Southeastern USA to Bermuda

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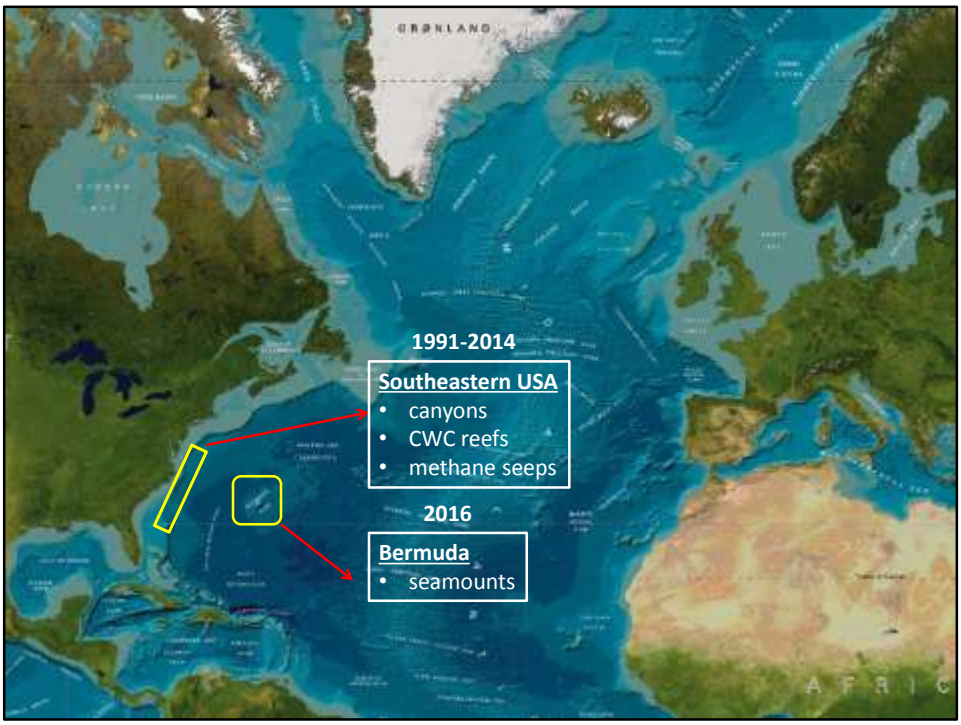
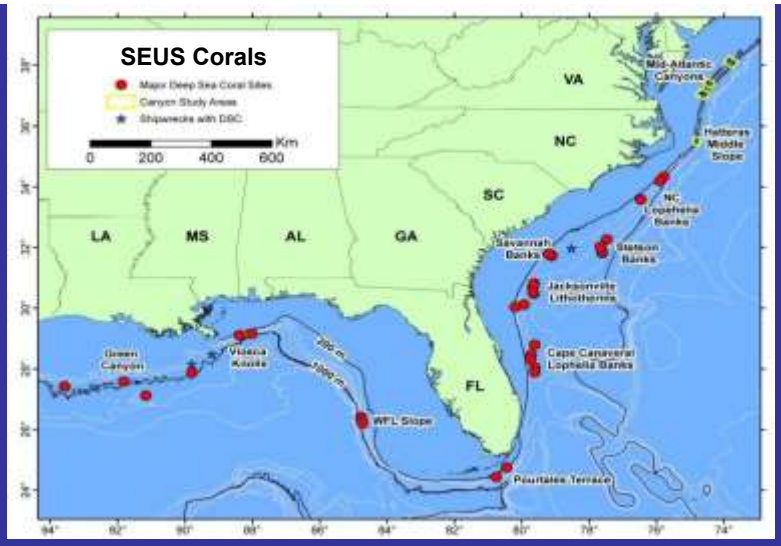
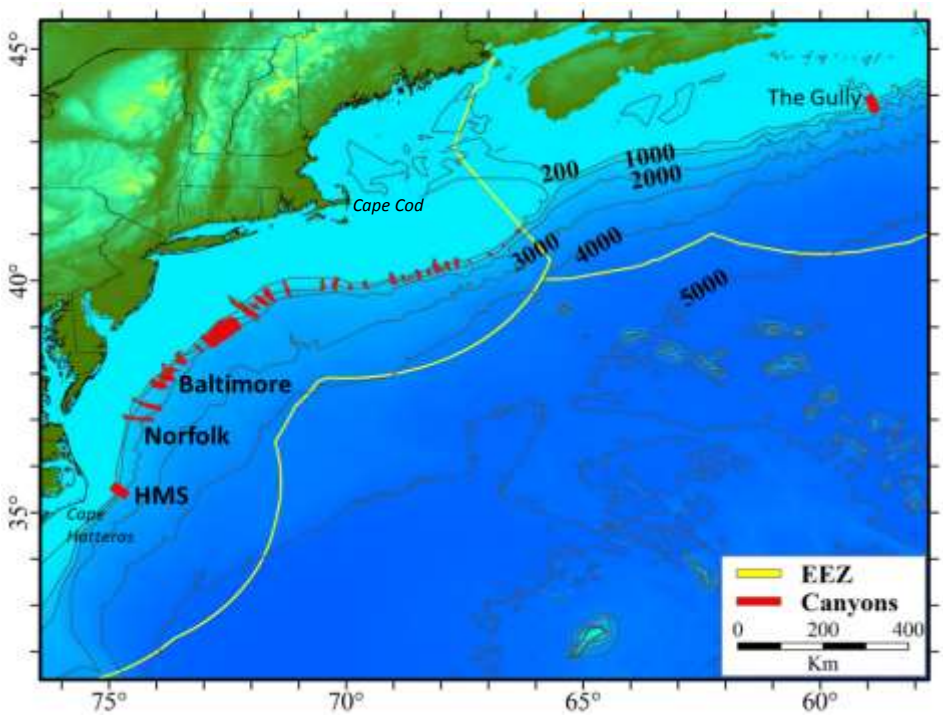
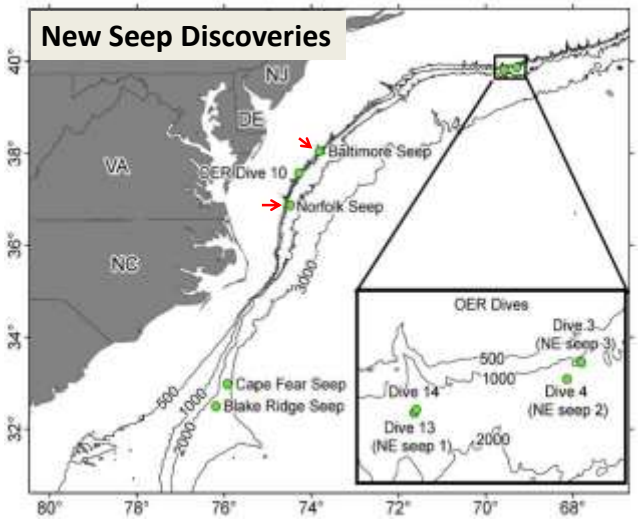
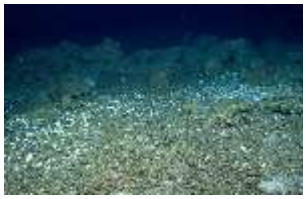




- Consistent core objectives and methods used throughout (1999-2013, 250-1650 m depth range)
- Unique standardised deep-sea archive (fish, coral, multibeam, water column, samples)



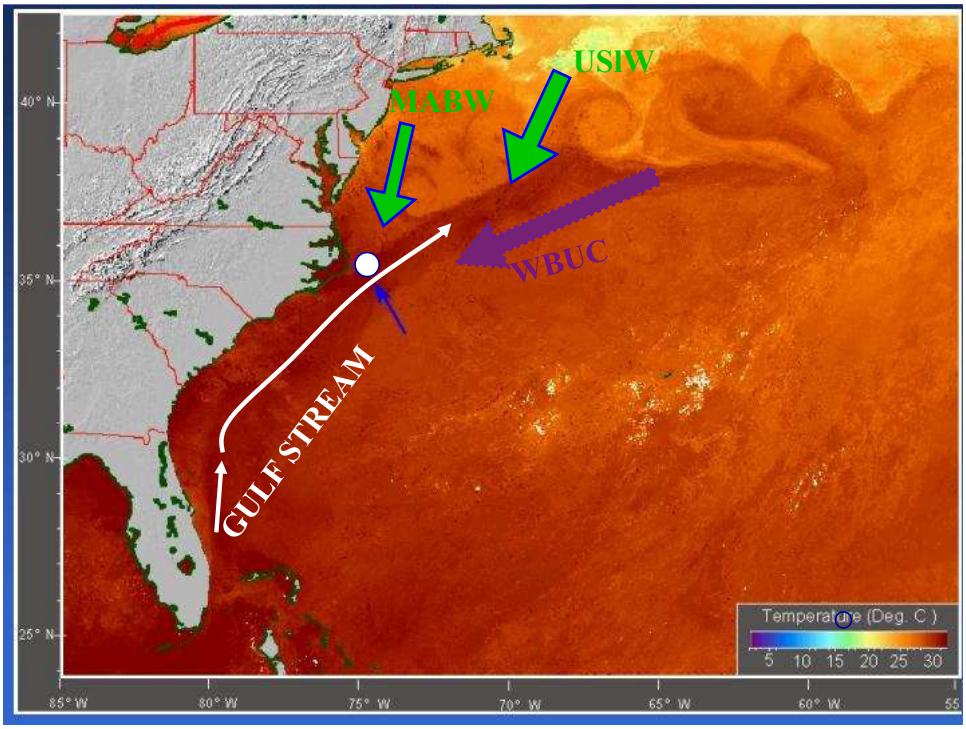




Two seeps mapped and surveyed in detail near Baltimore Canyon & Norfolk Canyon.
As many as **560+** seeps remain to be explored.
Huge impact on benthic habitats and fauna.

Data Availability

- Hatteras Middle Slope (1991-1992, 1999-2002):
  - CTD; multibeam sonar maps
  - submersible video surveys of macrofauna and habitats
  - quantitative surveys of fishes and invertebrates (full water column)
  - trophodynamics data (stable isotope & diets), surface to bottom
- Norfolk/Baltimore canyons & surroundings (2011-2013):
  - CTD; multibeam sonar maps
  - ROV video surveys of macrofauna and habitats
  - bottom quantitative surveys of fishes and invertebrates
  - trophodynamics data (stable isotope & diets)
  - paleoecology data using corals as proxies
  - connectivity/genetics data for selected species, especially corals
  - geology & geochemistry & physical oceanography
  - aragonite saturation & other water chemistry

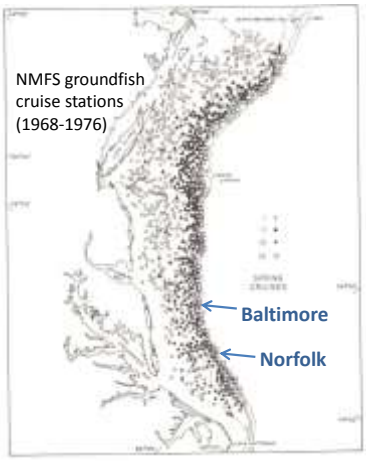


Hatteras Middle Slope

- Dynamic, variable currents, upwelling present
- Below 200m, no net motion
- Nepheloid layer present
- Rugged topography, mud canyons
- High organic deposition to the bottom
- Very high infaunal biomass
- High macrofaunal abundance, low species richness
- Abnormally small size structure in fish community
- High productivity and biological activity in surface waters

Norfolk & Baltimore Canyons

- Oceanography differs between the two: canyon morphology & orientation may drive this
- Canyons are regularly disturbed, and have persistent phenomena (e.g., nepheloid layers)
- Infauna between canyons differs because of physical differences leading to different OM regimes
- Other sessile fauna (corals, sponges, etc.) may be affected
- Mobile fauna keys on habitat, but only in depths < ~1400 m
- Complex habitats important hotspots & support unique assemblages
- Abundant methane seeps also provide important habitat & enhance benthic productivity



Human impacts common:
lost fishing gear, trash,
lesions on fishes

These studies and others led to the creation of the largest benthic protected areas in US continental waters, with protection for canyons under review.

Current & Blue Growth Sectors