

# The Outer Limits of the U.S. Extended Continental Shelf

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CIRES Rendezvous  
5/16/2024

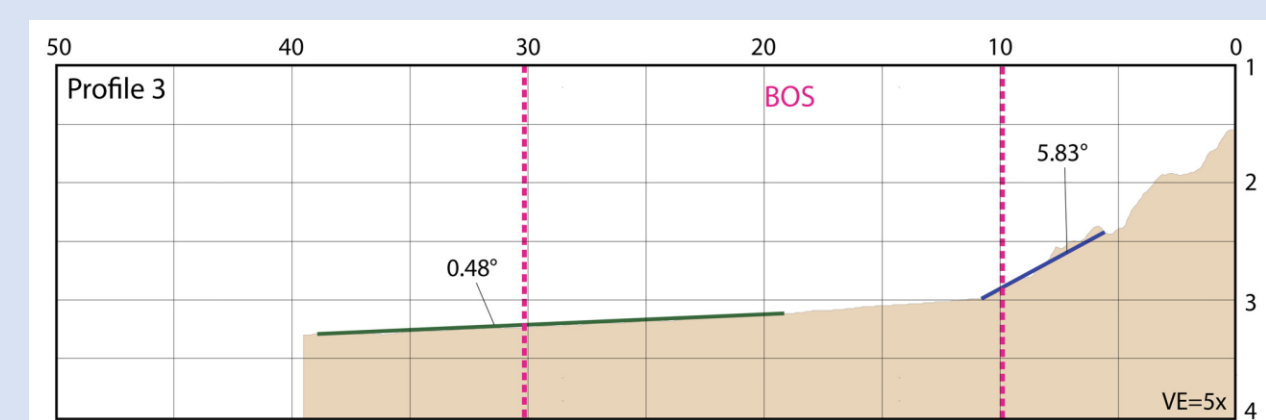
## ECS Announcement

On December 19th, 2023, the United States announced the outer limits of its continental shelf in areas beyond 200 nautical miles from the coast, known as the extended continental shelf (ECS). This was the culmination of a decades-long effort by multiple U.S. agencies — led by the Department of State, NOAA, and USGS — to map, analyze, determine, and document these limits, in accordance with provisions of Article 76 of the UN Convention on the Law of the Sea.

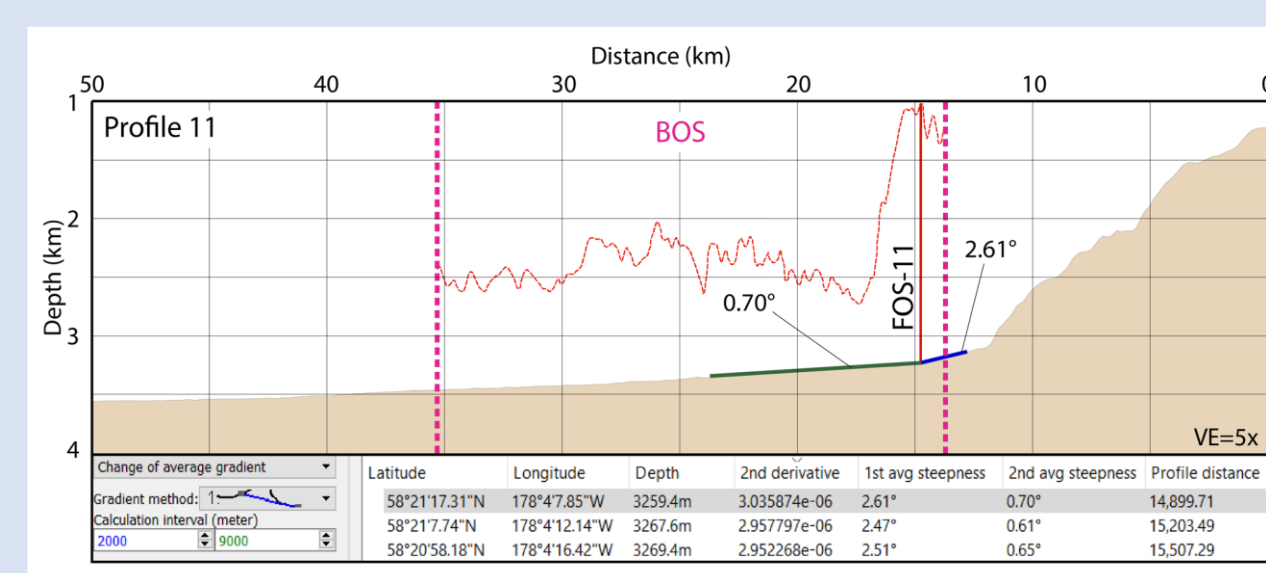
The CIRES team at the ECS Project Office, located at NOAA/NCEI in Boulder, played a significant role in helping to determine these outer limits, including developing and implementing: (i) seafloor analysis procedures, (ii) a systematic approach to map and figure creation, and (iii) the documentation necessary to demonstrate the U.S. ECS outer limits.

## Seafloor Analyses

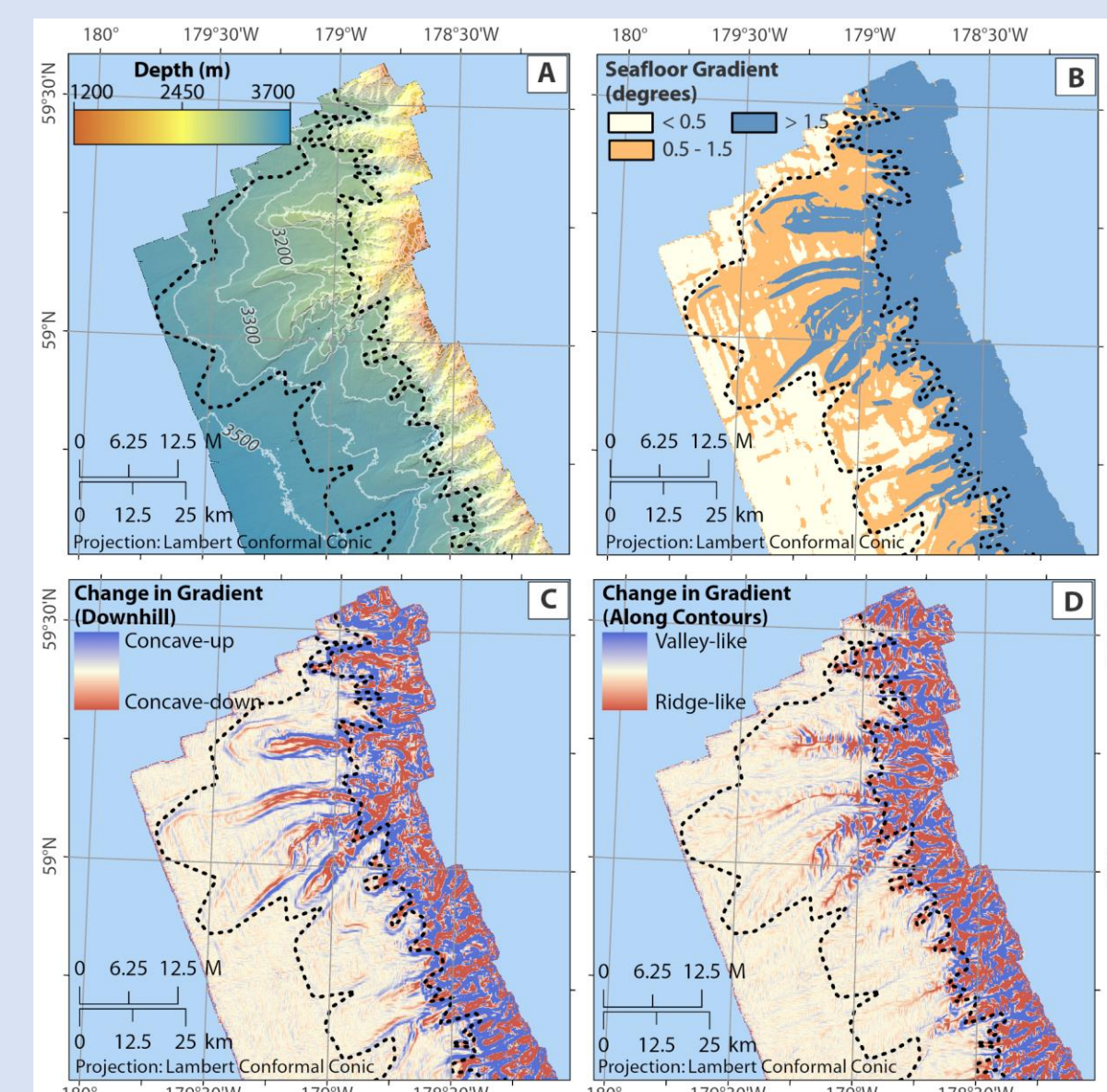
The CIRES team developed a robust method for analyzing and assessing the bathymetry of the continental slope. *Geocap Shelf* software was used for rigorously analyzing the bathymetry and identifying the base of the continental slope (BOS). Further analyses were then done to identify the location of the foot of the slope (FOS) within the BOS. FOS points were then used to calculate and determine the ECS outer limits in each region. Results were exported as shapefiles for use in map and figure generation.



Example Geocap analysis to determine the BOS area



Example FOS analysis showing the maximum change in gradient within the BOS



BOS area in the Bering Sea

## Maps and Figures

We used a systematic approach for map and figure development to ensure consistency in graphics across multiple regional documents. Multiple software packages were used to generate maps and figures, including: ArcGIS Pro (for geospatial maps); Adobe Illustrator (bathymetric and seismic profiles, geologic illustrations), Photoshop (image edits), Acrobat (document drafts for review), and InDesign (final document compilation); and Natural Scene Designer and Fledermaus (bathymetric profiles, perspective views, seafloor shaded relief). We also standardized file names, shapefile attributes, data models, and data schemas. Frequent and thorough reviews of maps and figures inevitably led to numerous iterations.

1000+ maps & figures  
Countless iterations

1. Selecting software
2. GIS data
3. Storyboarding
4. Templates
5. Style guides
6. Editing & review process

### Systematic approach to figure development

- Standardized:
- + Data sources
  - + Base map
  - + Graphic & typographic styles
  - + Layer control
  - + Custom tools
  - + Data queries or scripting

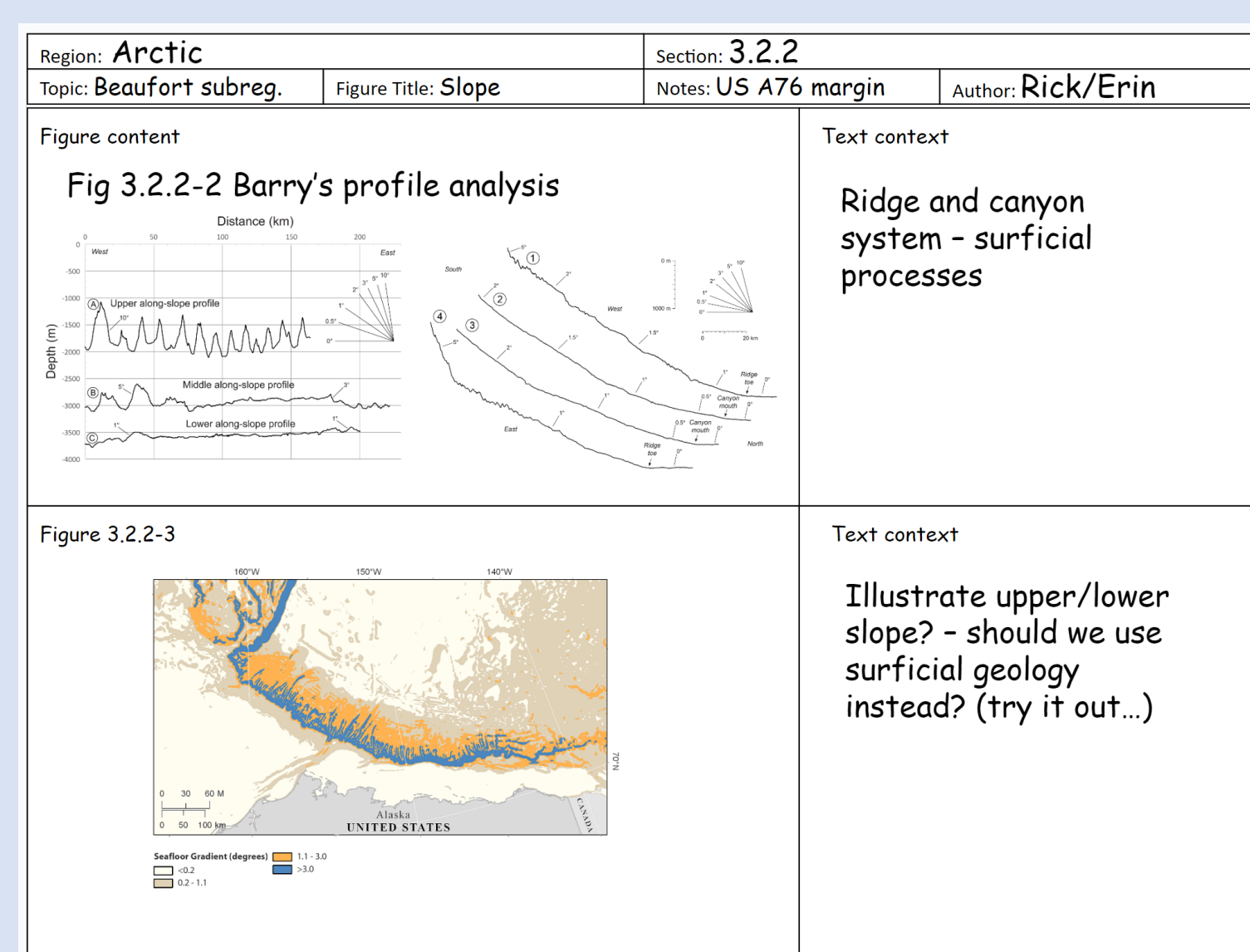
### Project template

- Standardized:
- + Image or page size
  - + Layout & design
  - + Map extent, map scale
  - + Dynamic legends, grid lines
  - + Dynamic labels (when possible)

### Figure template

- Article 76 Points**
- Baseline Point
  - Foot of Slope Point
  - Contributing Foot of Slope Point
  - 60 M Formula Point
  - Sediment Thickness Formula Point
  - Depth Constraint Point
  - Distance Constraint Point
  - Outer Limit Point
- Article 76 Lines**
- Base of the Slope
  - 60 M Formula Line
  - Sediment Thickness Formula Line
  - Outer Edge of the Continental Margin
  - Distance Constraint
  - Depth Constraint
  - Final Constraint Line
  - Outer Limits of the Continental Shelf

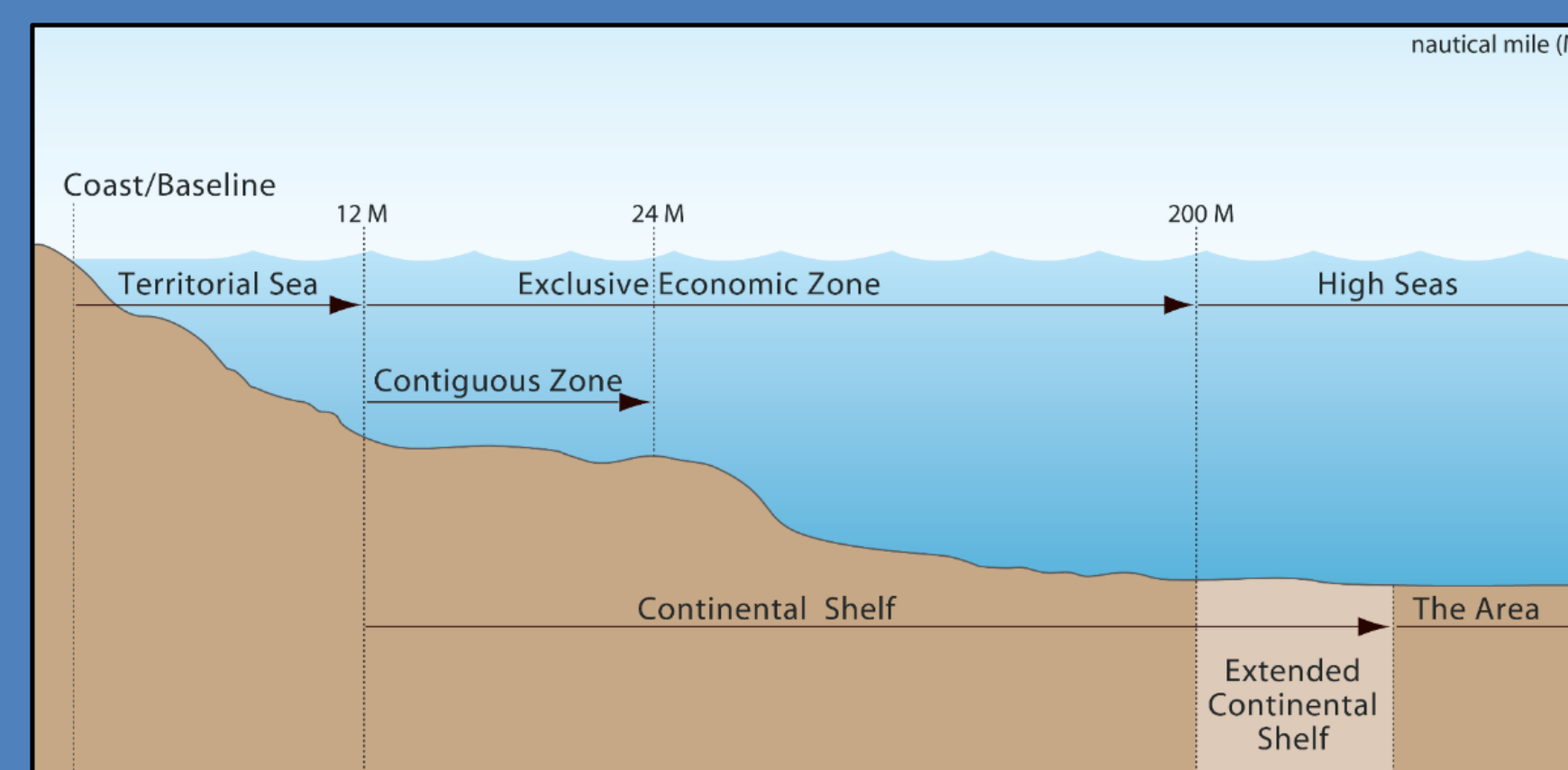
### Consistent map symbology



Storyboard example

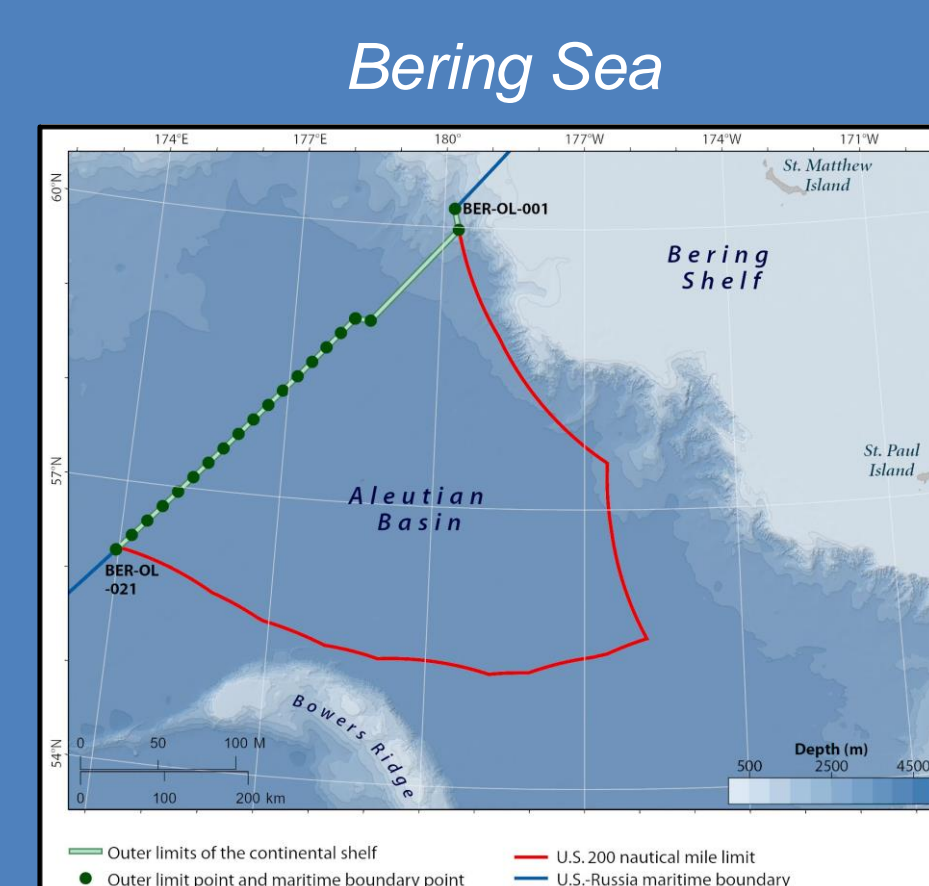
## Main Points

### Maritime zones

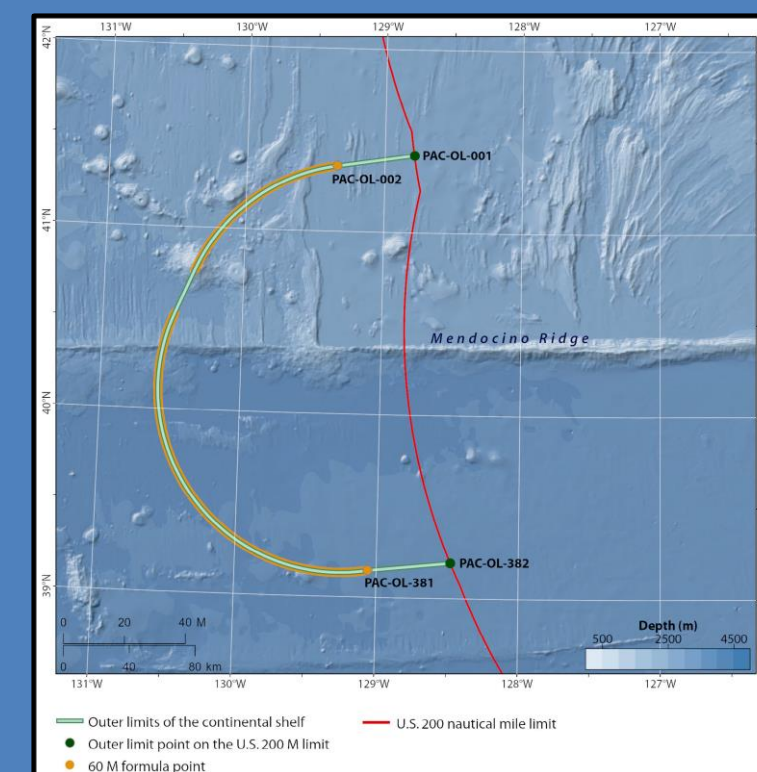


The extended continental shelf, or ECS, refers to that portion of the continental shelf beyond 200 nautical miles from the coast.

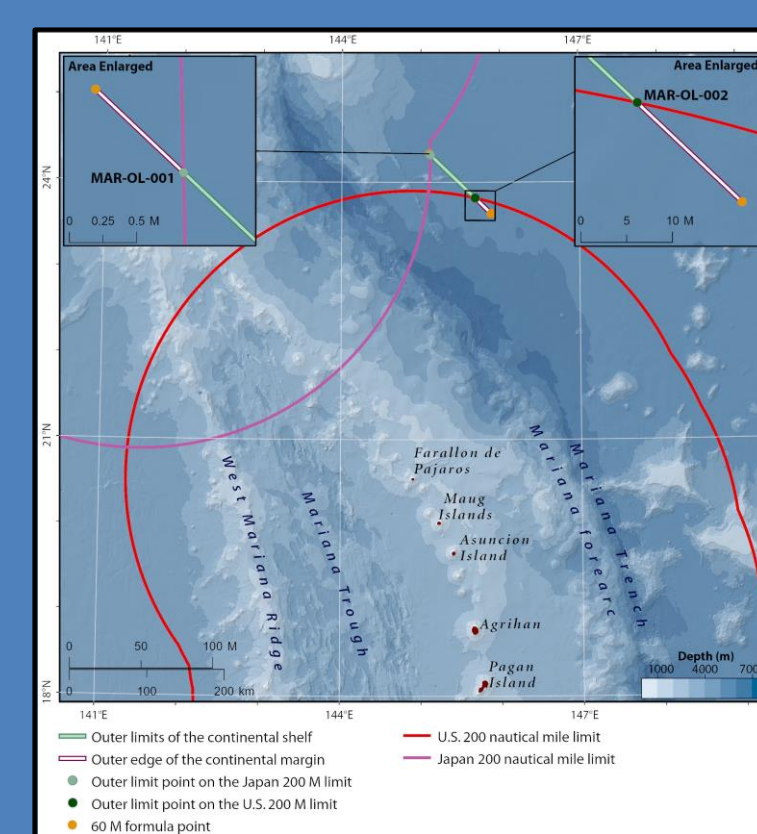
Seven U.S. ECS areas  
Nearly 1 million km<sup>2</sup>



### Pacific



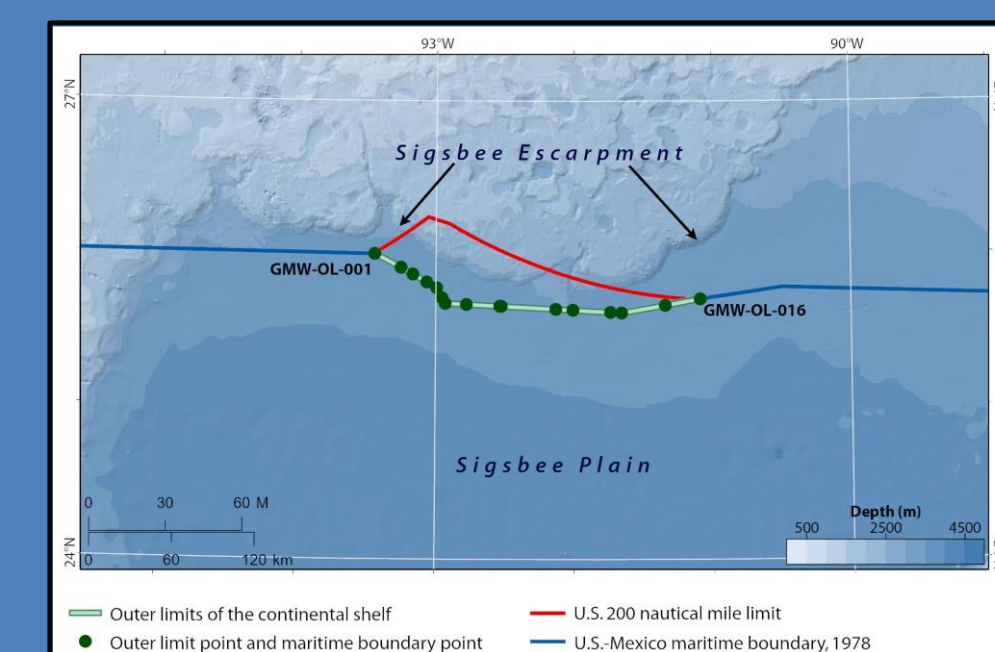
### Mariana Islands



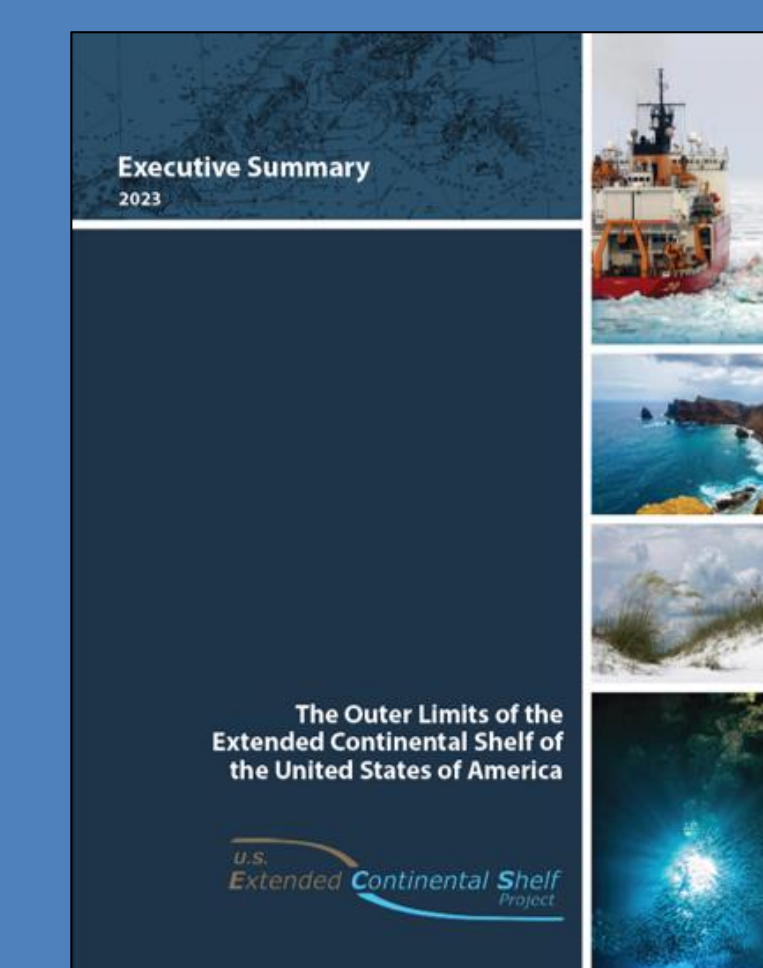
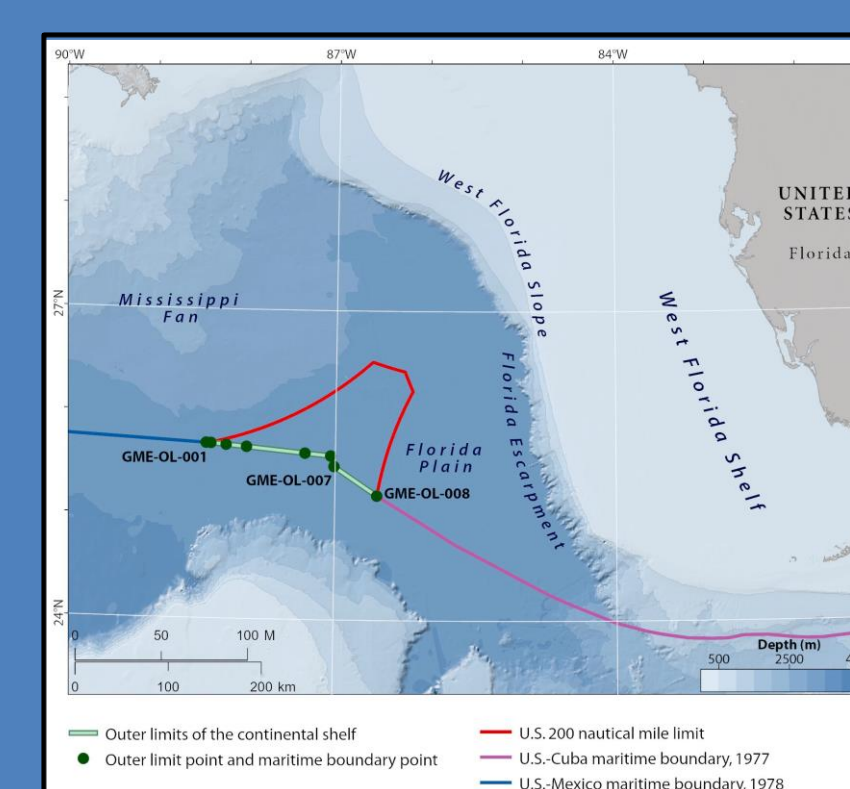
### U.S. ECS Regions



### Western Gulf of Mexico



### Eastern Gulf of Mexico



100 pages  
~1200 outer limit coordinates  
987,700 km<sup>2</sup>  
Summary of each region

### Executive Summary and maps available at

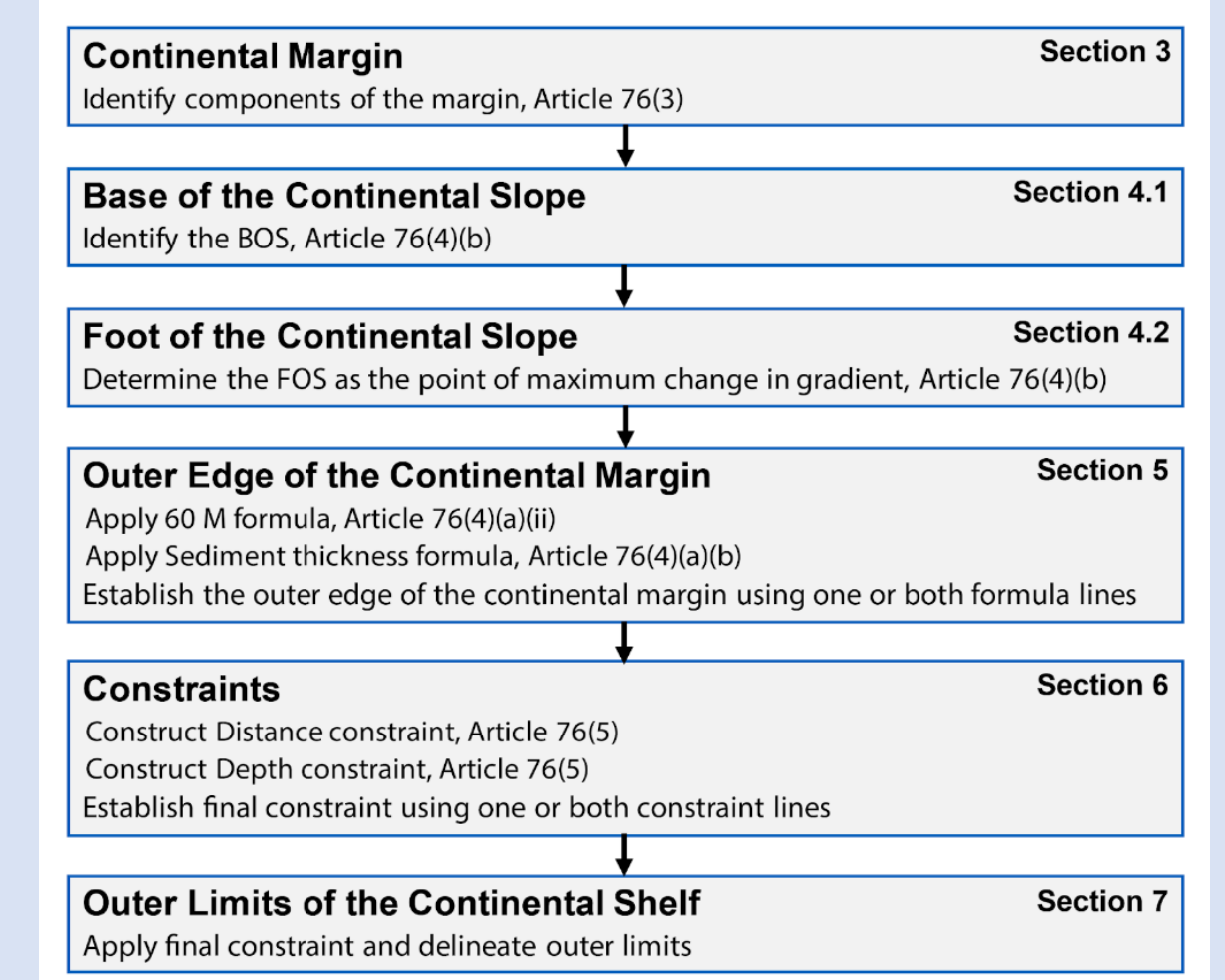
<https://www.state.gov/the-us-ecs/>

Contact: [barry.eakins@noaa.gov](mailto:barry.eakins@noaa.gov)

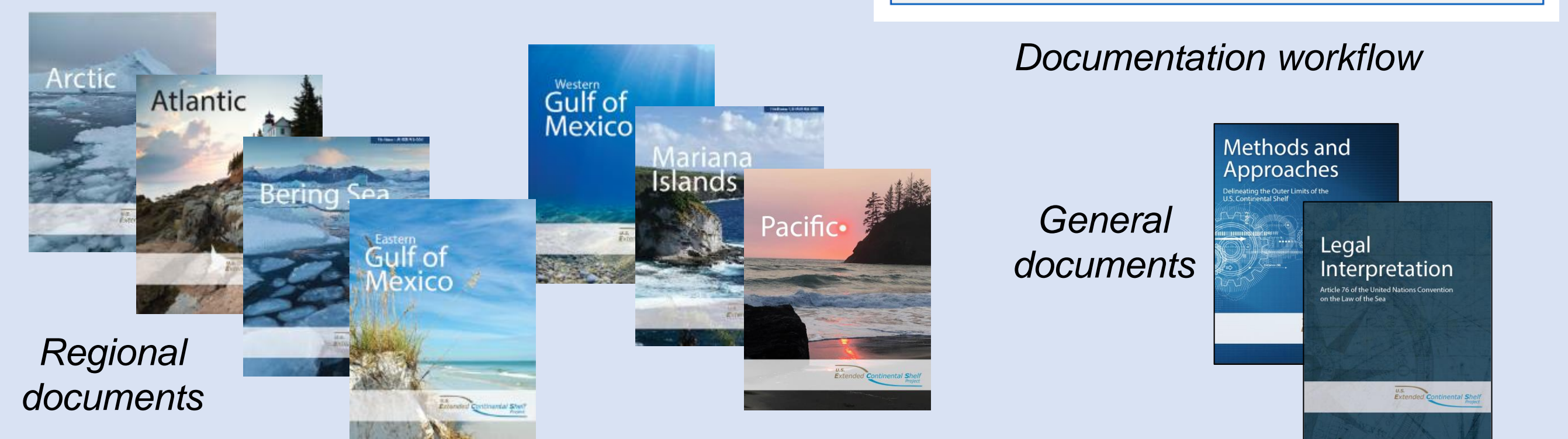
## Documents

The CIRES team, in cooperation with Department of State, NOAA, and USGS colleagues, wrote and reviewed numerous project documents, including embedding of relevant figures that illustrated the descriptive text. They also shepherded many documents through multiple reviews by ECS Project team members and international experts. The regional documents applied a common structure that followed a logical sequence to demonstrate the outer limits.

- Executive Summary (100 pages)
- 7 Regional Documents (1000+ pages)
- 12 Bathy/Seismic Supplemental Analysis Documents
- Legal Interpretation Document
- Methods and Approaches Document
- 39 memos to file describing issues and decisions made
- Media Note, Fact Sheet, Federal Register Notice
- Documents for other areas evaluated

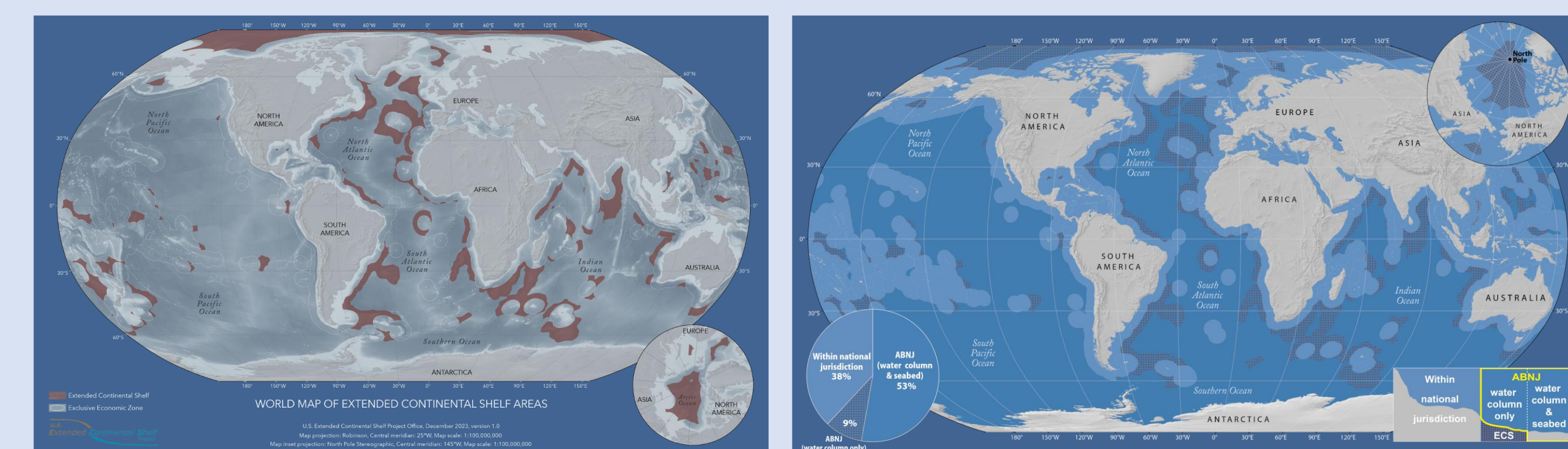


### Documentation workflow



## Global ECS

We developed a global GIS database of ECS outer limits from submissions made to the Commission on the Limits of the Continental Shelf. This included developing a workflow for creating ECS polygons and resolving inconsistencies between source datasets, including shorelines and derived 200 nautical mile limits. This global map of ECS limits allowed us to derive a map of ocean areas beyond national jurisdiction.

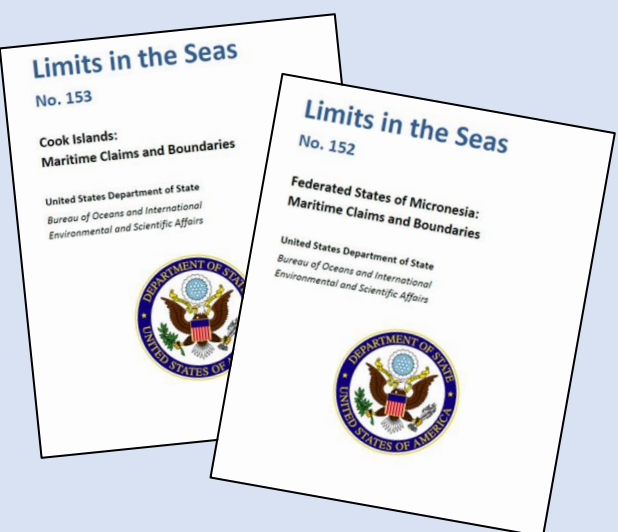


Global ECS limits

Areas beyond national jurisdiction

## Future Work

Future work of the ECS Project Office includes: (i) assessing and documenting published maritime limits and boundaries of coastal States, (ii) technical support to maritime boundary negotiations with U.S. neighbors, and (iii) assessing potential marine protected areas in areas beyond national jurisdiction.



Assessments of maritime limits

## Acknowledgements

Special thanks to Dept. of State colleagues in the ECS Project Office: Brian Van Pay and Kevin Baumert. This research was supported by the NOAA cooperative agreement NA22OAR4320151. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of NOAA, the U.S. Department of Commerce, or the U.S. Department of State.

## Web Resources

United Nations Convention on the Law of the Sea:  
[https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf)  
 Submissions to the Commission on the Limits of the Continental Shelf:  
[https://www.un.org/depts/los/clcs\\_new/commission\\_submissions.htm](https://www.un.org/depts/los/clcs_new/commission_submissions.htm)  
 U.S. Department of State Extended Continental Shelf:  
<https://www.state.gov/shelf>

