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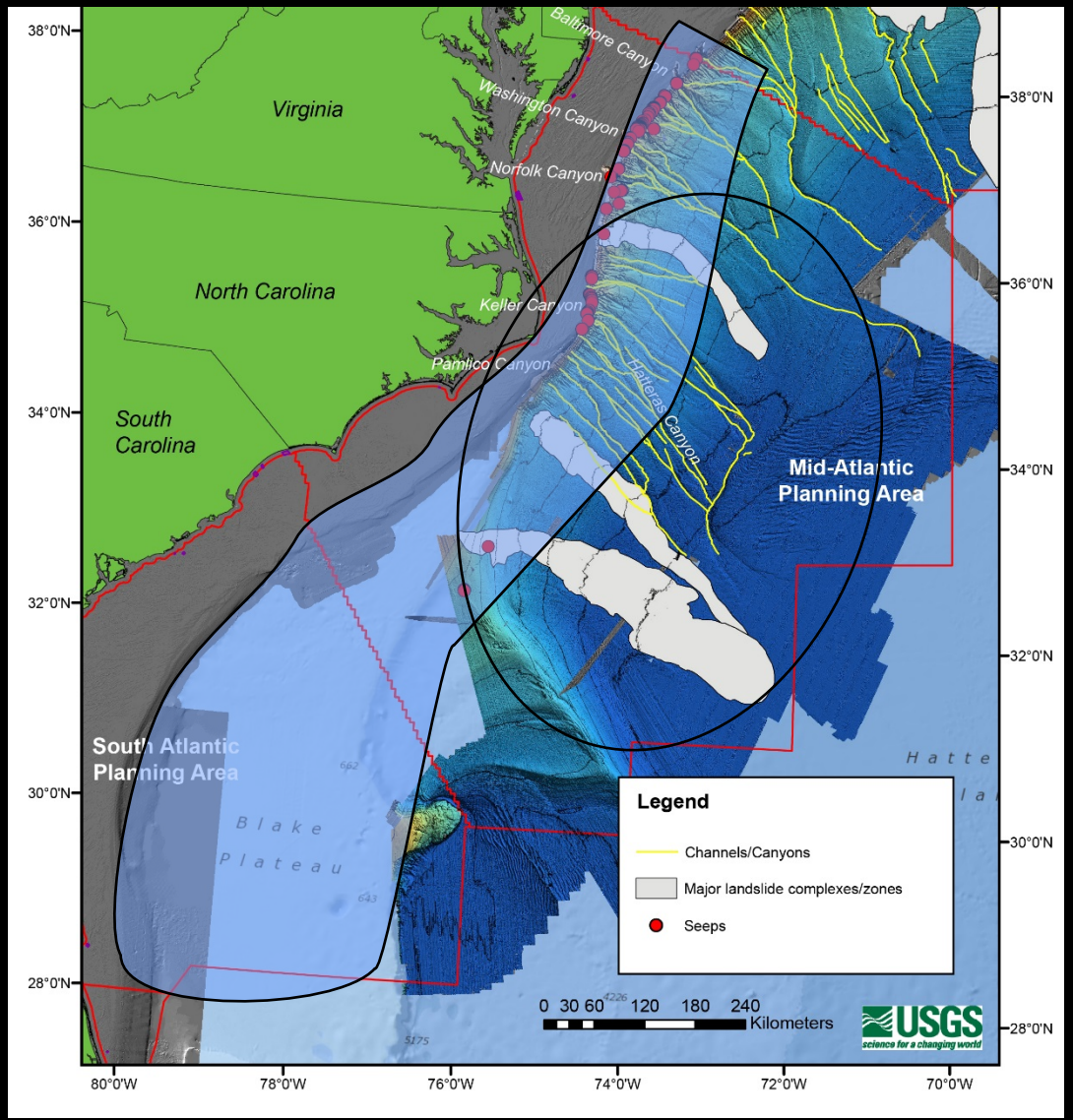
U.S. South Atlantic Bight

Amanda Demopoulos
USGS Wetland and Aquatic Research Center, Gainesville, FL

U.S. Department of the Interior
U.S. Geological Survey

Geologically and Ecologically Complex Region



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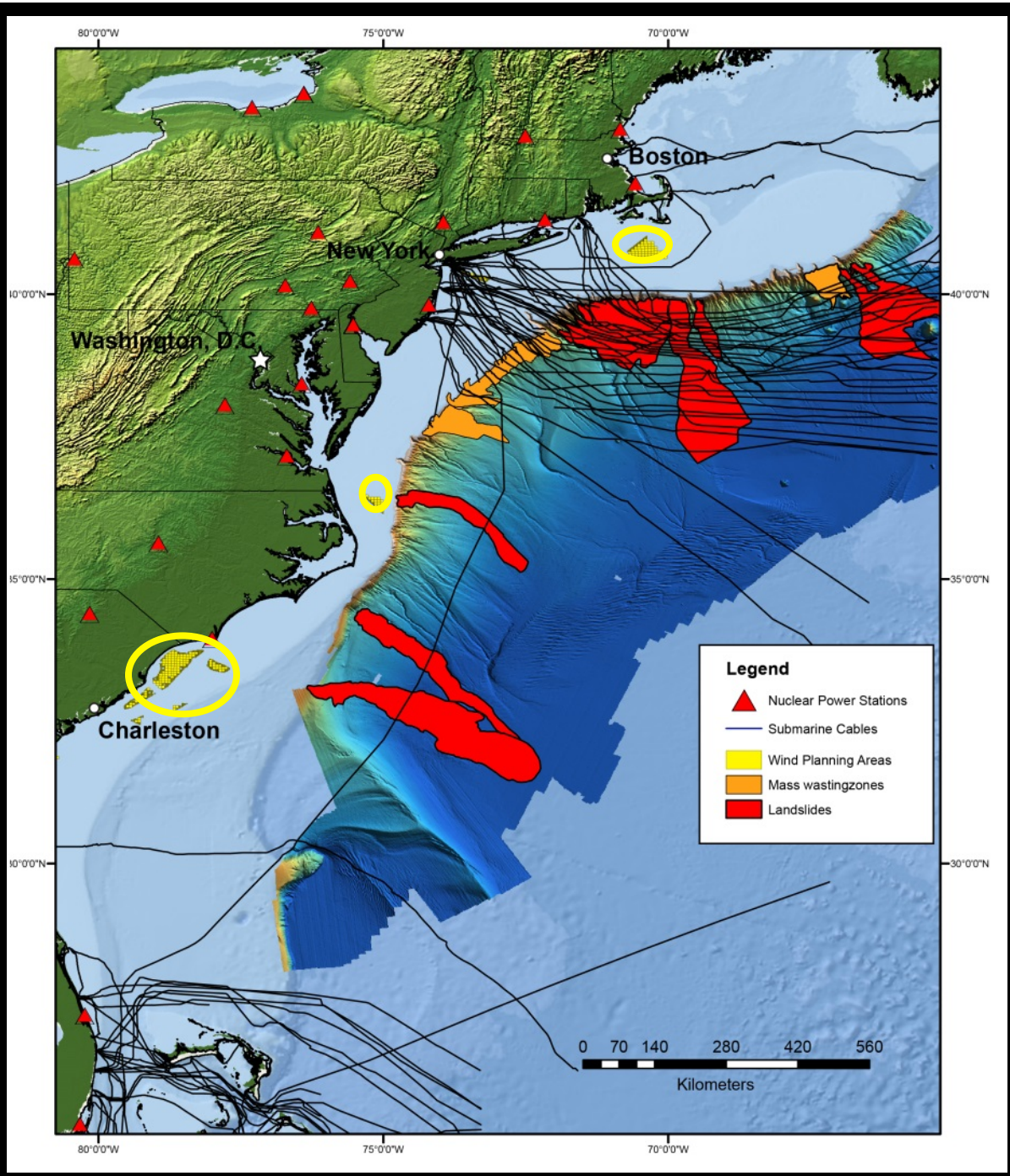
Submarine Landslide Hazards

- Multiple landslides historically
- Triggers include earthquakes, storms, changes in sediment strength etc.
- Direct impact on near-coast and seafloor infrastructure (e.g., power plants, wells, pipelines, rigs, submarine cables, wind farms, ports)



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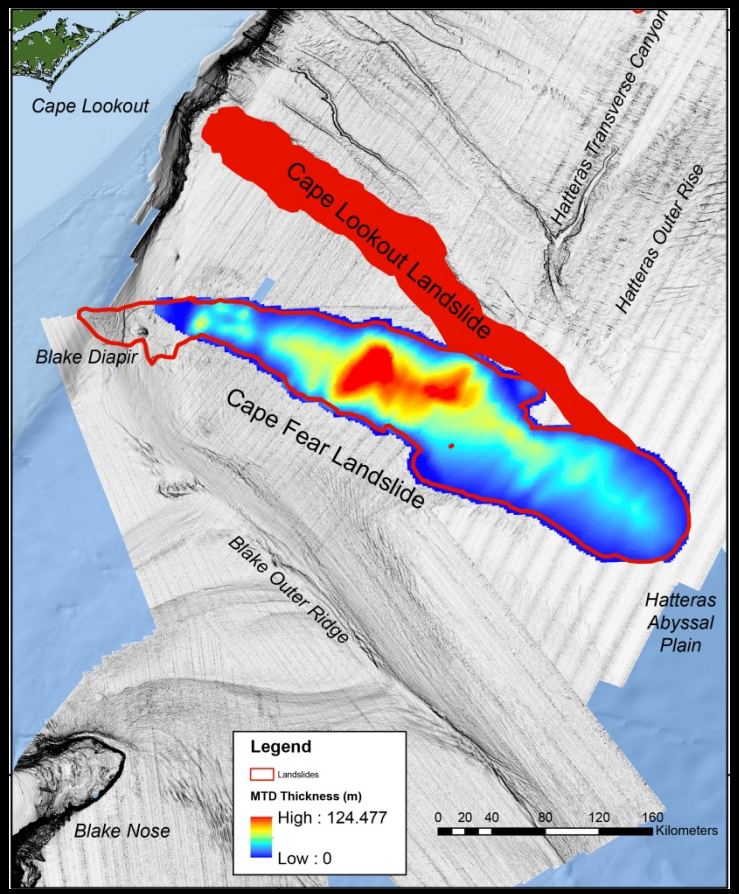
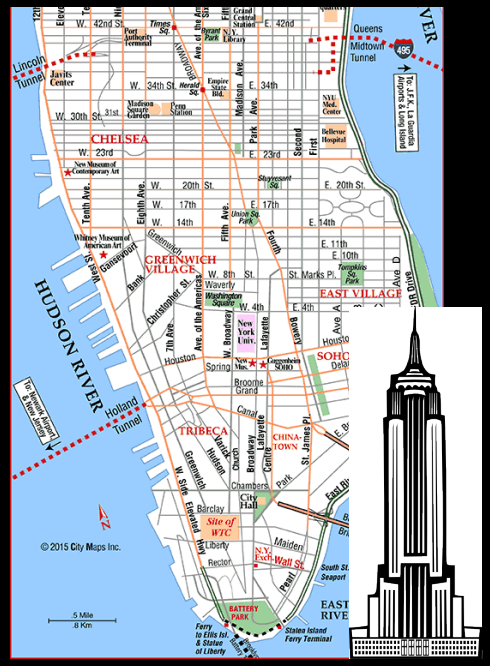
How Big are Submarine Landslides?

Case Study: Cape Fear Landslide



CFS Area = ~ 23,000 km^2
CFS MTD Volume = ~ 600 km^3

- More post-failure data needed to help constrain tsunami models (e.g., visual observations)
- Better resolved dates for the events



Manhattan: 59 km^2
Empire State Building: 381 m

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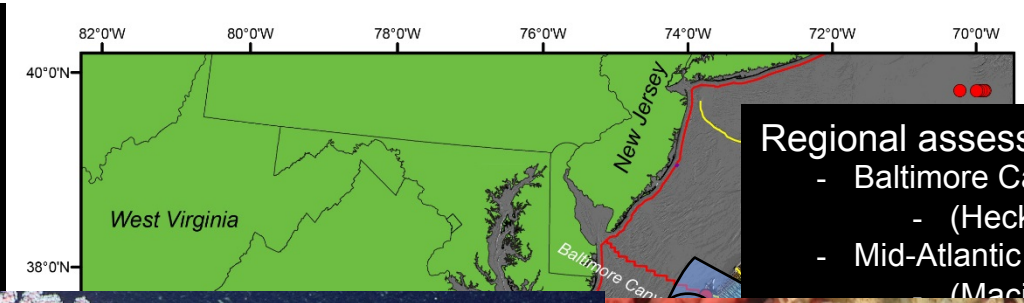

Regional assessments
- Baltimore Canyon
  - (Hecker et al. 1983)
- Mid-Atlantic Slope and Rise
  - (Maciolek et al. 1987)

- 2011-2015-BOEM/USGS/NOAA examined Baltimore and Norfolk Canyons and slopes in detail
- Additional work by Nizinski et al. in the NE and Mid Atlantic canyons
- Complex communities of fishes, corals, other invertebrates and associated food webs (Quattrini et al. 2015; Ross et al., 2015; Brooke et al. 2016; Demopoulos et al. 2016)
- Many questions remain regarding connectivity and controls on species distribution throughout the region beyond these two canyons (e.g., Morrison et al. 2016)

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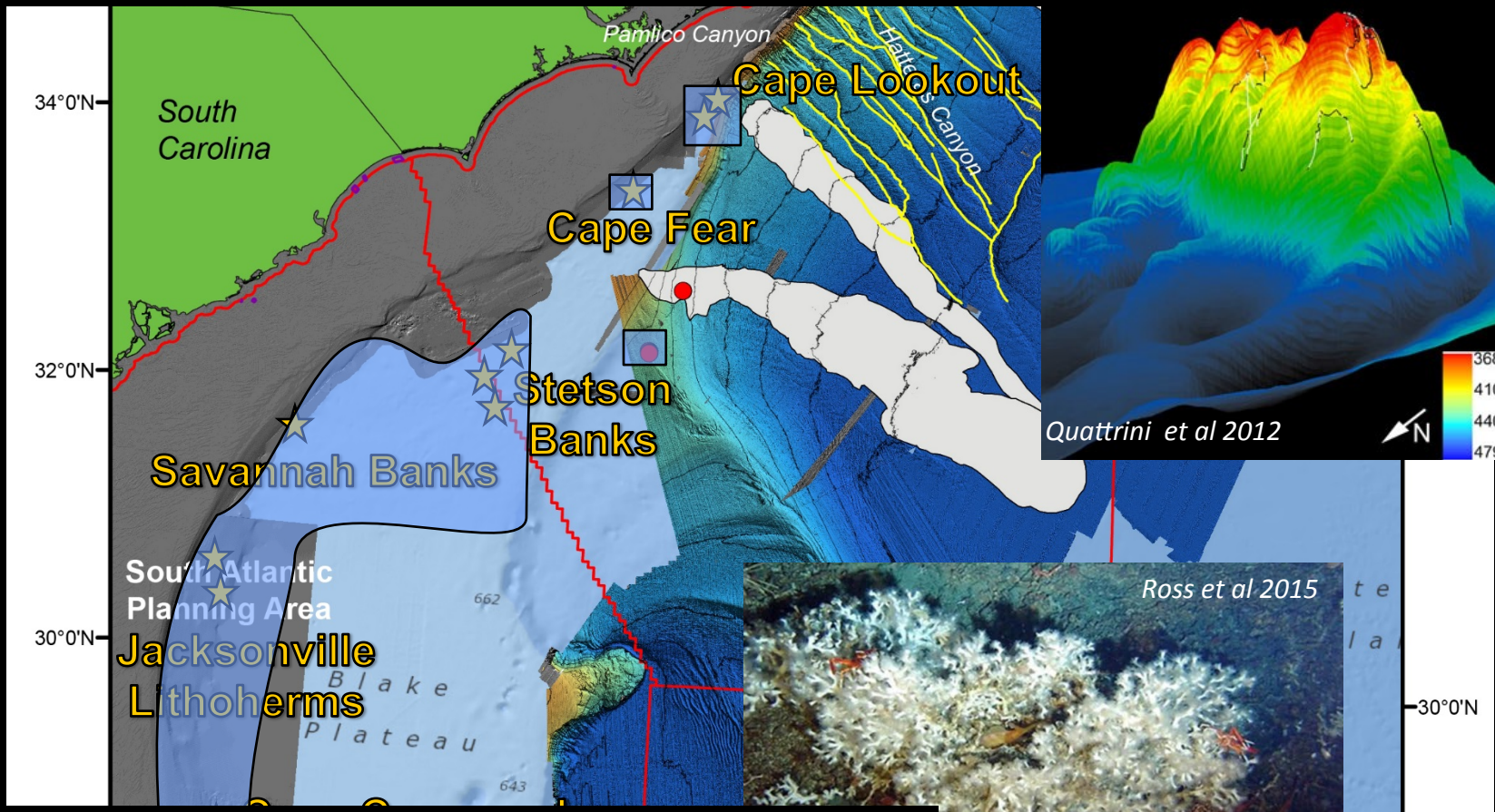
Other Known Deep-sea Coral Habitats



- HAPC protection
- Limited multibeam bathymetry, hampering habitat suitability models
- Overall connectivity among areas unknown (ex. *L. pertusa*, Morrison et al. 2011)

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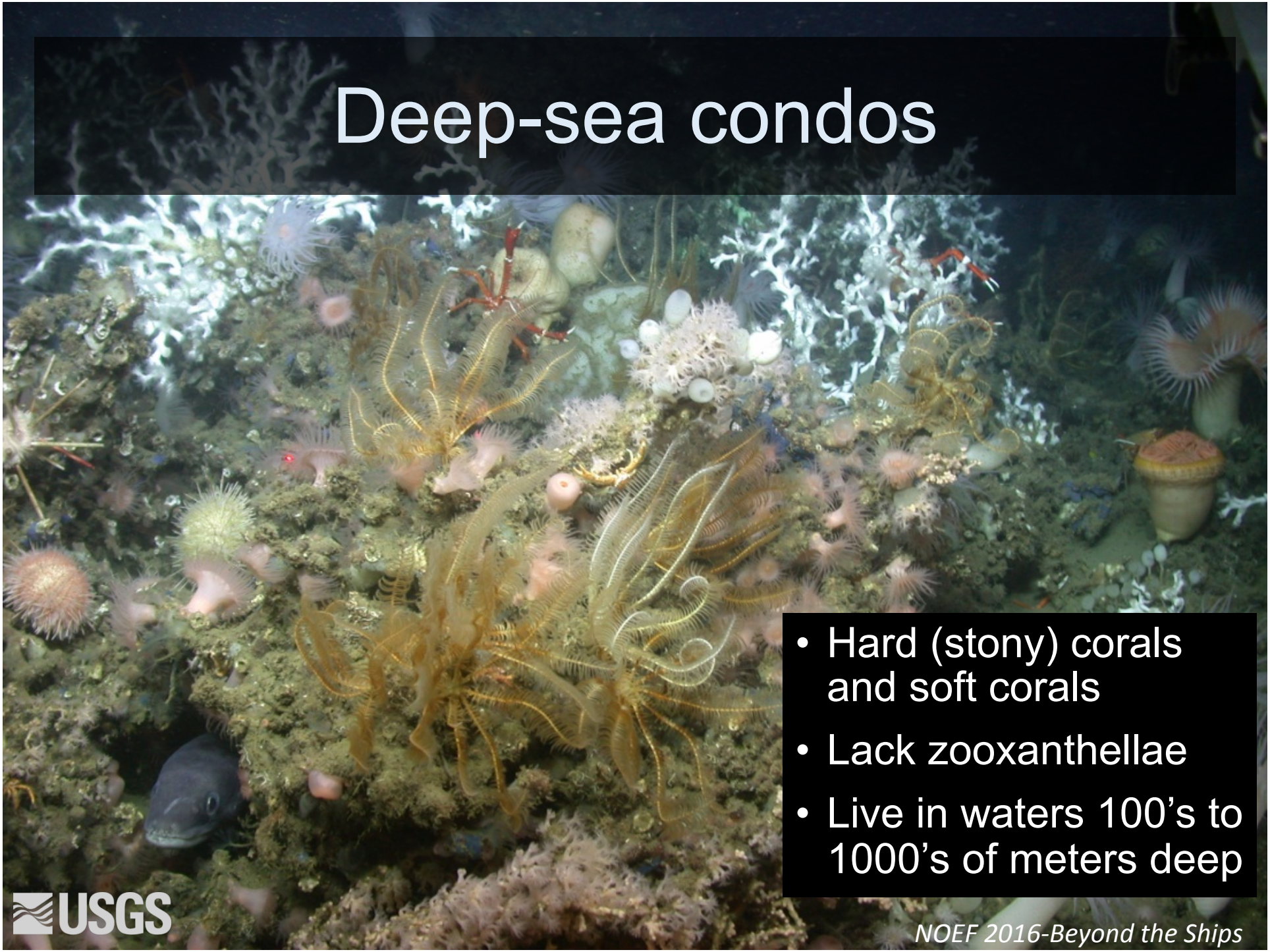
Deep-sea condos



- Hard (stony) corals and soft corals
- Lack zooxanthellae
- Live in waters 100's to 1000's of meters deep

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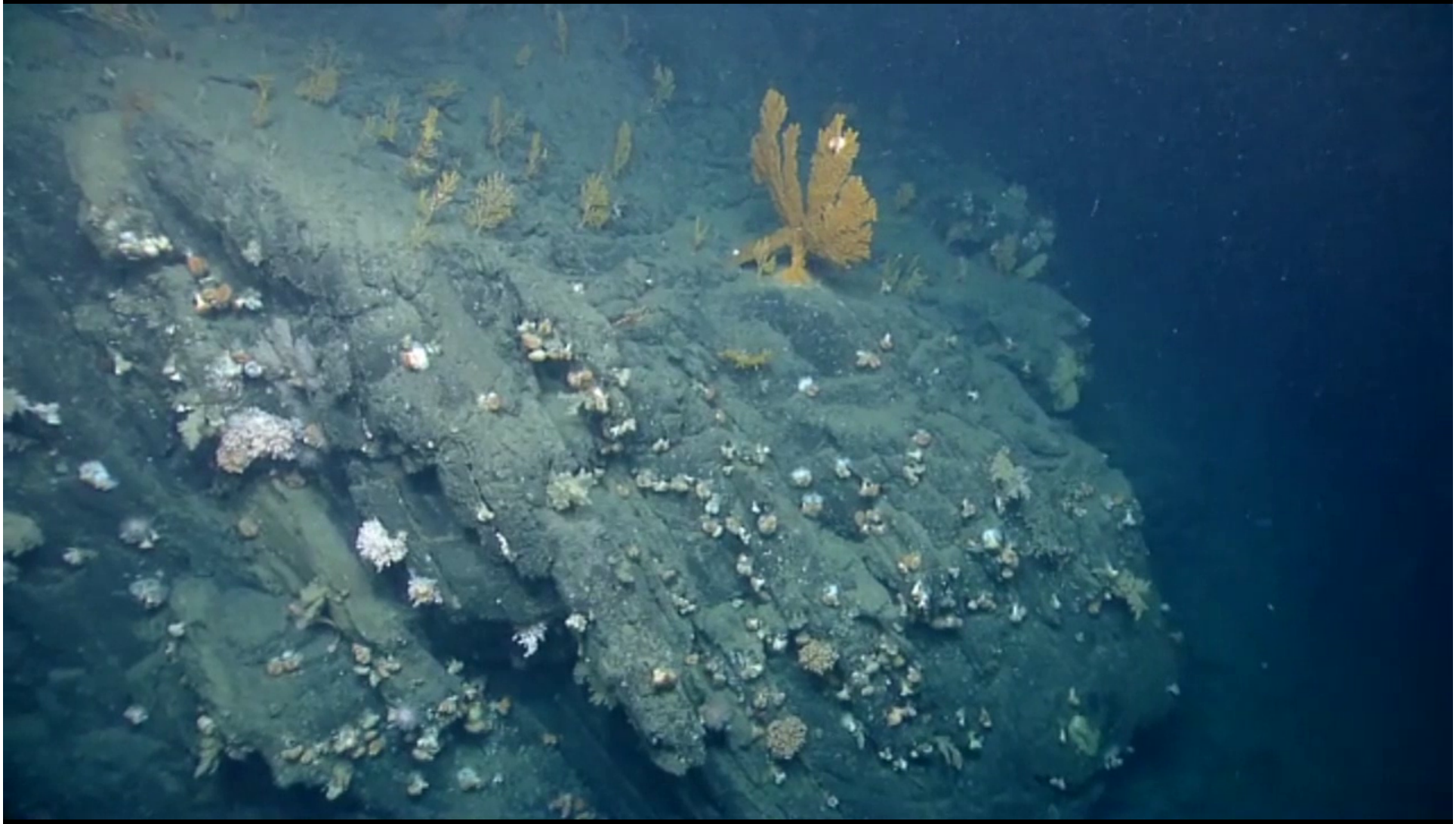
Strong links between geology and ecology



Coral ages-Prouty et al. 2015

USGS OCEAN EXPLORATION & RESEARCH

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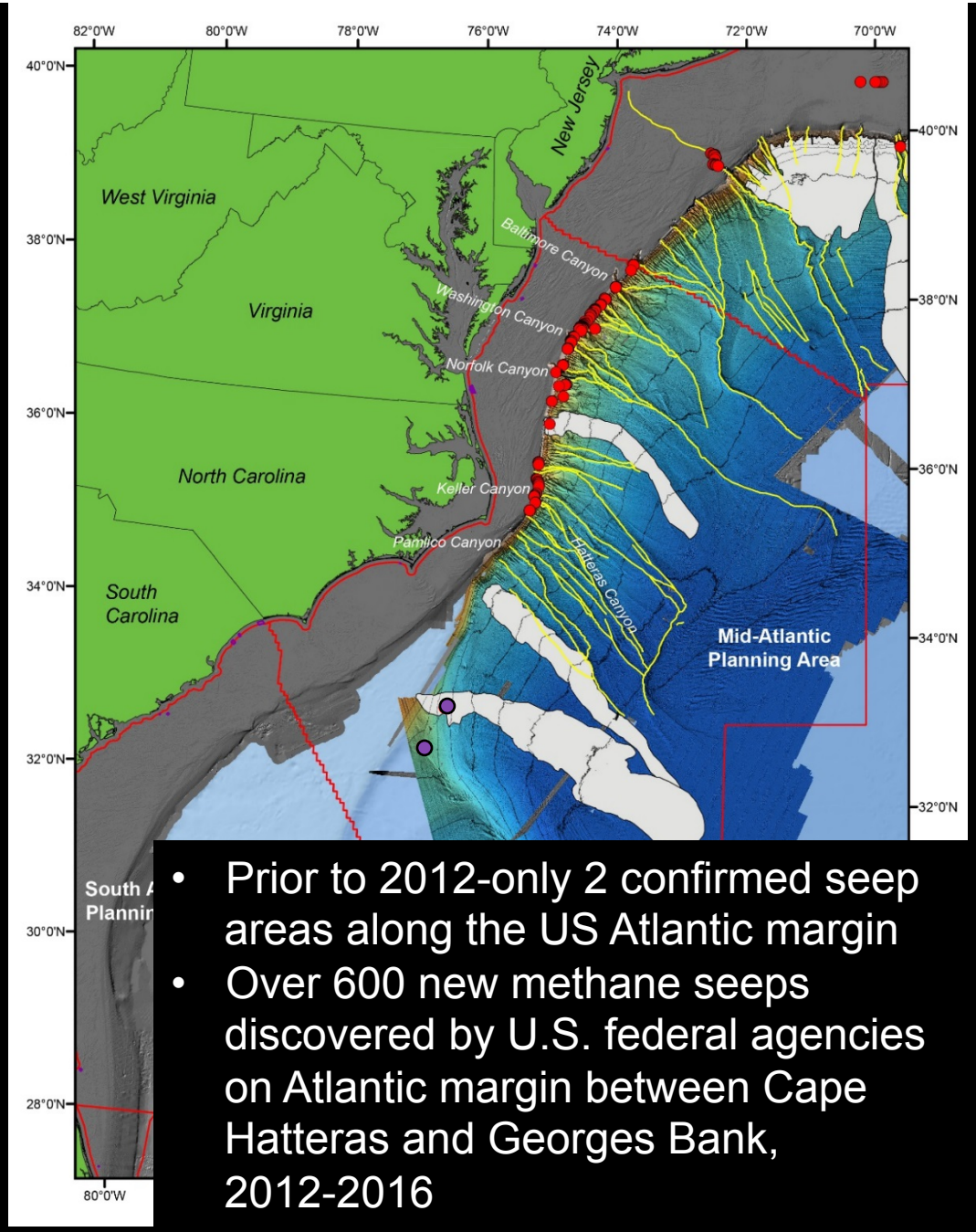
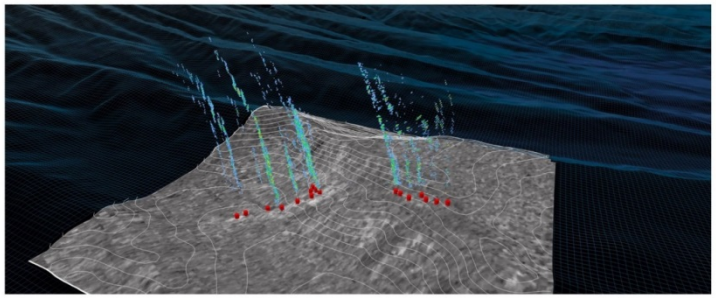
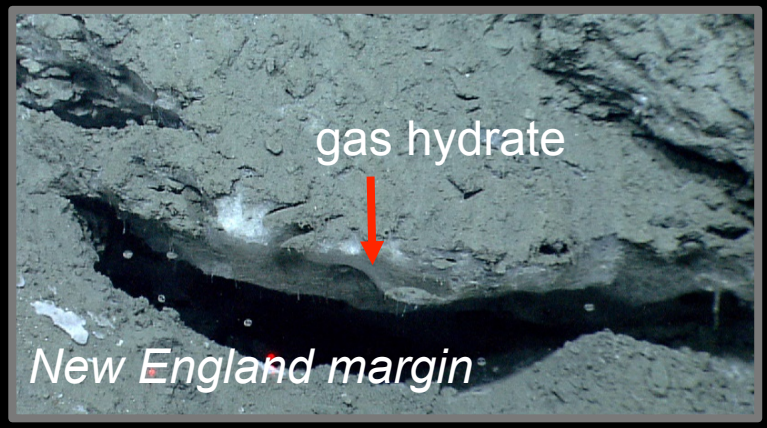
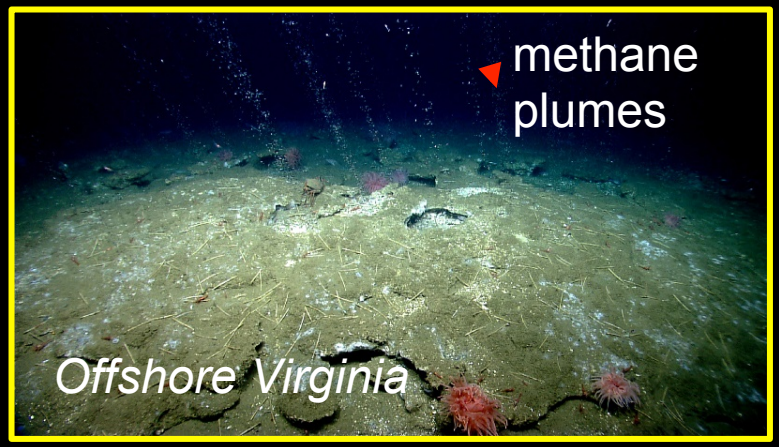






Images Courtesy of NOAA Office of Exploration and Research

- Prior to 2012-only 2 confirmed seep areas along the US Atlantic margin
- Over 600 new methane seeps discovered by U.S. federal agencies on Atlantic margin between Cape Hatteras and Georges Bank, 2012-2016



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Van Dover et al., 2003; Brothers et al. 2013; Skarke et al, 2014; Bourque et al.,2016; Prouty et al. , 2016

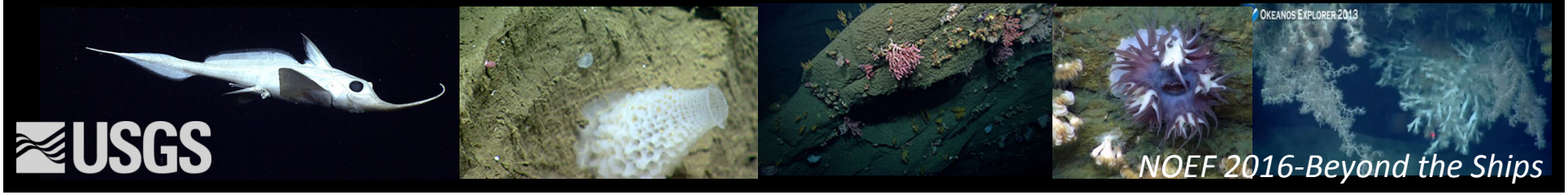
New seep communities discovered

Undersea plumbing may connect seep environments-possible stepping stones
Extensive seeps may play important, unquantified role in methane and carbon cycling

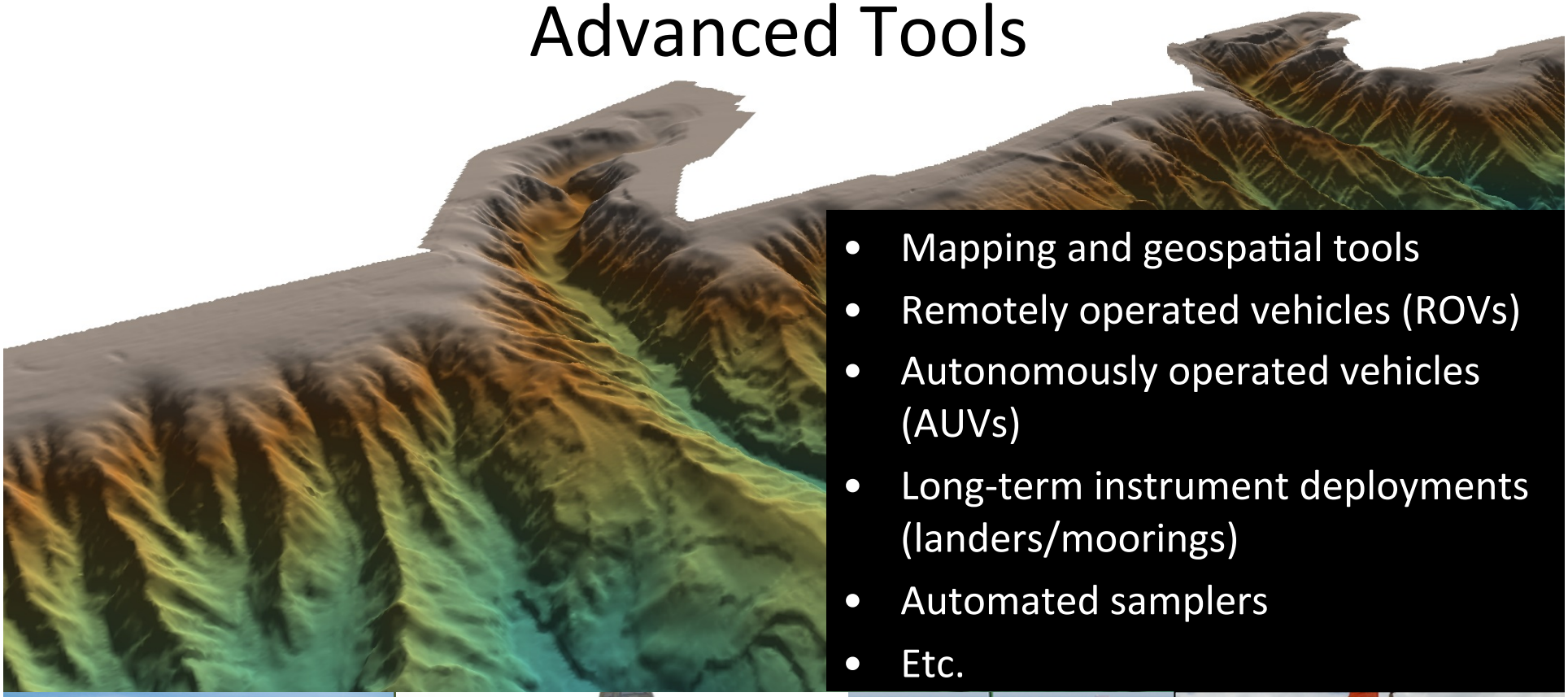
NOEF 2016-Beyond the Ships

South Atlantic Bight Campaign

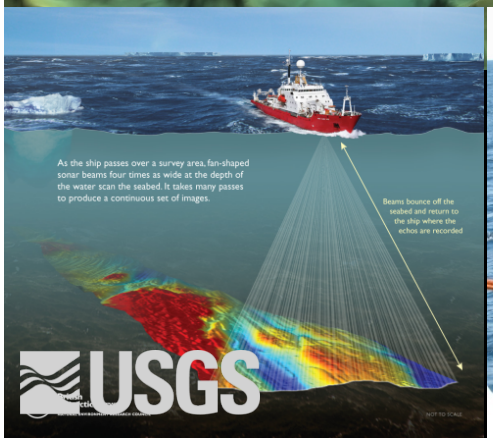
- Led by NOAA, BOEM, USGS-FY16-20
  - Examine geomorphology, slope failure, and geological processes
    - Mapping, coring, subbottom profiling
  - Characterize faunal communities and food webs
    - Video, imaging: ground-truthing geology & biology
    - Sample collections for species identifications, genetics
    - Age and growth of deep-sea corals
  - Genetics and genomics
    - Species identification, connectivity, presence/absence
- Continued partnering!

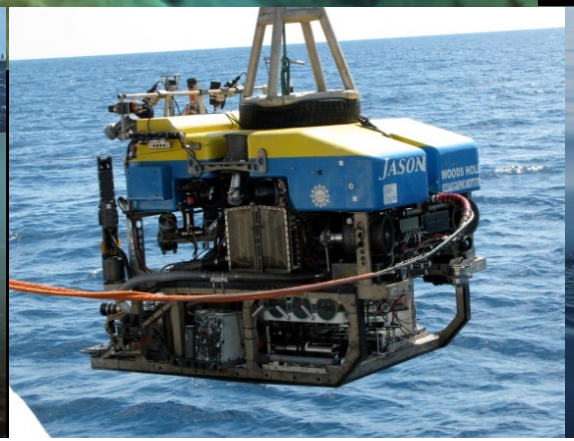


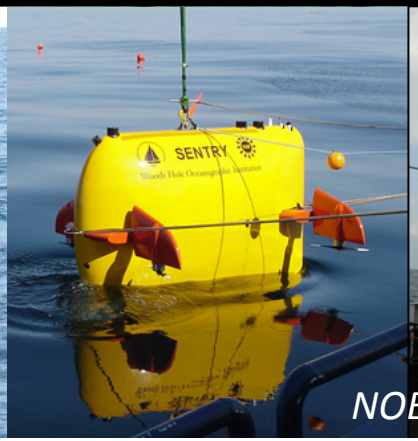
Exploring South Atlantic Bight Requires Advanced Tools



- Mapping and geospatial tools
- Remotely operated vehicles (ROVs)
- Autonomously operated vehicles (AUVs)
- Long-term instrument deployments (landers/moorings)
- Automated samplers
- Etc.







USGS Partnerships Run Deep

USGS Funding: Environments, Coastal and Marine Coastal and Marine Geology, Climate and Land Use, Earthquake Hazards, Energy Resources, and other programs

Academic, Public and Industrial Partners

UNCW, FSU, LSU, OIMB , Penn State, Temple, CCU, LDEO, TAMU, UA, WHOI, URI, UNH, MBARI, SIO, NC Museum of Natural Resources, C&C Technology, TDI Brooks, CSA

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International collaborators

Natural Resources Canada-GSC
Royal Netherlands Inst for Sea Research
Scottish Assoc for Marine Science
Heriot-Watt University
University of Bangor
British Geological Survey
University of Haifa

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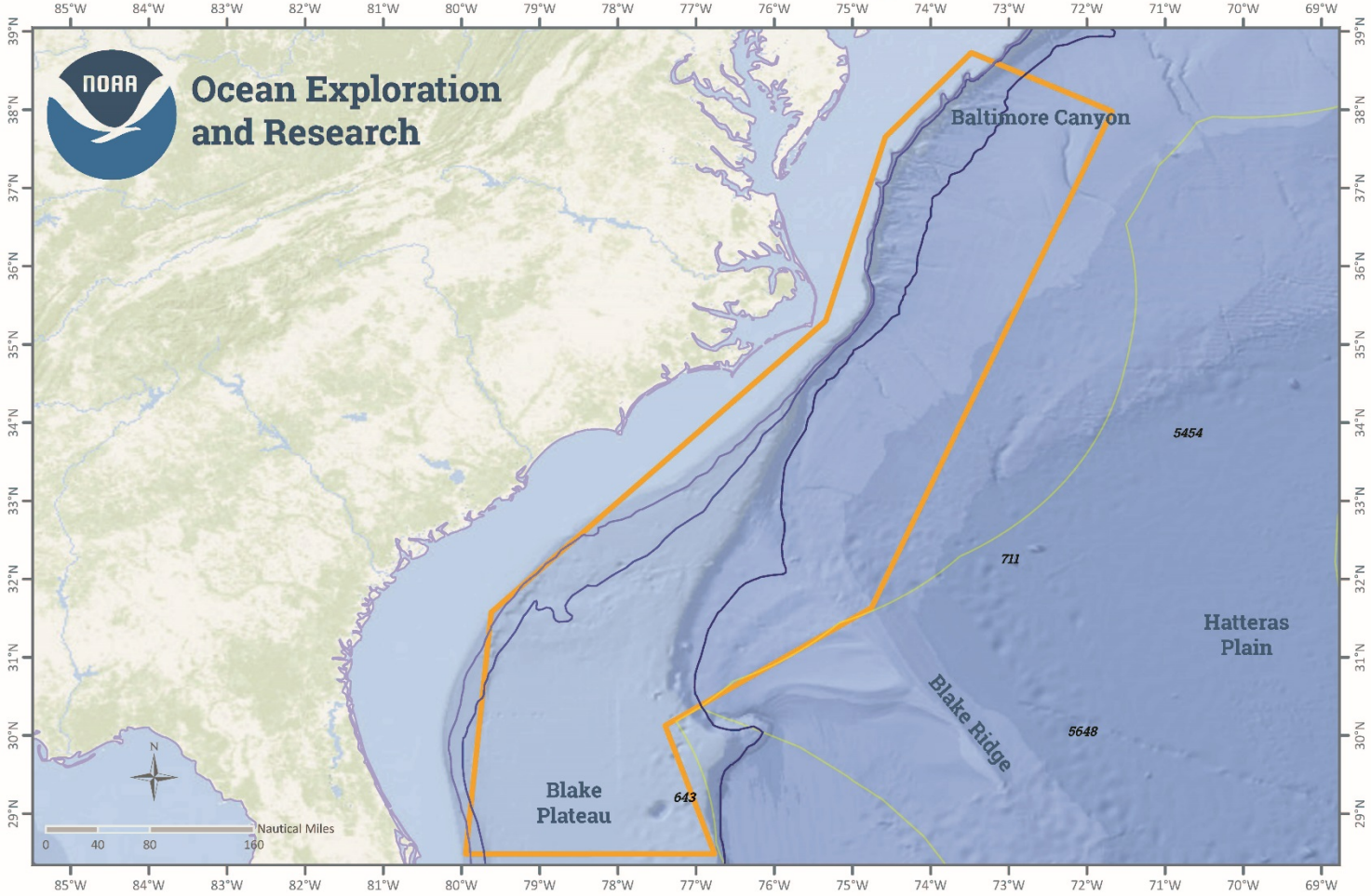
National Ocean Exploration Forum 2016
Southeast U.S. Coast Bight



EEZ Boundaries
Area of interest

200 m
500 m
1000 m
2500 m

Prepared by the NOAA Office of Ocean Exploration and Research for "Nation Ocean Exploration Forum 2016: Beyond the Ships."

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors

Themes of Interest

- Bathymetry
- Deep Sea Coral
- Reef Die-Off
- Genetic Interconnectivity
- Water Column Characteristics
- Fish Distribution
- Submerged Cultural Resources
- Sanctuary Borders & Resources
- Chemosynthetic Communities
- Submarine Landslides
- Acoustics

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