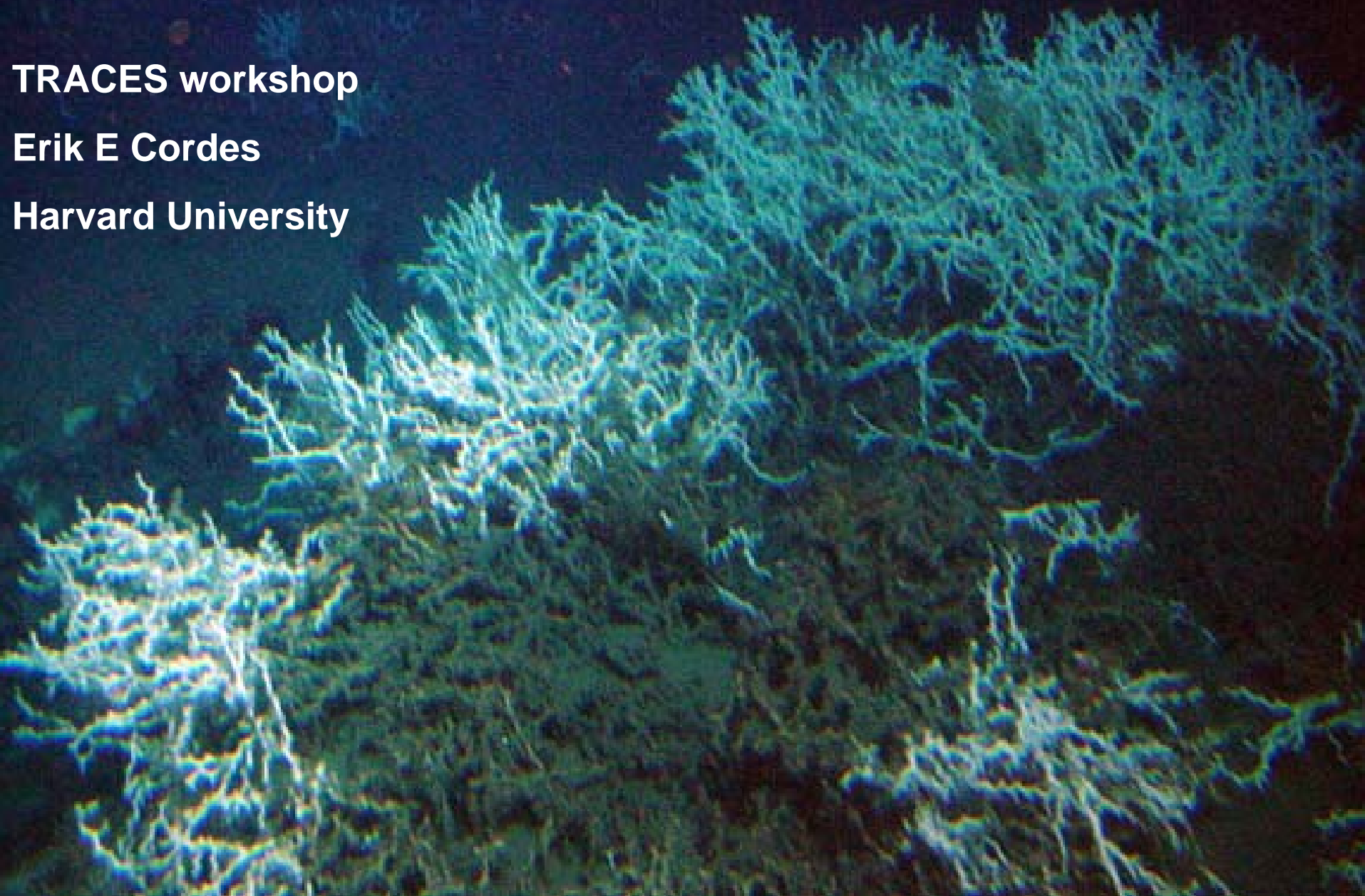


# Biodiversity & Biogeography of Cold-Water Coral Communities

TRACES workshop

Erik E Cordes

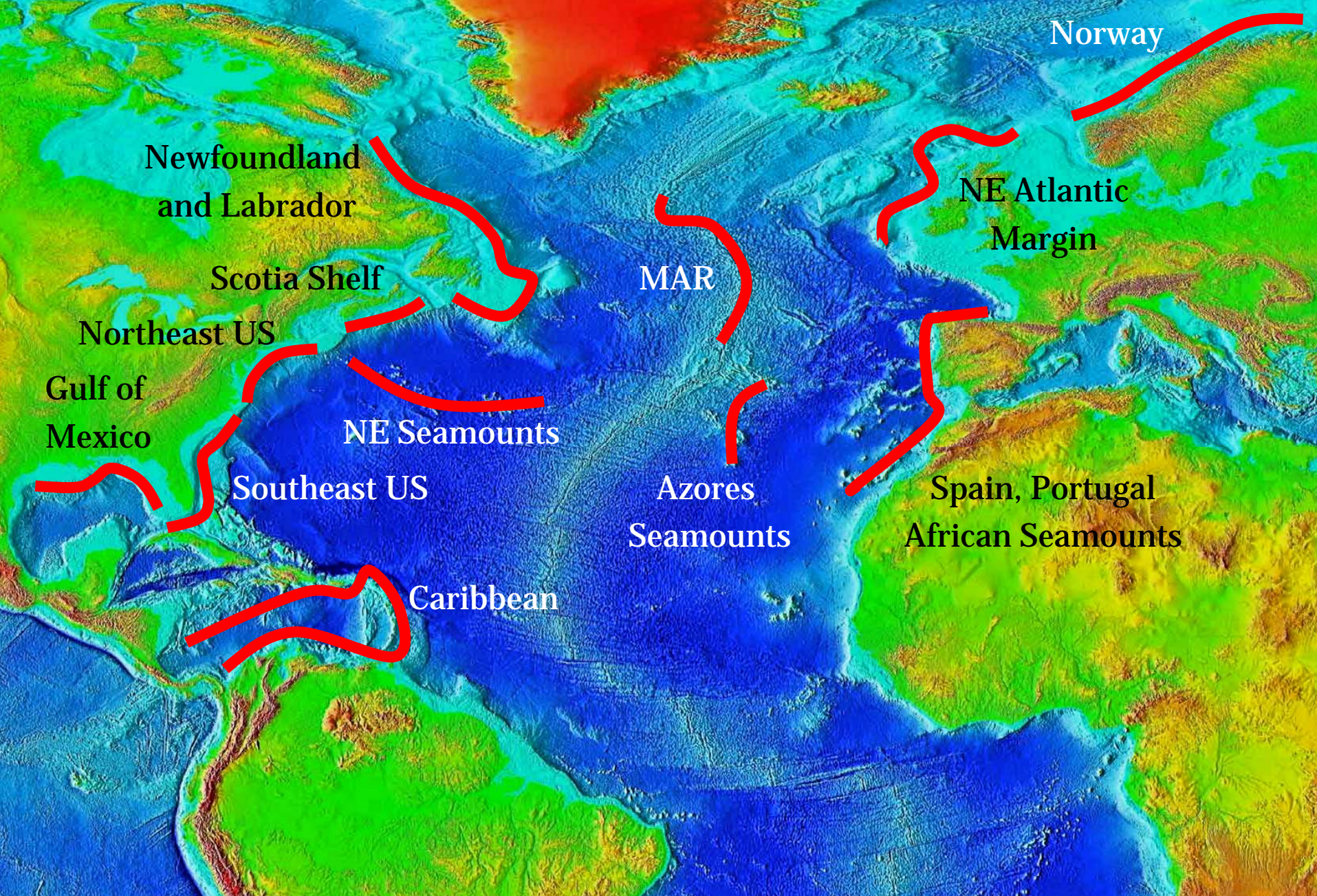
Harvard University

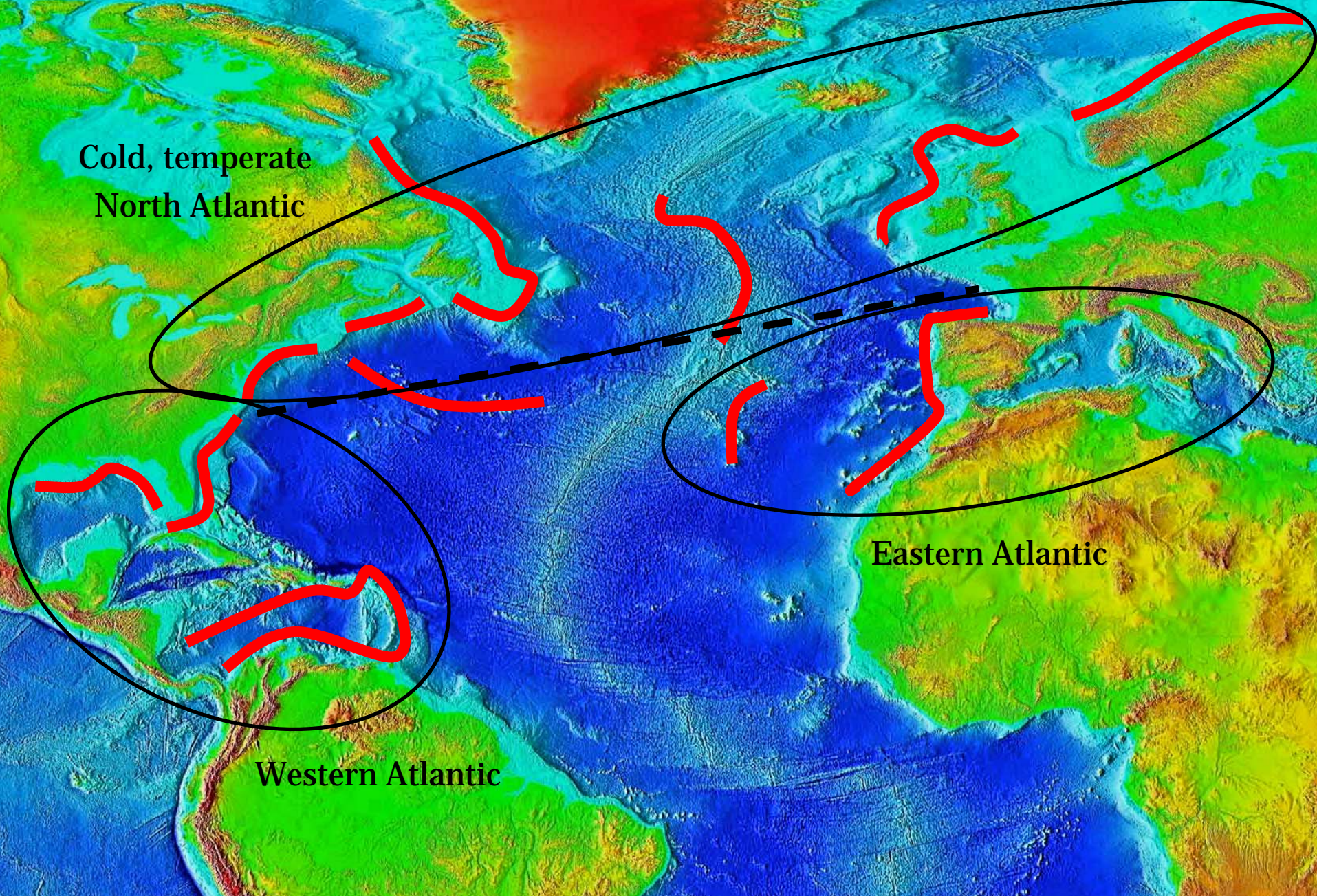


# Ecosystems: Biodiversity and Biogeography

- North Atlantic cold-water coral biogeography
  - major biogeographic provinces
  - major framework species
- Fish biodiversity
- Invertebrate biodiversity
- Case study: Gulf of Mexico
  - sampling strategy
  - local-scale biogeography



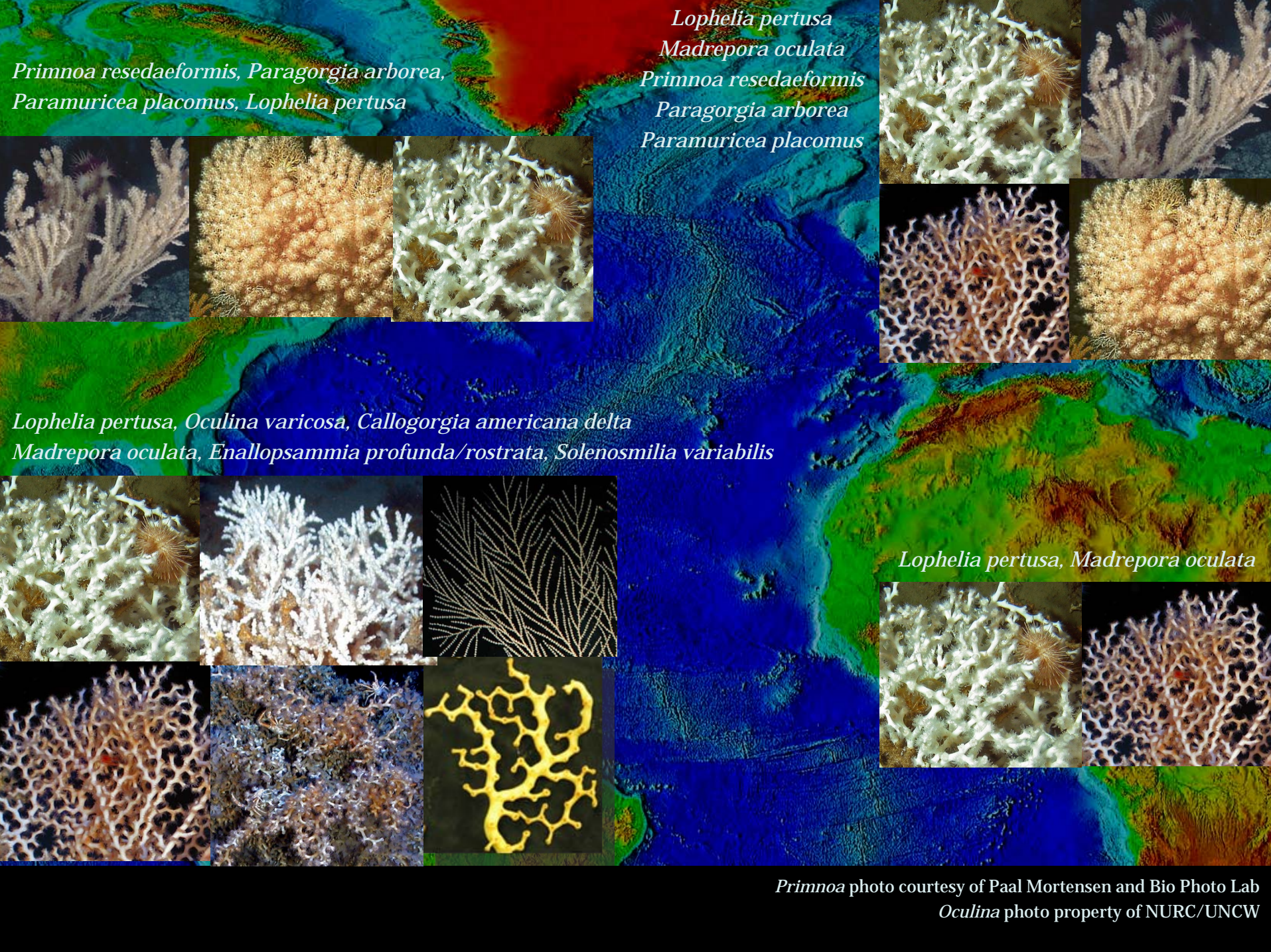




Cold, temperate  
North Atlantic

Eastern Atlantic

Western Atlantic



*Primnoa resedaeformis, Paragorgia arborea,  
Paramuricea placomus, Lophelia pertusa*

*Lophelia pertusa  
Madrepora oculata  
Primnoa resedaeformis  
Paragorgia arborea  
Paramuricea placomus*

*Lophelia pertusa, Oculina varicosa, Callogorgia americana delta  
Madrepora oculata, Enallopsammia profunda/rostrata, Solenosmilia variabilis*

*Lophelia pertusa, Madrepora oculata*

*Primnoa* photo courtesy of Paal Mortensen and Bio Photo Lab  
*Oculina* photo property of NURC/UNCW

# Common Associated Fishes



## North Atlantic

Pollock

Haddock

Cod

Hake

Monkfish

*Sebastes* spp.



## Western Atlantic

Conger eel

Blackbelly rosefish

*Beryx* spp.

Wreckfish

Atlantic roughy

Codling



# Invertebrate Biodiversity

Forams

Hydroids

Polychaetes

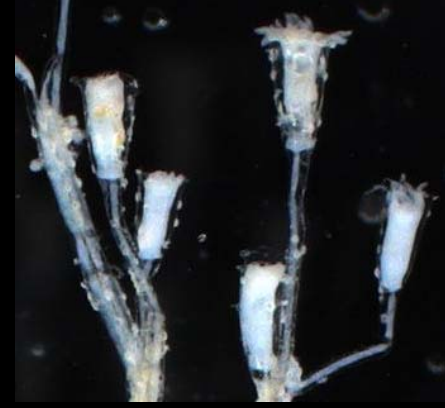
Gastropods

Bivalves

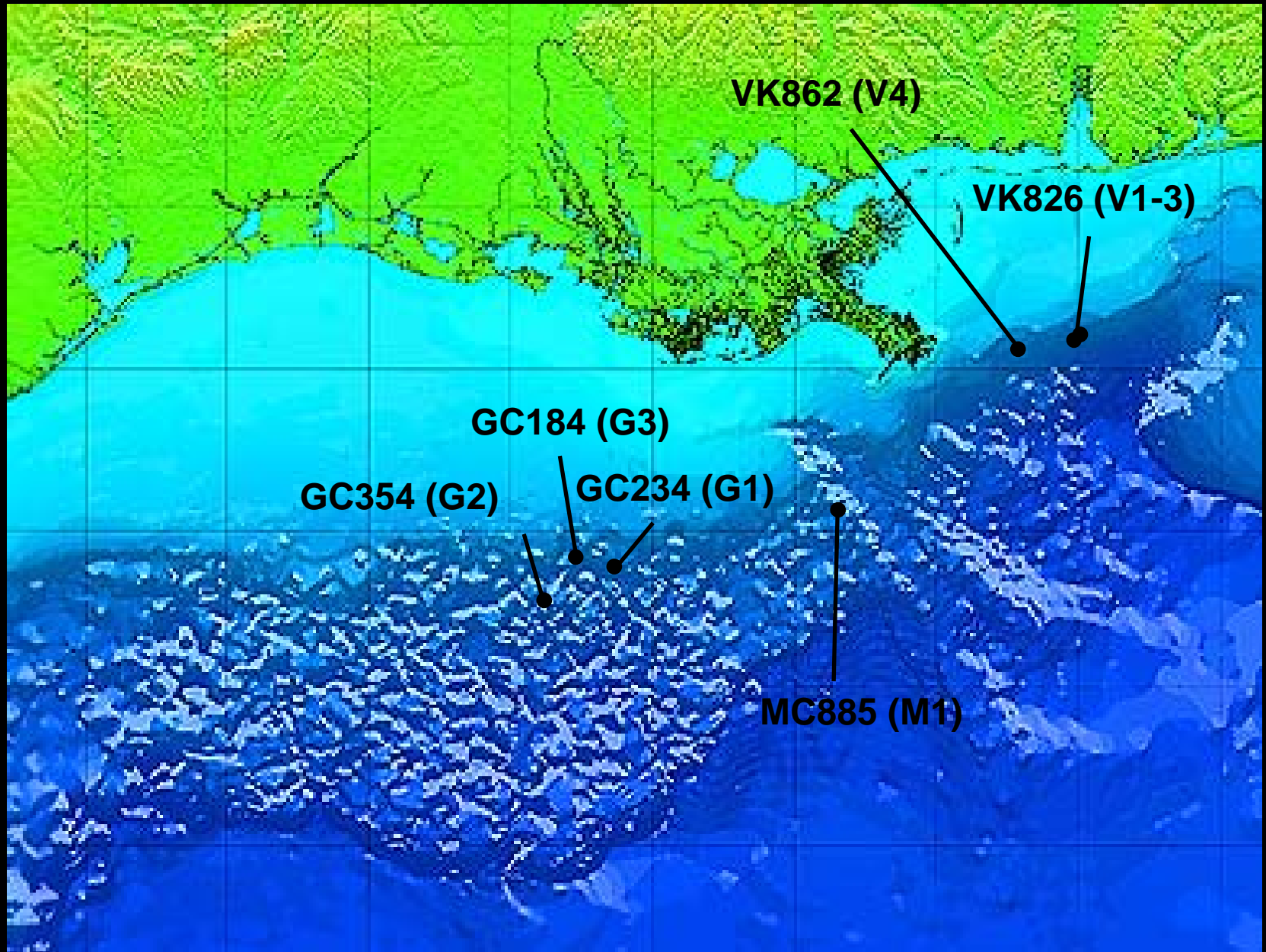
Galatheoids

Ophiuroids

Crinoids



# Local Biogeography: Gulf of Mexico

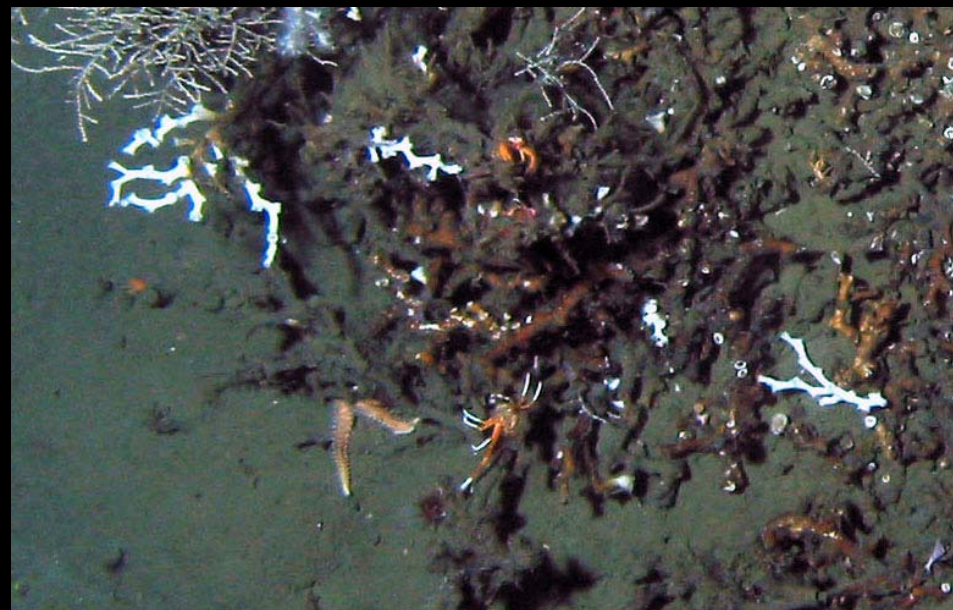
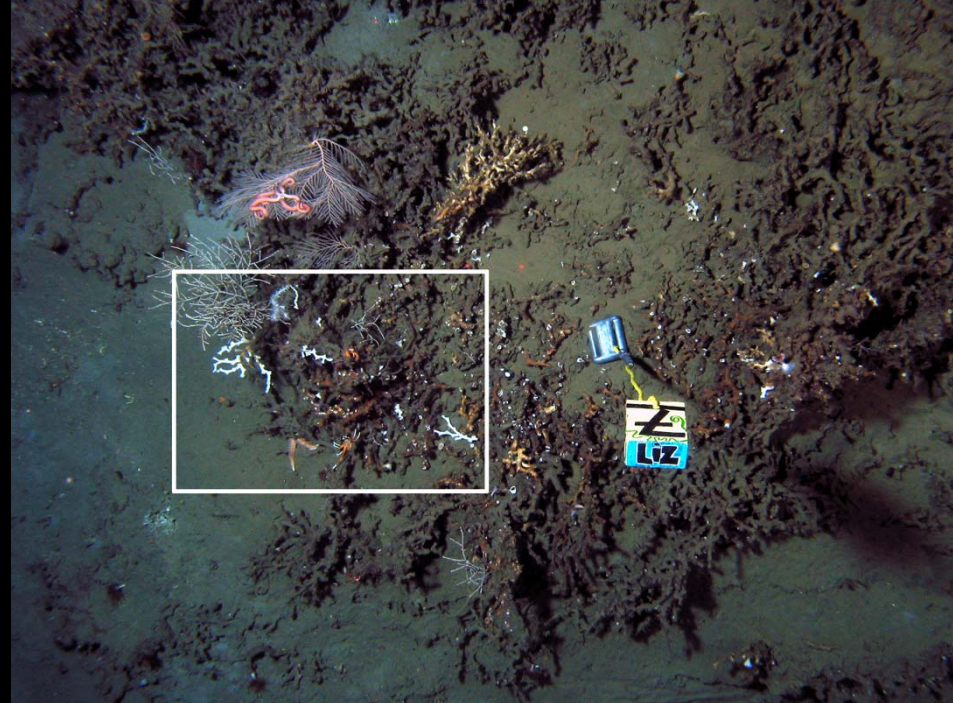
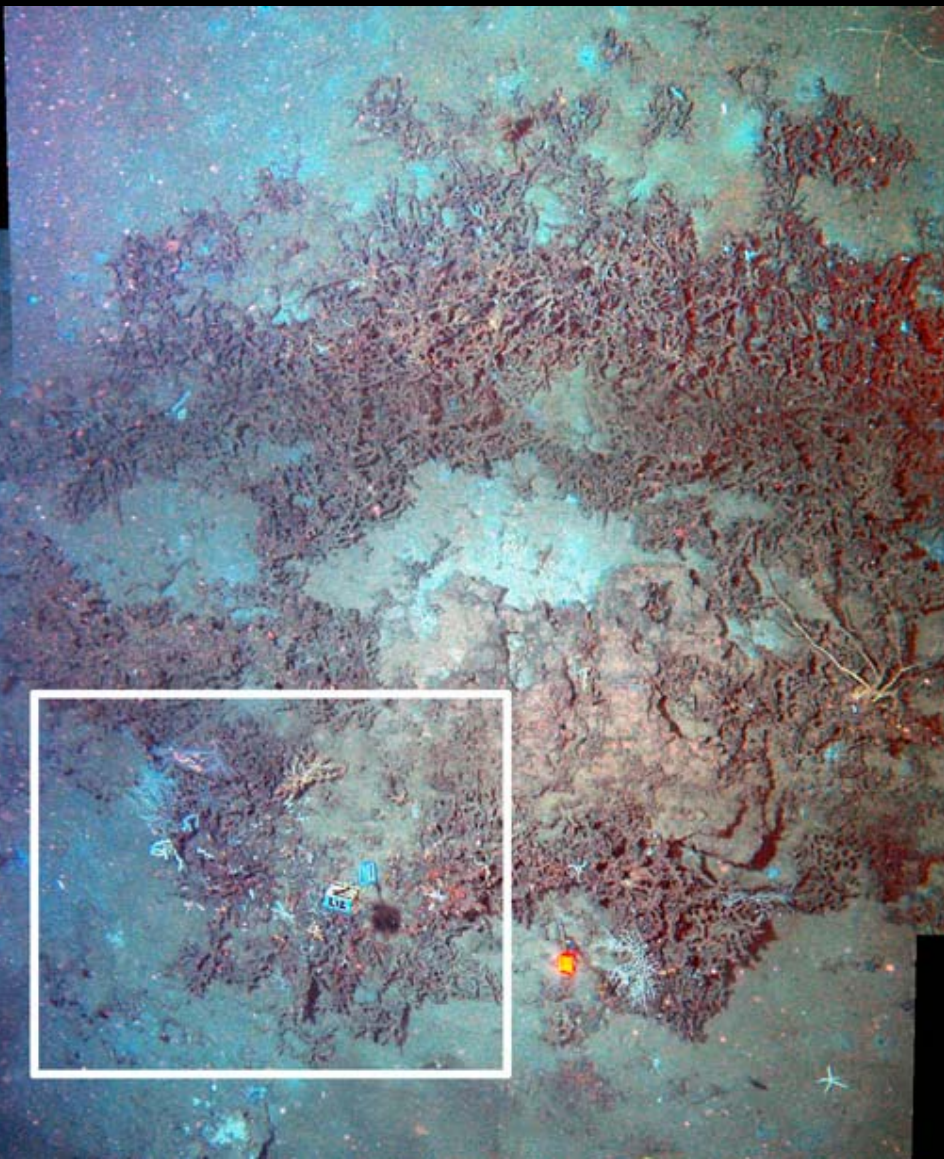




# Community sampling case study

- Photomosaics
  - diversity
  - habitat associations
- Physical collections
  - additional species
  - biogeography





# Photomosaic results

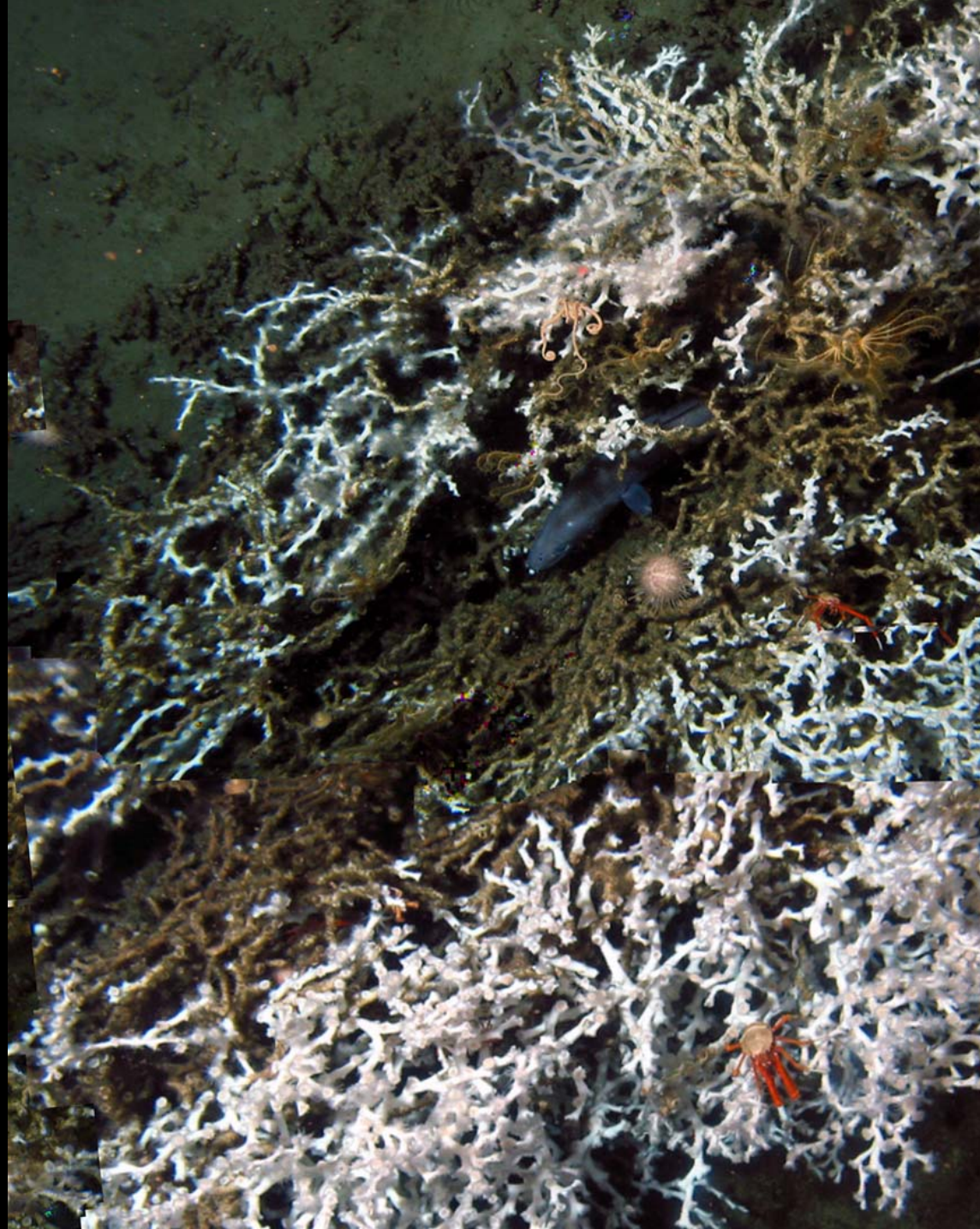
12 mosaics

substrata:

1. dead coral
2. rubble
3. live coral
4. carbonate

mobile fauna:

1. *Munidopsis* spp.
2. *Eumunida picta*
3. ophiuroids
4. crinoids
5. fishes



# Significant habitat associations among megafauna and substrata

*Eumunida picta*:

on dead or other cnidarians  
near live or carbonate



ophiuroids:

on other colonial cnidarians



crinoids:

on dead or mixed near live



*Munidopsis* spp:

on live or seep away from dead

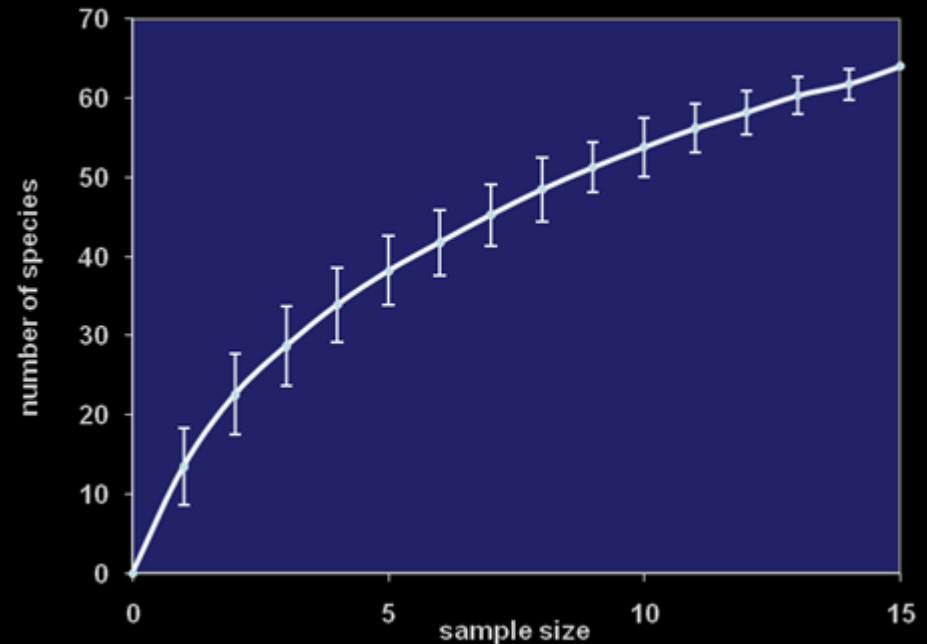


fishes: near live, mixed, or carbonate

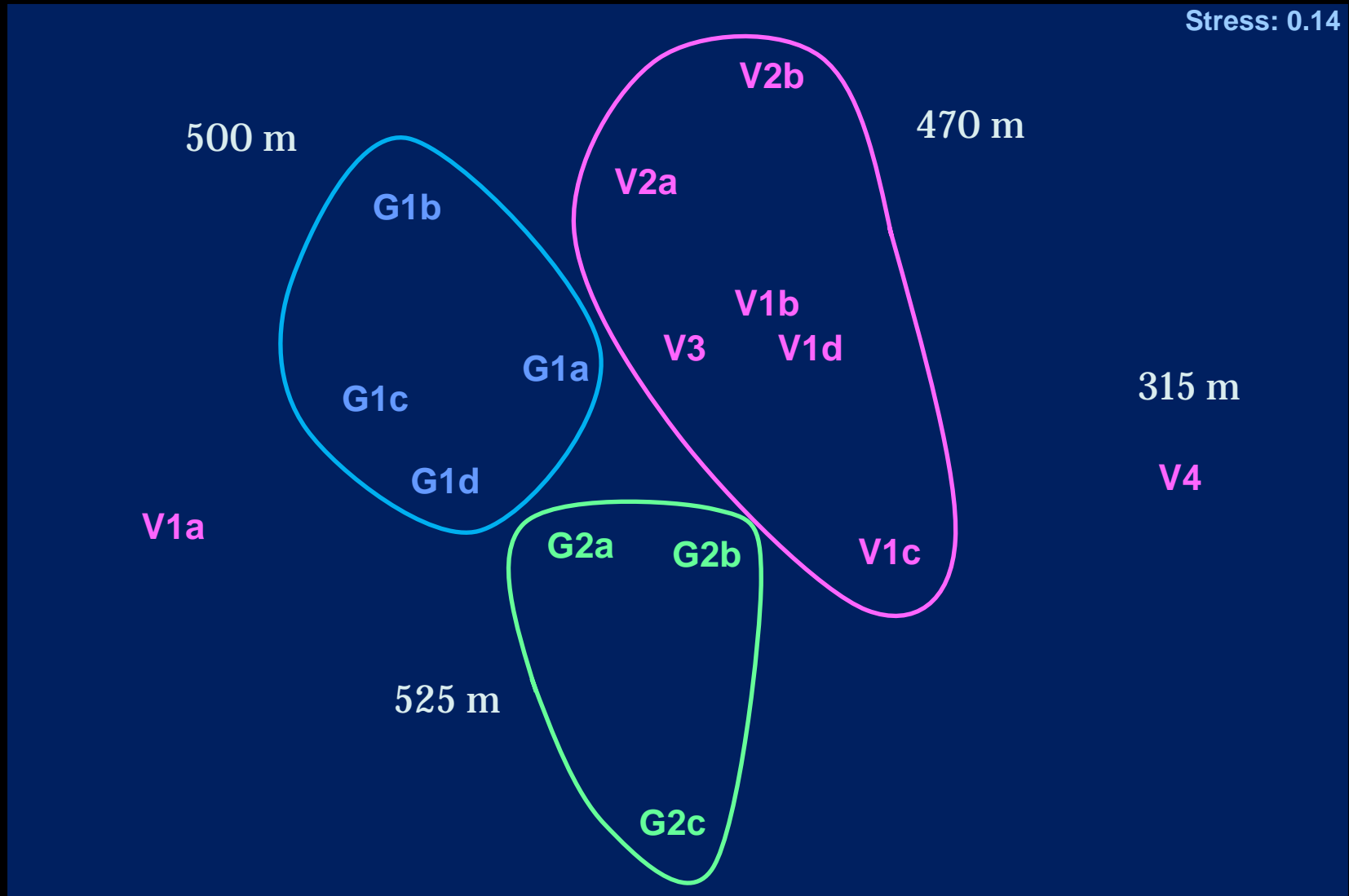


# Community collections

- 15 collections
- 64 species
  - 6 to 23 per sample
  - 16 new species
- $H'$  0.67 to 2.54
- $J'$  0.41 to 0.98



# Coral-associated communities are similar within sites and similar depth ranges



Multidimensional scaling (MDS) plot based on Bray-Curtis similarity matrix

# Conclusions

- major biogeographic provinces related to water mass
  - finer scale patterns to depth, live coral
- diverse and commercially significant fish communities
  - appear to be some obligate species
  - also not fully described
- diverse invertebrate community
  - a few obligate species, some preferences
  - not fully described



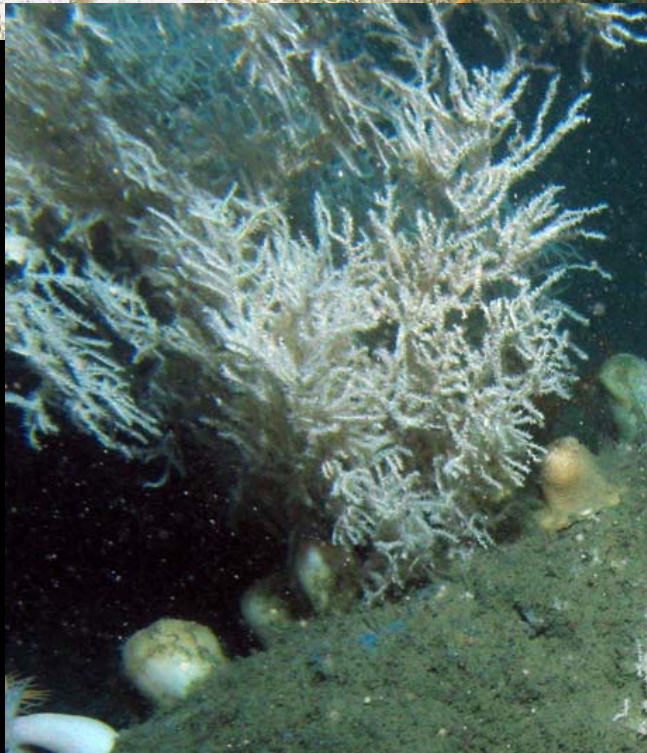
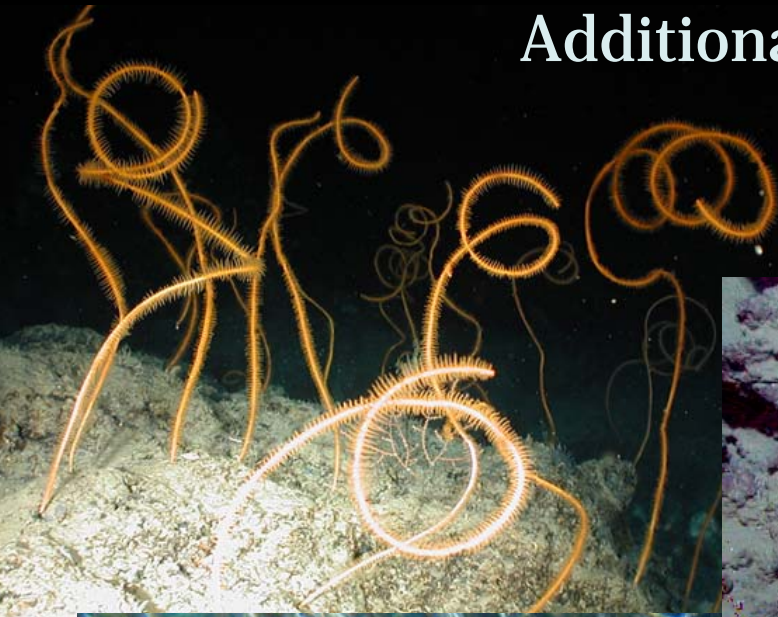
# Research Questions

1. Are there obligate coral species?
2. Refine biogeographic boundaries
3. Discover new coral habitats...





# Additional coral communities to be described...



# Acknowledgements

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