- Continental Offshore Stratigraphic Test (COST) Well Data
- Paleontological Data
- Revised Biostratigraphic Chart
- Chronozones
- Directional Surveys
- Indicated Hydrocarbon List
- Shallow Water Flow Information
- Geologic Summary Reports

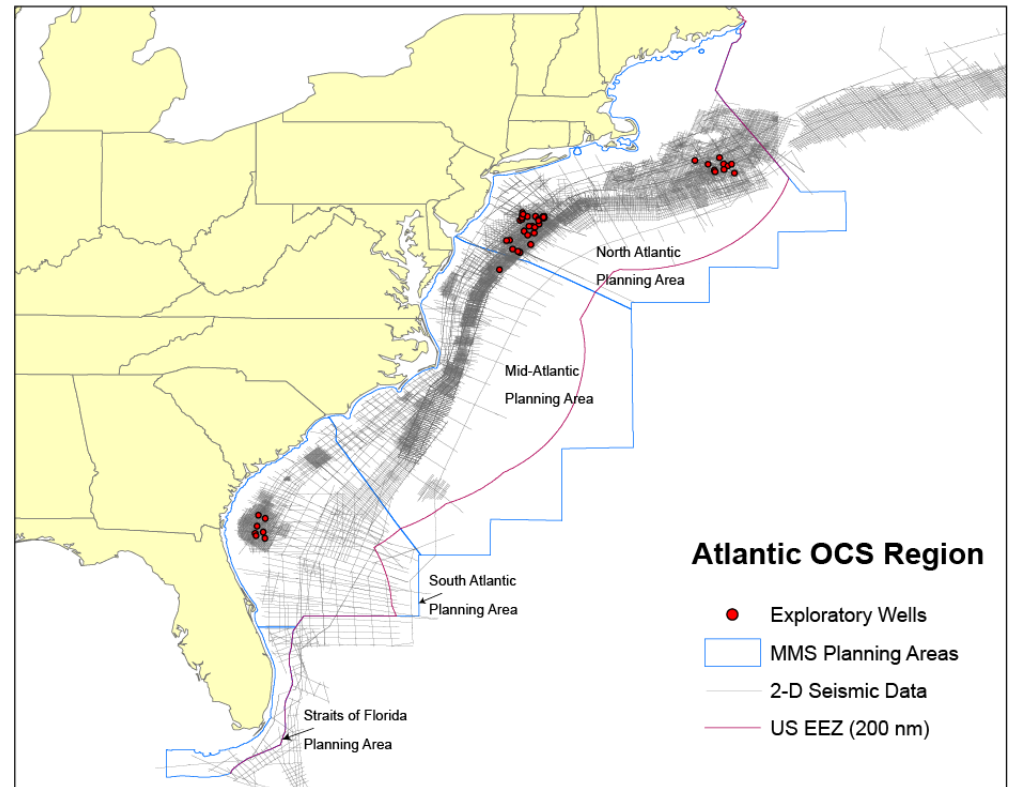


<http://www.boem.gov/Oil-and-Gas-Energy-Program/Resource-Evaluation/Geological-and-Geophysical-Data-Acquisition/Index.aspx>

http://www.data.boem.gov/homepg/data_center/index.asp

BOEM OCS Geophysical Data

- Non-Proprietary Seismic Data
- Well Data (Velocity Wells)
- Seismic Water Bottom Anomalies Maps (GOM)
- **USGS National Archive of Marine Seismic Surveys (NAMSS)**
 - BOEM Data
 - Interactive Map Search

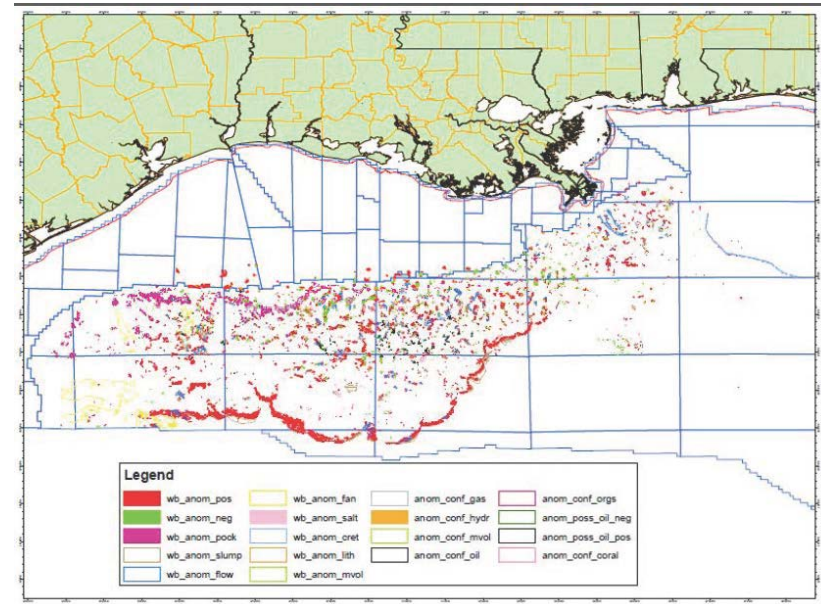


<http://www.boem.gov/Oil-and-Gas-Energy-Program/Resource-Evaluation/Geological-and-Geophysical-Data-Acquisition/Index.aspx>

<http://walrus.wr.usgs.gov/NAMSS/about.html>

Other BOEM OCS Data

- **Reserves Information:** Reserves Reports, Field and Reserves Data, Production Data, O&G Sands Atlas, Bottomhole Pressure Survey Data
- **Geological and Geophysical Permits:** Permit Forms, Data Queries
- **OCS Maps and GIS Data:** Marine Cadaster (MarineCadastre.gov), GIS Data, Leasing, and Other Maps



Over 28,000 seafloor seismic amplitude anomalies exist in the deep water northern GOM. The purpose of this mapping program is to understand the distribution of natural hydrocarbon seeps and the related benthic fauna (chemosynthetic and coral communities) in the GOM, and to characterize other seafloor features related to the geological framework of the seafloor.

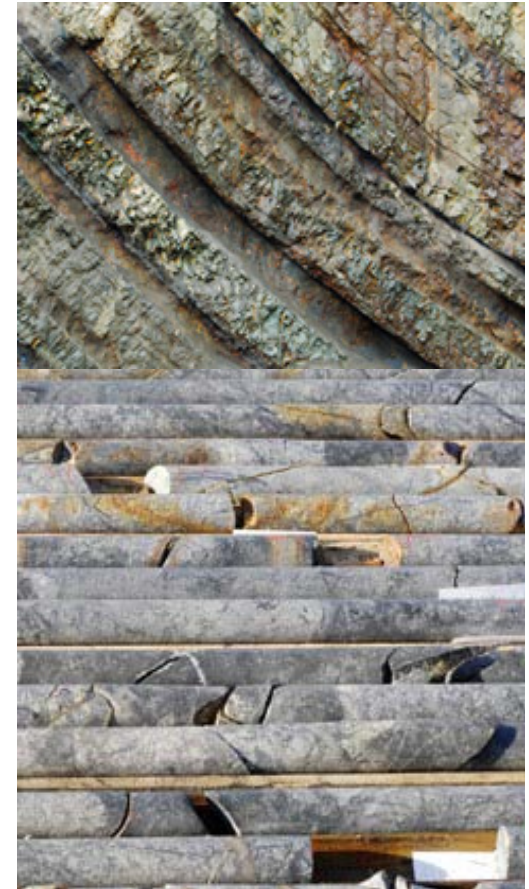
<http://www.boem.gov/Oil-and-Gas-Energy-Program/Resource-Evaluation/Geological-and-Geophysical-Data-Acquisition/Index.aspx>

<http://www.boem.gov/Maps-and-GIS-Data/>

BSEE OCS Geological and Geophysical Data

- **BSEE Data Center:**

- http://www.data.bsee.gov/homepg/data_center/index.asp
 - Field & Reserves
 - Geological and Geophysical Studies
 - Seismic
 - Well: Directional Surveys, Paleontological
 - Production
 - Other: Leasing, Pipeline, Plans and Permits, Platform/Rig, Company

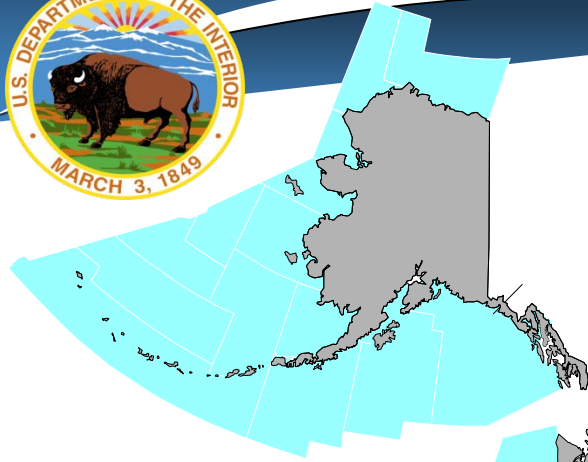


BOEM-BSEE Research Structure

- BOEM conducts research through:
 - Environmental Studies Program (ESP)
 - Oil & Gas, Marine Minerals, Renewable Energy
 - Economic Analyses
- BSEE conducts research through:
 - Technology Research and Assessment (TAR)
 - Oil and Gas Operational Safety and Engineering Research (OSER)
 - Oil Spill Response Research (OSRR)
 - Ohmsett – The National Oil Spill Response and Renewable Energy Test Facility



Outer Continental Shelf (OCS) Planning Areas

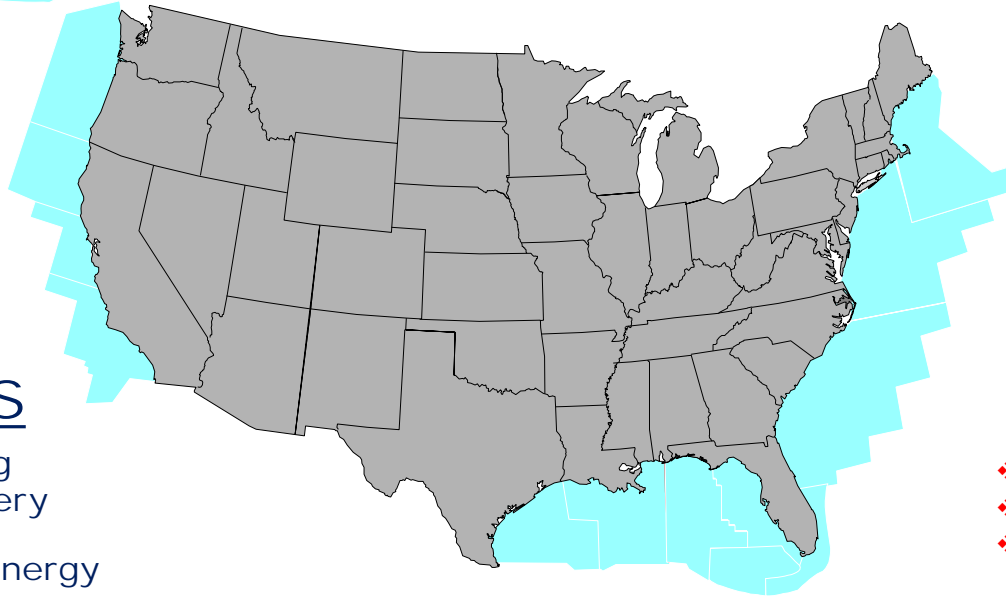


Alaska OCS

- ❖ Arctic Operations
- ❖ G&G Operations
- ❖ Air Quality

Pacific OCS

- ❖ Decommissioning
- ❖ Enhanced Recovery Operations
- ❖ Wind and Wave Energy



Gulf of Mexico OCS

- ❖ Production and Oil Spill Risk
- ❖ G&G Operations
- ❖ Air Quality
- ❖ Marine Minerals

National

- ❖ 5-Year O&G Leasing Program
- ❖ Renewable Energy
- ❖ Marine Minerals
- ❖ OCS Alternate Use
- ❖ CO₂ Storage

Atlantic OCS

- ❖ G&G Operations
- ❖ Wind Energy
- ❖ Marine Minerals – Hurricane Response

BOEM Study Mechanisms

1. Competitive Contracts
2. Cooperative Agreements
3. Inter/Intra-Agency Agreements:
 - Bureau of Safety and Environmental Enforcement (BSEE)
 - U. S. Geological Survey (USGS)
 - U. S. Fish & Wildlife Service (USFWS)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Department of Energy (DOE)
 - Office of Naval Research (ONR)
 - Federal Energy Regulatory Commission (FERC)
 - U. S. Coast Guard (USCG)
 - Smithsonian Institution
4. Sole Source



Smithsonian



<http://www.boem.gov/studies/>

BOEM CO₂-Related Research

- BOEM Costs and Benefits Analysis of CO₂ Sequestration on the OCS
- BOEM OCS CO₂ BMPs Study

BOEM Costs and Benefits Analysis of CO₂ Sequestration on the OCS

- BOEM funded a study on the costs and benefits of CO₂ sequestration on the OCS, which concludes that the most favorable option for offshore CO₂ sequestration would be in the Gulf of Mexico where carbon gases are used for EOR operations.
- The final report, published in Fall 2012, is available at:
http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/External_Studies/OCS%20Sequestration%20Report.pdf

BOEM OCS CO₂ BMPs Study

- **BOEM is conducting research to develop Best Management Practices (BMPs) for CO₂ sub-seabed sequestration on the OCS.**
- **The BMPs will address the following:**
 1. Site Selection and Characterization (data collection, capacity/injectivity assessments, modeling, etc.)
 2. Risk Analysis
 3. Project Planning and Execution (design, construction, operation, and maintenance)
 4. Environmental Monitoring
 5. Mitigation
 6. Inspection and Auditing
 7. Reporting Requirements
 8. Emergency Response and Contingency Planning
 9. Decommissioning and Site Closure
 10. Legal Issues (liability, bonding, long-term stewardship)

Deliverables

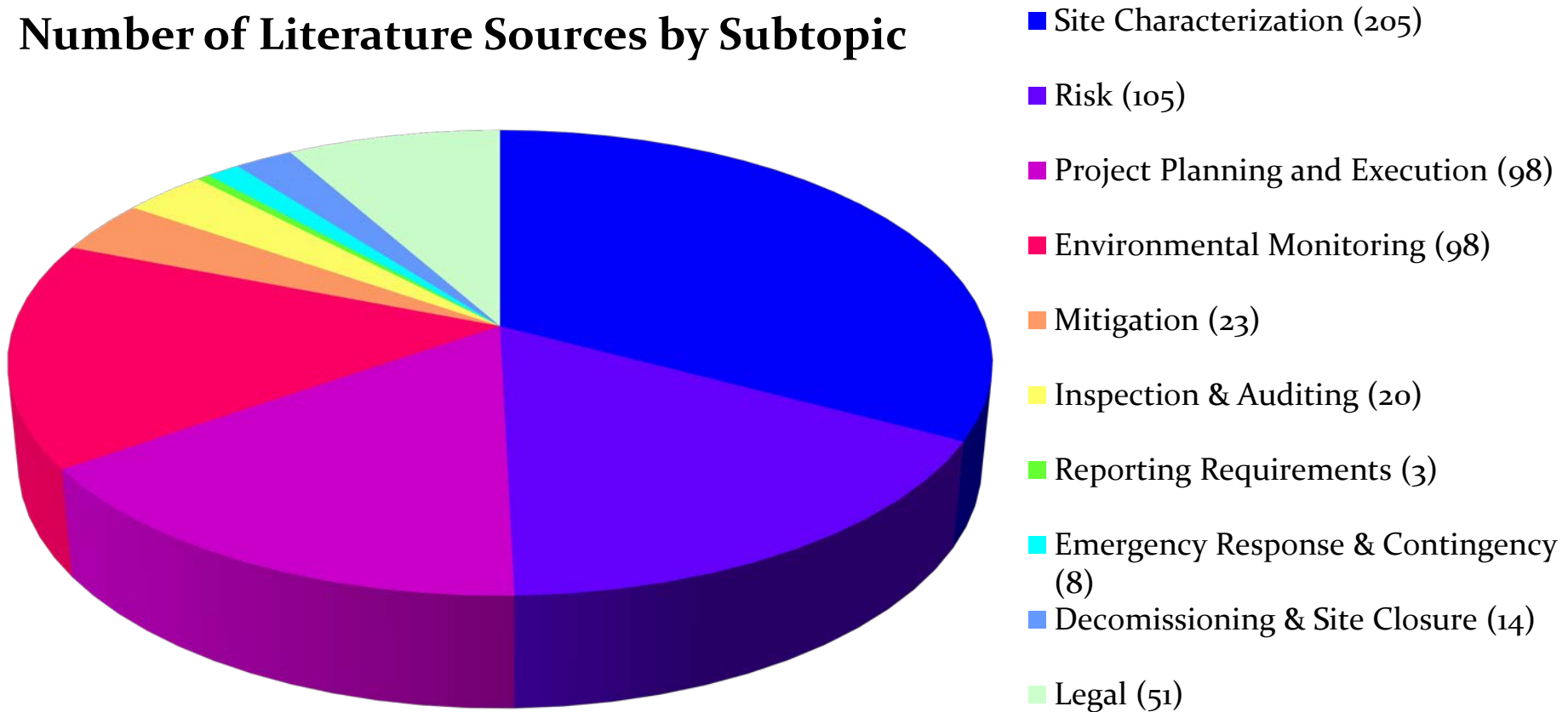
- 1. Worldwide Annotated Literature and Data Survey Database and Summary Report:**
 - Database containing all literature and other materials compiled with annotations
 - Synthesis of the worldwide literature/data survey
- 2. BMPs**
- 3. Data Gaps Analysis Report:**
 - Identify data gaps in the information and practices.
 - Adaptive management framework that includes indicators and criteria for the development of mitigations and the incorporation of new information into the regulatory program where gaps exist.

Deliverables

- **Worldwide Annotated Literature and Data Survey Database and Summary Report:**
 - Draft – Summer 2014 (Currently Under Review)
 - Final – Fall 2014
- **BMPs:**
 - Draft – Fall 2014
 - Final – Spring 2015
- **Data Gaps Analysis Report:**
 - Draft – Fall 2014
 - Final – Spring 2015
- These deliverables will be made available to the public.

Annotated Bibliography Database




Number of Literature Sources by Subtopic



Annotated Bibliography Database

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Bibliographic Fields:

Reference Type: Journal Article
Author: Goldberg, D. S. ; Kent, D. V. ; Olsen, P. E. 
Title: Potential on-shore and off-shore reservoirs for CO2 sequestration in Central Atlantic magmatic province basalts
Year: 2010
Journal: Proceedings of the National Academy of Sciences of the United States of America
Volume: 107
Issue: 4
Pages: 1327-1332

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► Attachments:

Optional Fields:

Abstract: Identifying locations for secure sequestration of CO2 in geological formations is one of our most pressing global scientific problems. Injection into basalt formations provides unique and significant advantages over other potential geological storage options, including large potential storage volumes and permanent fixation of carbon by mineralization. The Central Atlantic Magmatic Province basalt flows along the eastern seaboard of the United States may provide large and secure storage reservoirs both onshore and **offshore**. Sites in the South Georgia basin, the New York Bight basin, and the Sandy Hook basin offer promising basalt-hosted reservoirs with considerable potential for CO2 sequestration due to their proximity to major metropolitan centers, and thus to large industrial sources for CO2. Onshore sites are suggested for cost-effective characterization studies of these reservoirs, although **offshore** sites may offer larger potential capacity and additional long-term advantages for safe and secure CO2 sequestration.

DOI: DOI 10.1073/pnas.0913721107
Date: Jan 26
ISSN: 0027-8424
Accession Number: ISI:000273974600020
Keywords: eastern united states;greenhouse gas;jurassic;lavas;rift;carbon-dioxide;coastal-plain;rift basin;new-york;storage;disposal;beneath
URL: <Go to ISI>://000273974600020 →
Author Address: Kent, DV
Lamont Doherty Earth Observ, 61 Route 9W, Palisades, NY 10964 USA
Lamont Doherty Earth Observ, Palisades, NY 10964 USA
Rutgers State Univ, Piscataway, NJ 08854 USA
Language: English
Notes: 5480Q
Times Cited:0
Cited References Count:43
Added to Library: 20 Jul 2012

Literature/Data Survey Draft Findings

Topic	Finding	Gaps?
Site Selection and Characterization	Many onshore methodologies can be applied to offshore	No Significant Gaps
Risk Analysis	Many similarities exist between risks associated with onshore and offshore CCS. Some aspects of risk may be less in the offshore environment	No Significant Gaps
Project Planning and Execution	Most relevant information for offshore CO ₂ transport and injection operations are associated with North Sea projects and planning done by European Union countries	Significant Knowledge Gaps Exist
Environmental Monitoring	Many onshore monitoring and CO ₂ accounting methodologies could be applicable to offshore settings	Some Knowledge Gaps Exist
Mitigation	Limited references associated with mitigation of offshore CO ₂ injection	Significant Knowledge Gaps Exist

Literature/Data Survey Draft Findings

Topic	Finding	Gaps?
Inspection and Auditing	Limited references specific to inspection and auditing associated with offshore CO ₂ transport and injection	Some Knowledge Gaps Exist
Reporting Requirements	Limited references specific to reporting requirements associated with offshore CO ₂ transport and injection	Significant Knowledge Gaps Exist
Emergency Response and Contingency Planning	Limited references specific to emergency response and contingency planning for offshore CO ₂ transport and injection	Significant Knowledge Gaps Exist
Decommissioning and Site Closure	Existing DOI regulations for decommissioning of offshore O&G facilities and site clearance may translate to offshore CO ₂ transport and injection facilities	Some Knowledge Gaps Exist
Legal Issues	Numerous legal issues regarding offshore injection of CO ₂ such as, long-term liability, ratification of the 1996 London Protocol, etc.	Significant Knowledge Gaps Exist

Questions?

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