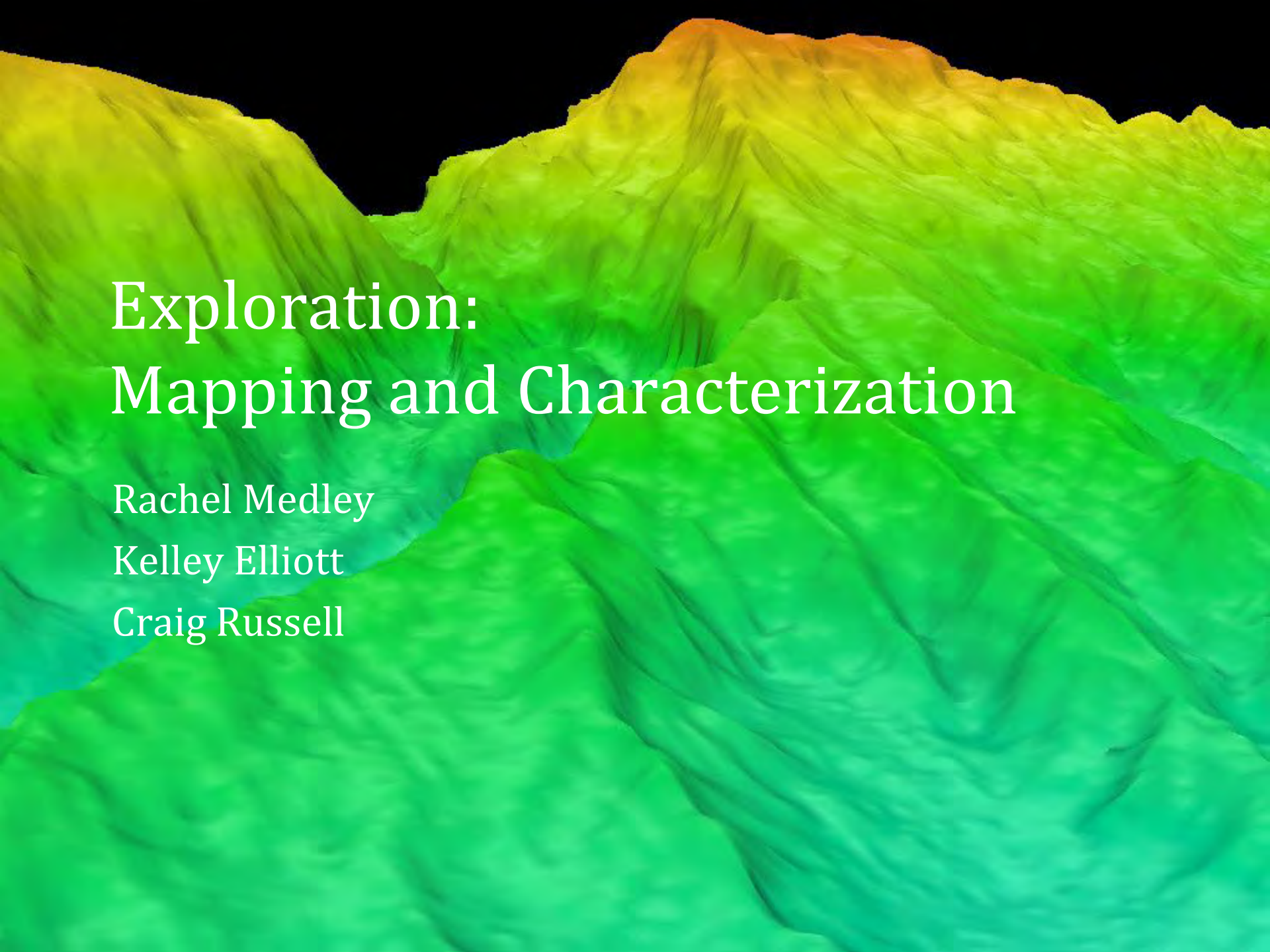


Exploration: Mapping and Characterization

Rachel Medley
Kelley Elliott
Craig Russell

Strategy for Ocean Exploration Campaigns

Rachel Medley, Chief
Expeditions and Exploration Division

Executing on Our Vision: Exploration Campaigns

A series of expeditions over multiple years to a geographic area or theme of **exploration priority** interest

Complementary expeditions using a wide variety of **platforms**, **technologies**, and strategies

Package of **data and information sharing** across platforms serves as foundation of environmental intelligence

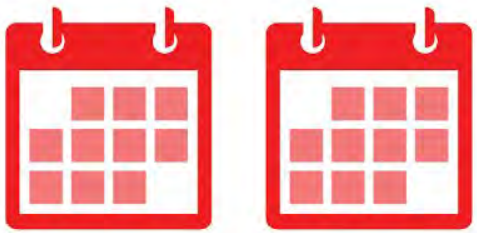
Robust **engagement** in education and outreach efforts are integral activities

Partners focus messaging on the breadth of work

ACUMEN

Atlantic Canyons Undersea Mapping Expeditions

Ocean Exploration and Research



CAPSTONE

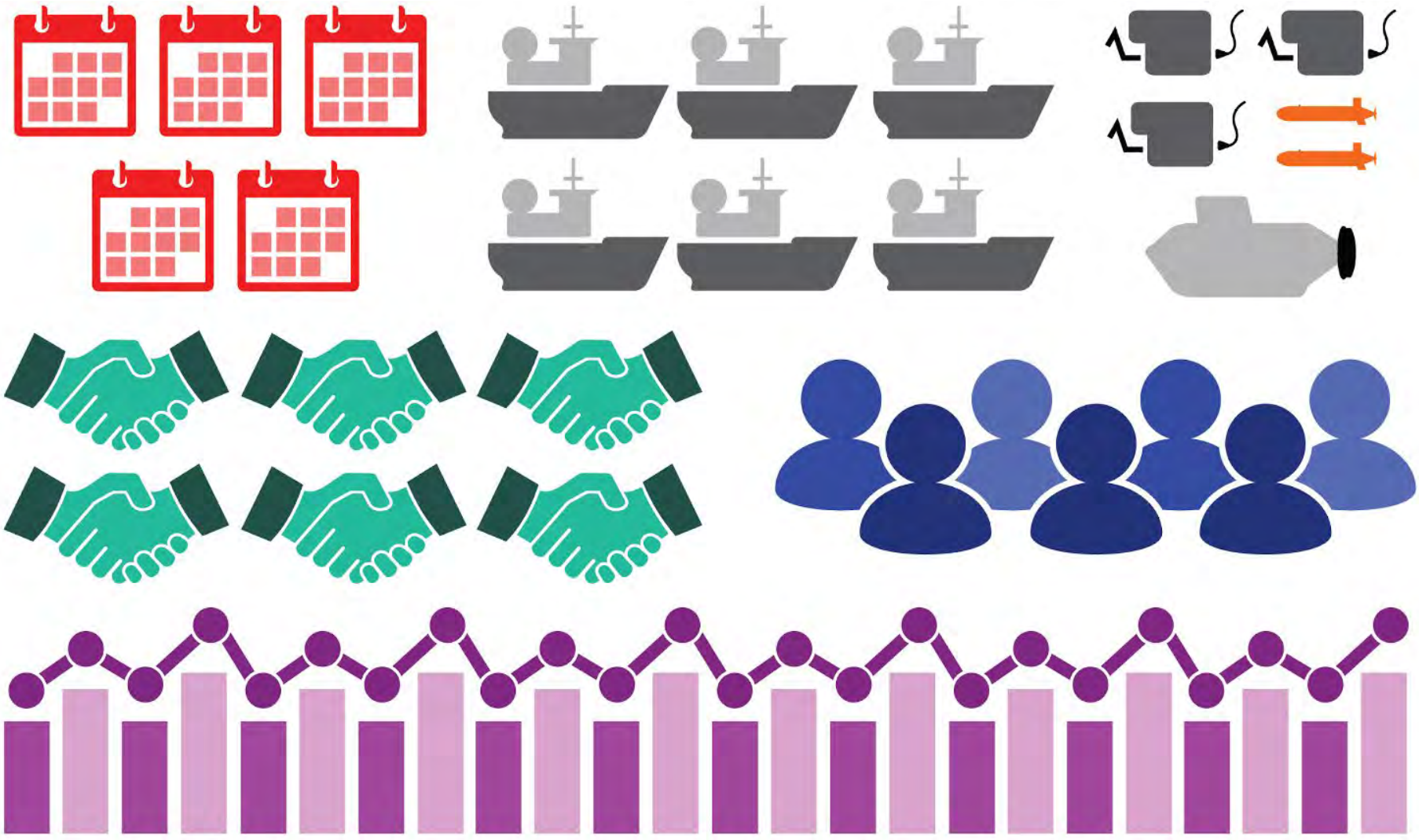
Campaign to Address Pacific Monument Science, Technology, and Ocean Needs

Ocean Exploration and Research

ASPIRE

Ocean Exploration and Research

Atlantic Seafloor Partnership for Integrated Research and Exploration



Nested Approach to Expedition Planning

CAMPAIGN

The highest level is development of a Campaign in an operating region or basin focused on themes, agreements, or interests of key partners that connect multiple expeditions and platforms in support of common goals

COMMUNITY WORKSHOP

Conduct a community workshop to identify exploration priorities, themes, and partners in a region.

CALL FOR INPUT

A “Call for Input” to solicit general mapping, CTD, and ROV dive targets in the operating area from the science and management community.

+

CONSULTATIONS

Expeditions require the Expedition Manager to identify and consult with key partners in the region to understand their priorities, data needs, and interests.

EXPEDITION PARTICIPATION

Any interested scientist, student, or manager with a relevant expertise is invited to join the expedition science and participate in the cruise and cruise planning meetings.

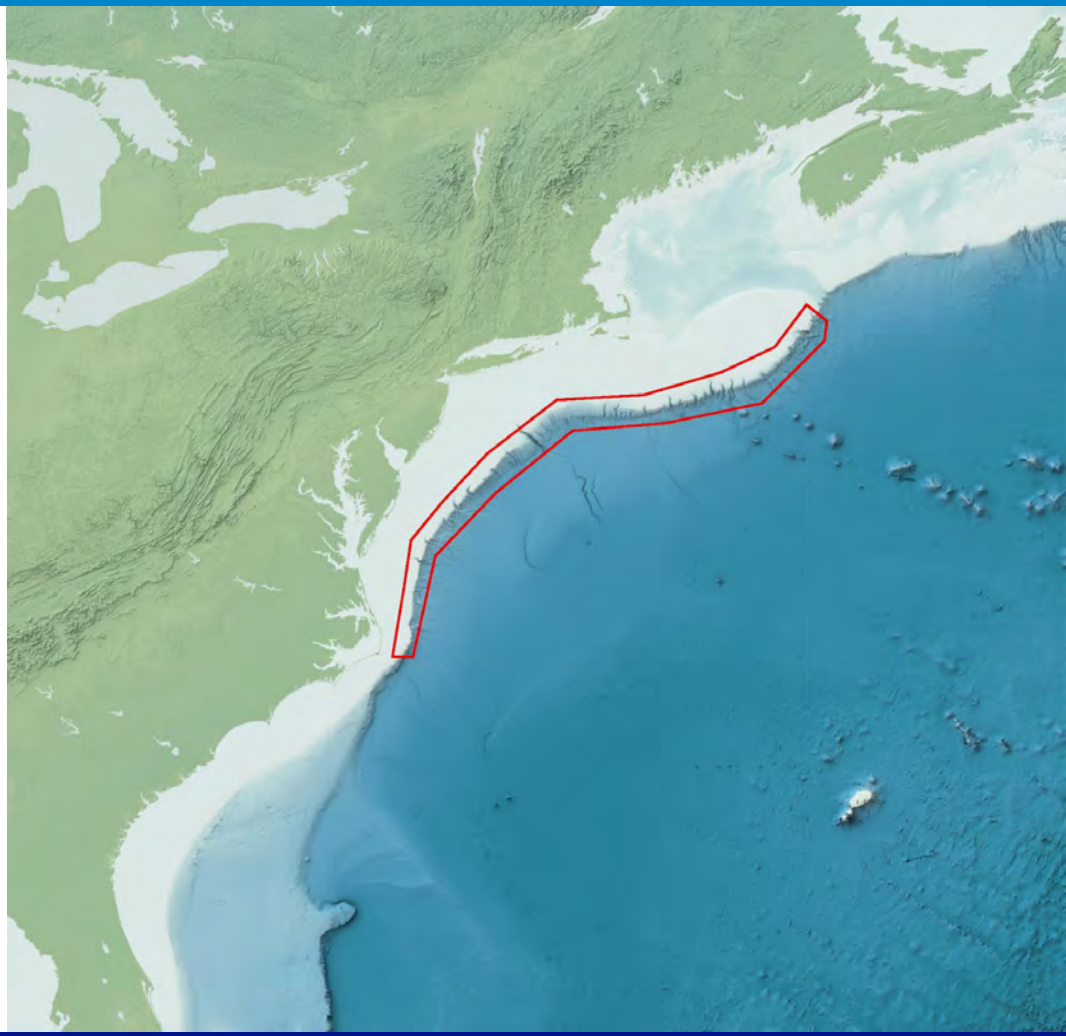
ACUMEN - Results

Atlantic Canyons Undersea Mapping Expeditions

- Mapped canyons from North Carolina to Maine
- Discovered each canyon is a different environment with distinct characteristics
- Revealed 570+ methane seeps along the U.S. East Coast
- Routine transit line bathy acquisition provided a model for data acquisition

13 cruises

45,530 km^2 mapped



CAPSTONE - Results

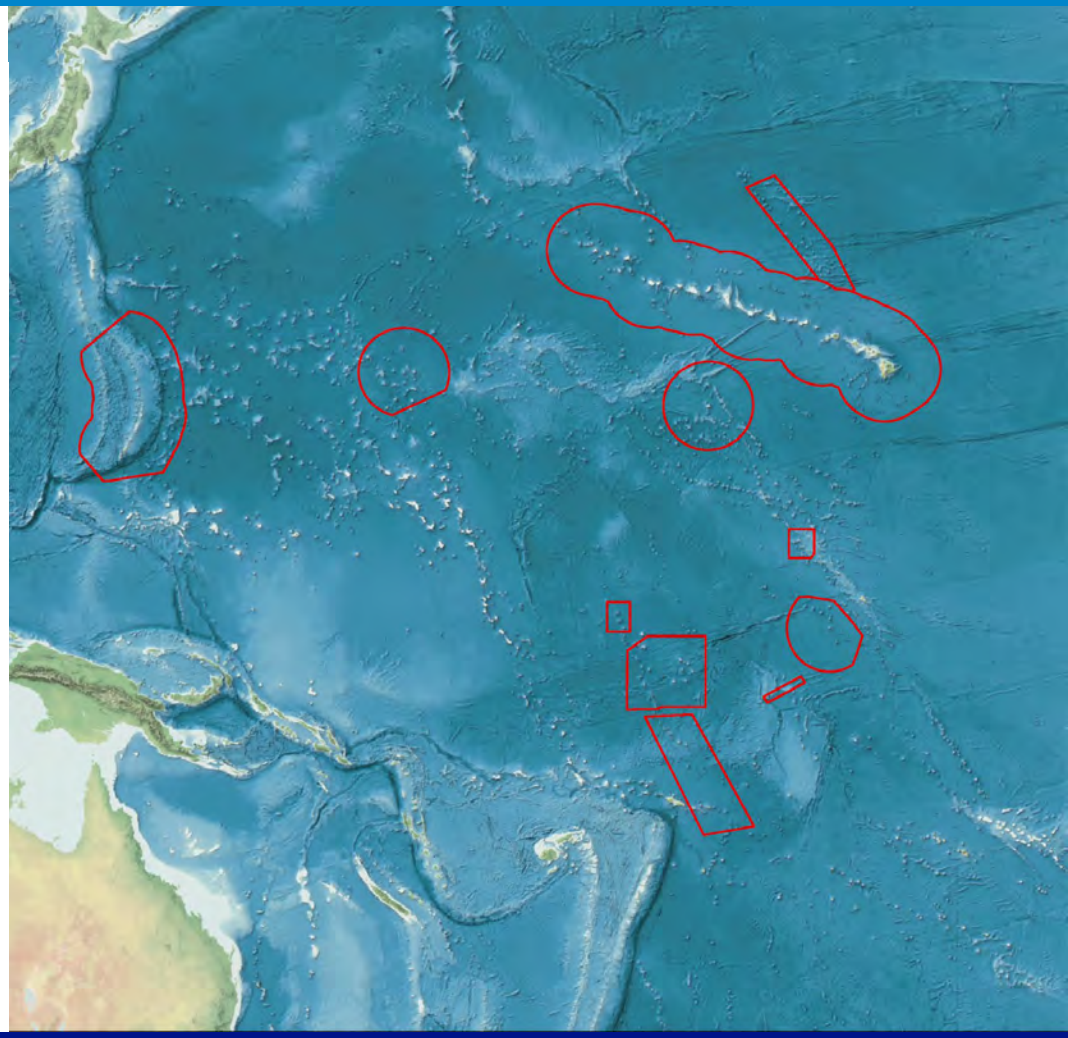
Campaign to Address Pacific monument Science, Technology, and Ocean NEeds

- Exponentially increased understanding of deep sea corals e.g. abundance & distribution
- New lines of scientific inquiry surrounding biogeographic patterns throughout the Pacific
- Discovered dozens of new species
- E/V *Nautilus* now building on initial CAPSTONE expeditions

23 cruises

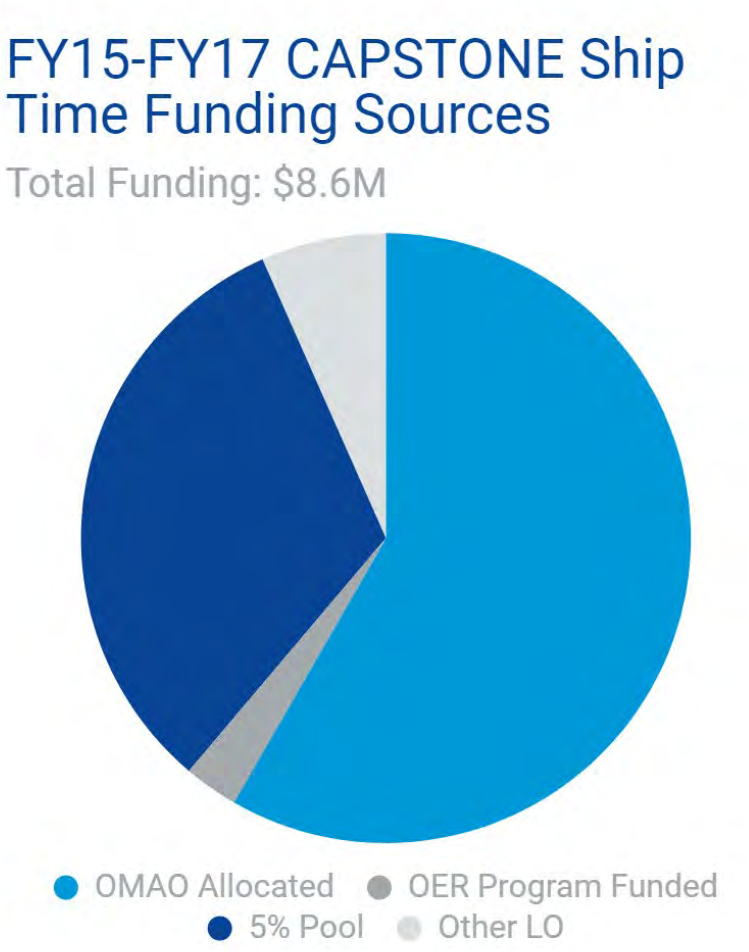
597,230 km² mapped

187 vehicle dives

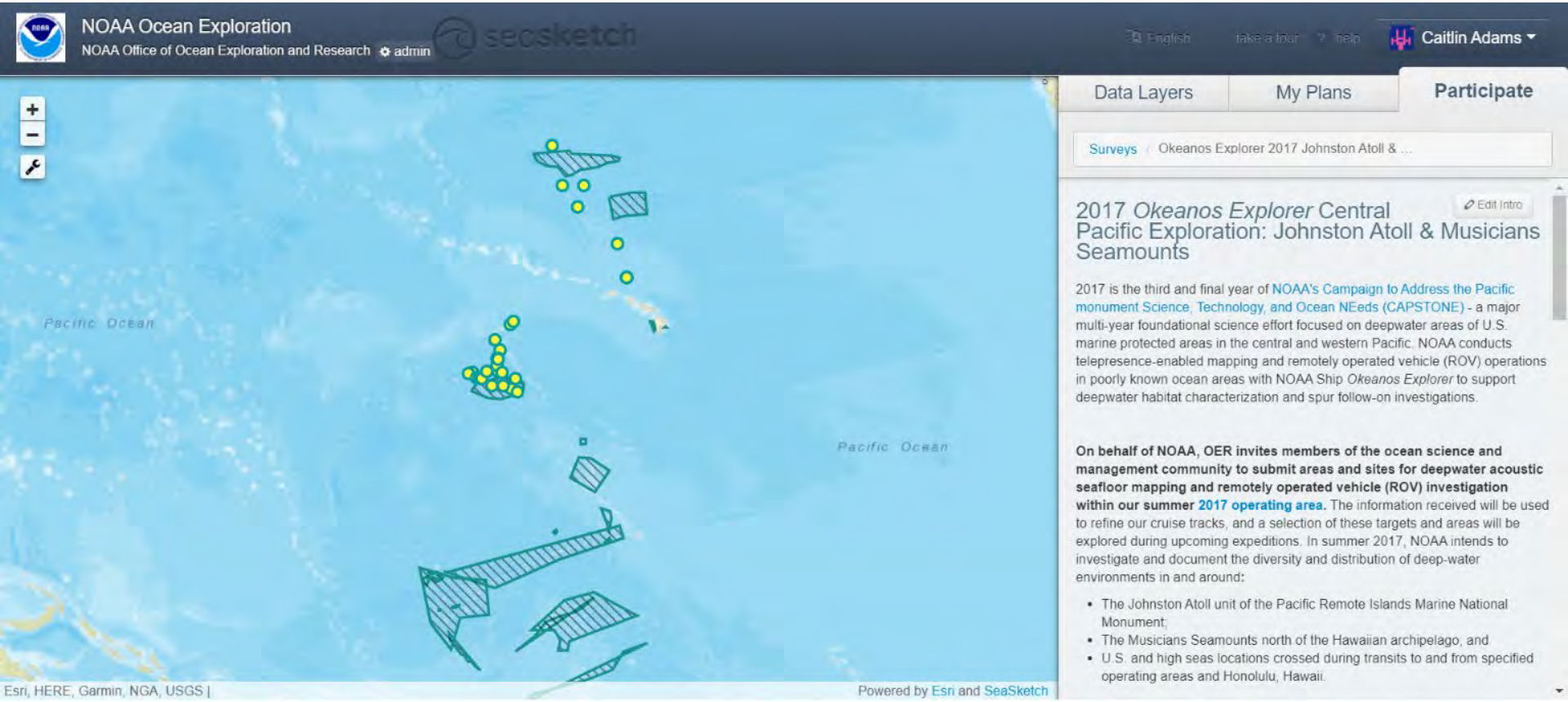


CAPSTONE: Capitalizing on Cross-NOAA Partnerships

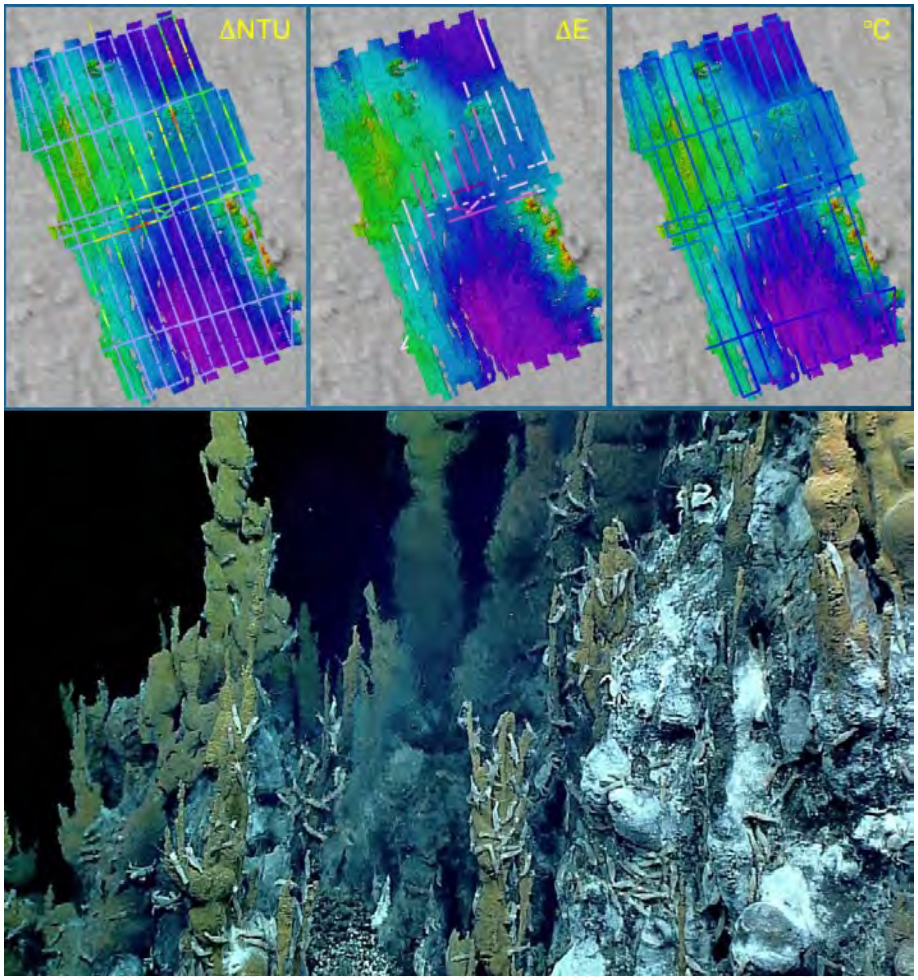
- CAPSTONE was the first time NOAA line offices recognized value of ocean exploration in terms of "hard currency:" DAS
- Capitalized on NOAA corporate 5% pool for cross-NOAA projects
- Leveraged variety of mechanisms for DAS needed over three years



Community-based Exploration Priorities



Collaborating beyond *Okeanos Explorer*



- Leveraged across platforms and projects: NSF, ECS, Falkor, PMEL, HURL, and OER grant funded scientists
- Leveraged data to complement operations
- Collaboratively planned expeditions across deep ocean community capitalizing on concurrent or near-concurrent expeditions on multiple platforms

ASPIRE Outcomes to date

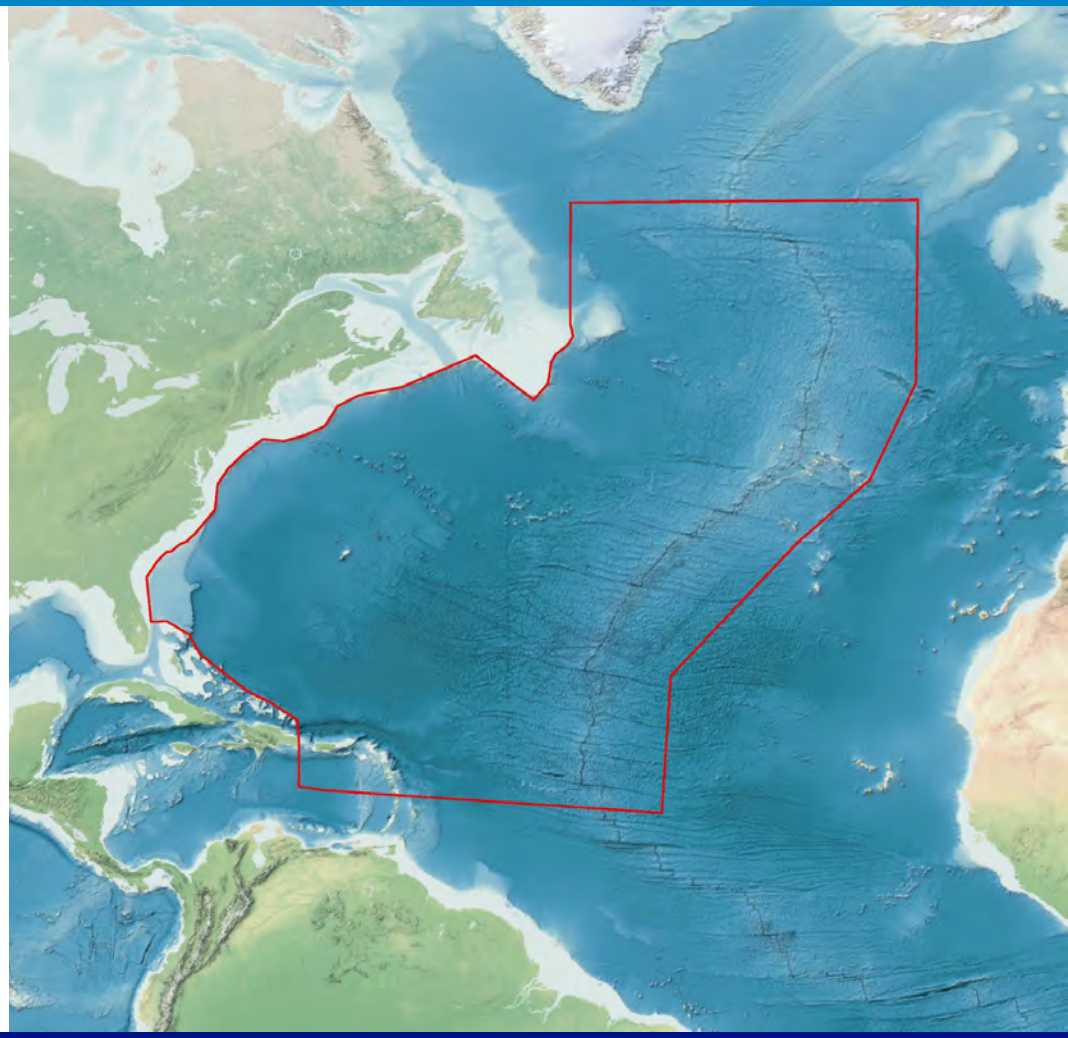
Atlantic Seafloor Partnership for Integrated Research and Exploration

- Extensive, previously unknown, deep sea coral habitats identified and characterized
- First U.S. government-led, focused mapping survey in support of the Atlantic Seabed Mapping International Working Group (ASMIWG)
- Significant contributions to mapping bathy gaps of US East Coast EEZ >200m

20 cruises

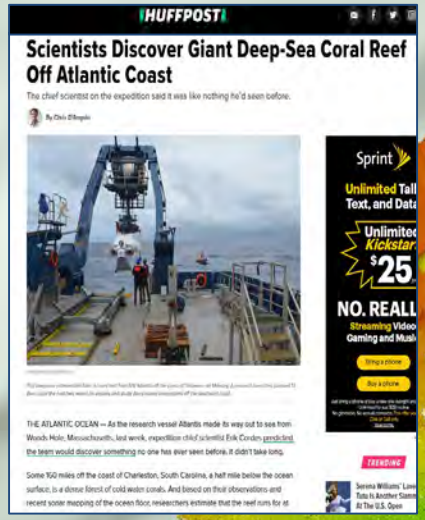
244,000+ km² mapped

122 vehicle dives




ASPIRE EXPEDITIONS
Mid-Atlantic Ridge ROV and Mapping
Summer 2020
NOAA OER, NOAA Ship Okeanos Explorer
Northern Neighbors: Transboundary Exploration of Deepwater Communities
June 2017, June 2019
NOAA NMFS/Dalhousie University, NOAA Ship Henry B. Bigelow
US-Canada ROV and Mapping
Summer 2019
NOAA OER/ONMS, NOAA Ship Okeanos Explorer
Mid-Atlantic Ridge Mapping
Summer 2020
NOAA OER, NOAA Ship Okeanos Explorer
Northeast US Tech Demonstration
July 2019
NOAA OER, NOAA Ship Okeanos Explorer
Canada Mapping
Summer 2020
NOAA OER, NOAA Ship Okeanos Explorer
Carolina Canyons
August 2016, August 2017
NOAA NMFS, NOAA Ship Pisces
Mid-Atlantic Ridge ROV and Mapping
Summer 2020
NOAA OER, NOAA Ship Okeanos Explorer
Southeast US ROV and Mapping
Fall 2019
NOAA OER/OCS, NOAA Ship Okeanos Explorer
DEEP SEARCH
2017-2019
BOEM/USGS/NOAA, Multiple Platforms
US Southeast and Bahama Ridge Mapping
October 2018
NOAA OER/OCS, NOAA Ship Okeanos Explorer
Blake Plateau Mapping
Spring 2020
NOAA OER, NOAA Ship Okeanos Explorer
ASMIWG Pilot Area Mapping
July 2018
NOAA OER, NOAA Ship Okeanos Explorer
Southeast US ROV and Mapping
Summer 2018, Spring 2019
NOAA OER/NMFS/ONMS, NOAA Ship Okeanos Explorer
US Caribbean ROV and Mapping
Fall 2018
NOAA OER/OCS, NOAA Ship Okeanos Explorer
US Caribbean Tech Demonstration
Spring 2020
NOAA OER/OCS, NOAA Ship Okeanos Explorer
US Caribbean Mapping
Spring 2020
NOAA OER/OCS, NOAA Ship Okeanos Explorer
Last updated: October 8, 2019

Expanding impacts: *Okeanos Explorer* and DEEP SEARCH


HUFFPOST

Scientists Discover Giant Deep-Sea Coral Reef Off Atlantic Coast

The chief scientist on the expedition said it was like nothing he'd seen before.

By Chris D'Angelo

THE ATLANTIC OCEAN — As the research vessel Atlantis made its way out to sea from Woods Hole, Massachusetts, last week, expedition chief scientist Erik Cordes predicted the team would discover something no one has ever seen before. It didn't take long.

Some 160 miles off the coast of Charleston, South Carolina, a half mile below the ocean surface, is a dense forest of cold-water corals. And based on their observations and recent sonar mapping of the ocean floor, researchers estimate that the reef runs for at

Sprint

Unlimited Tall
Text, and Data

Unlimited
Kickstar
$25

NO. REALL

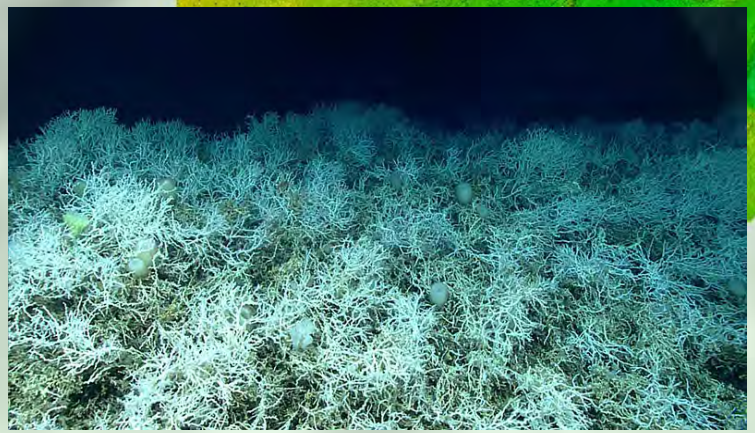
Streaming Video
Gaming and Mush

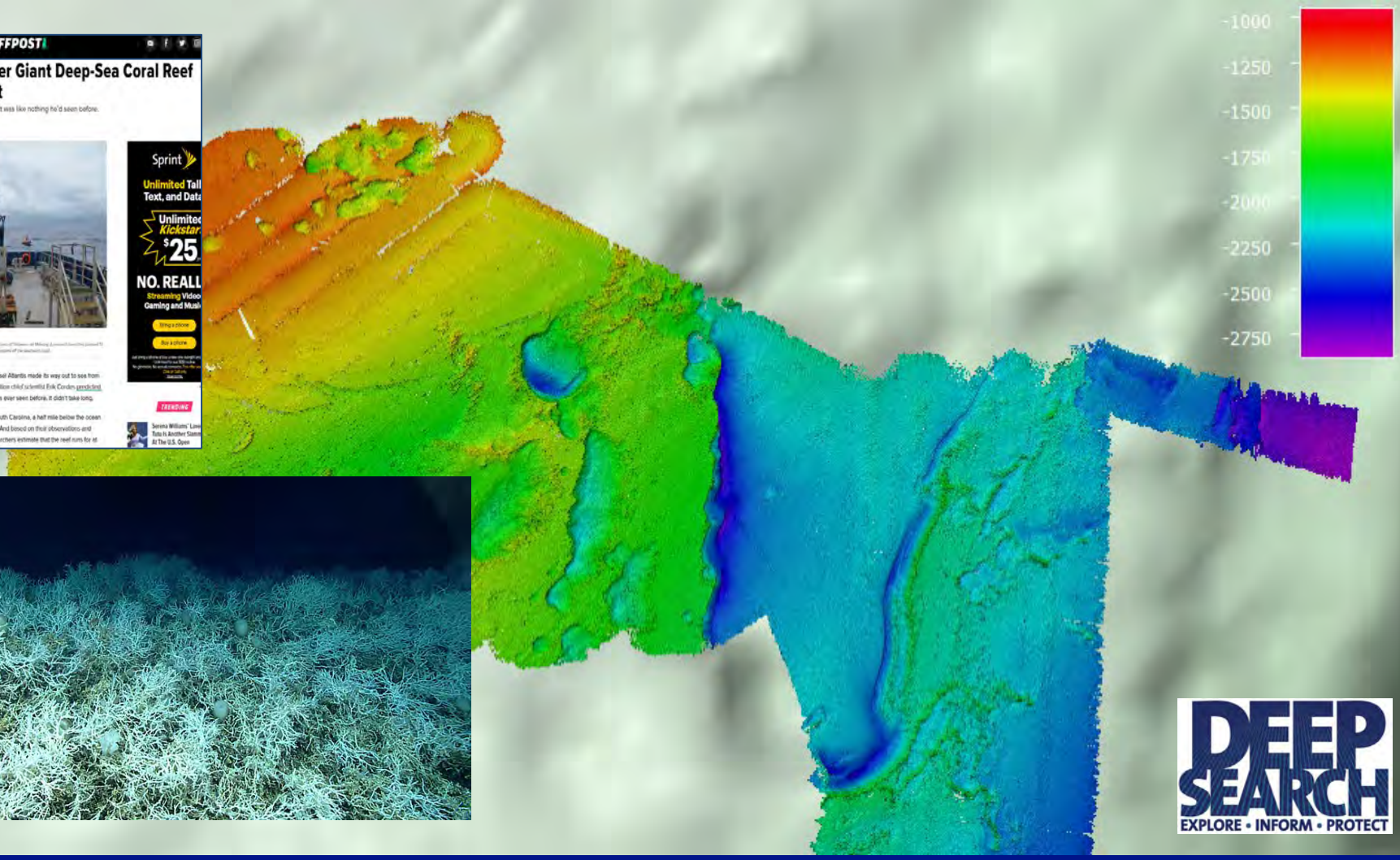
Bring a phone

Buy a phone

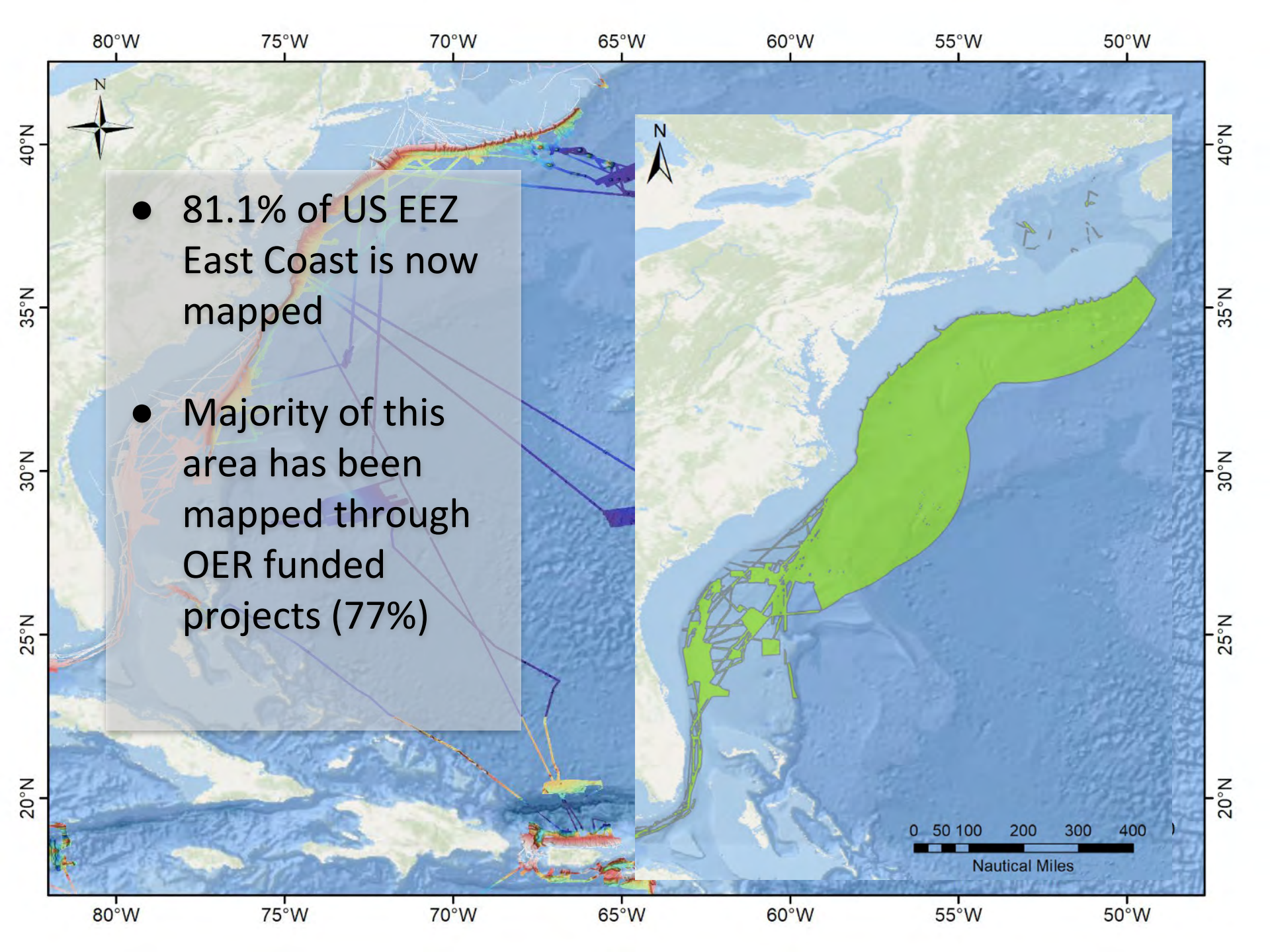
TRENDING

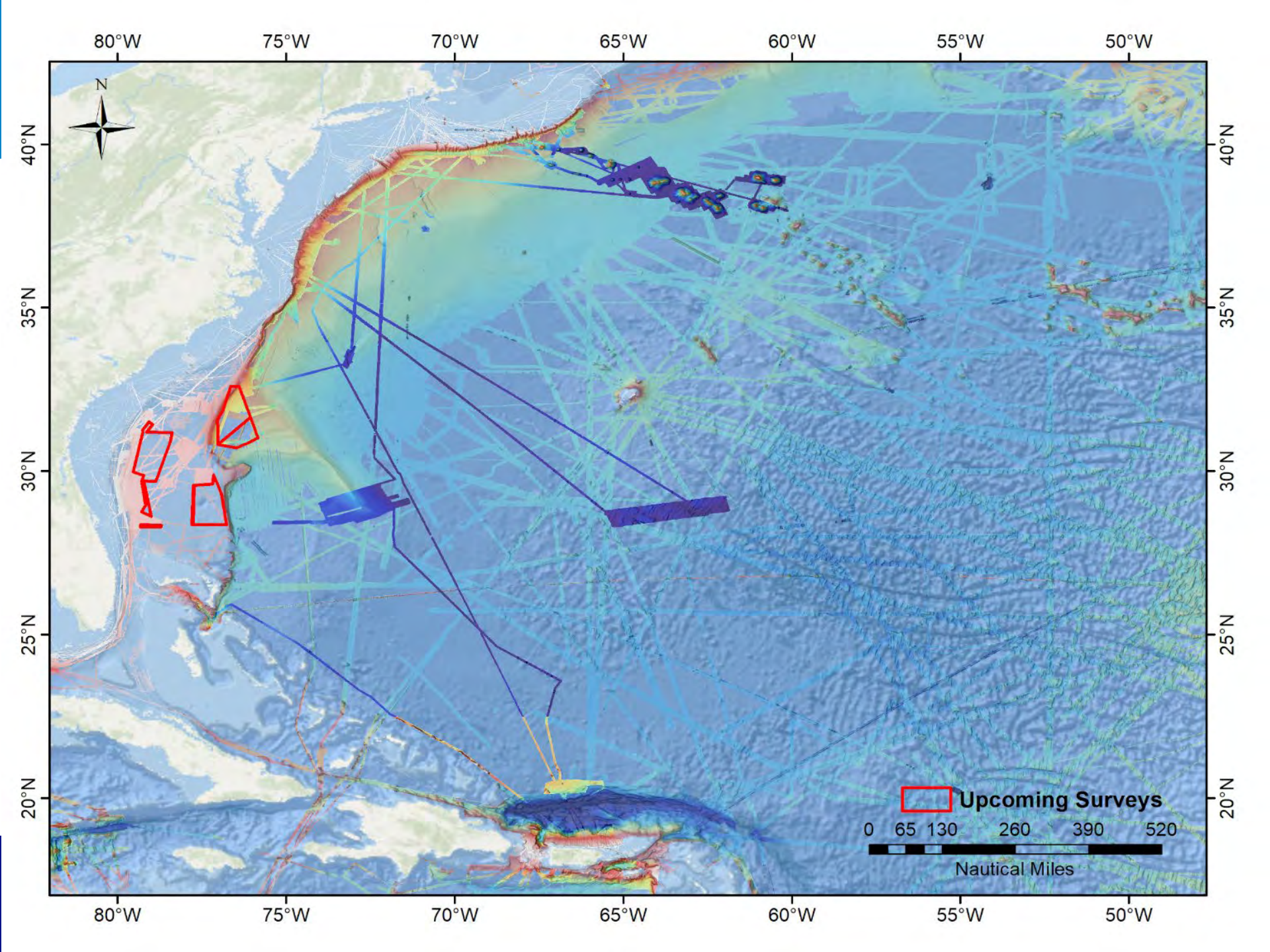
Serena Williams' Love Tots Is Another Slam At The U.S. Open



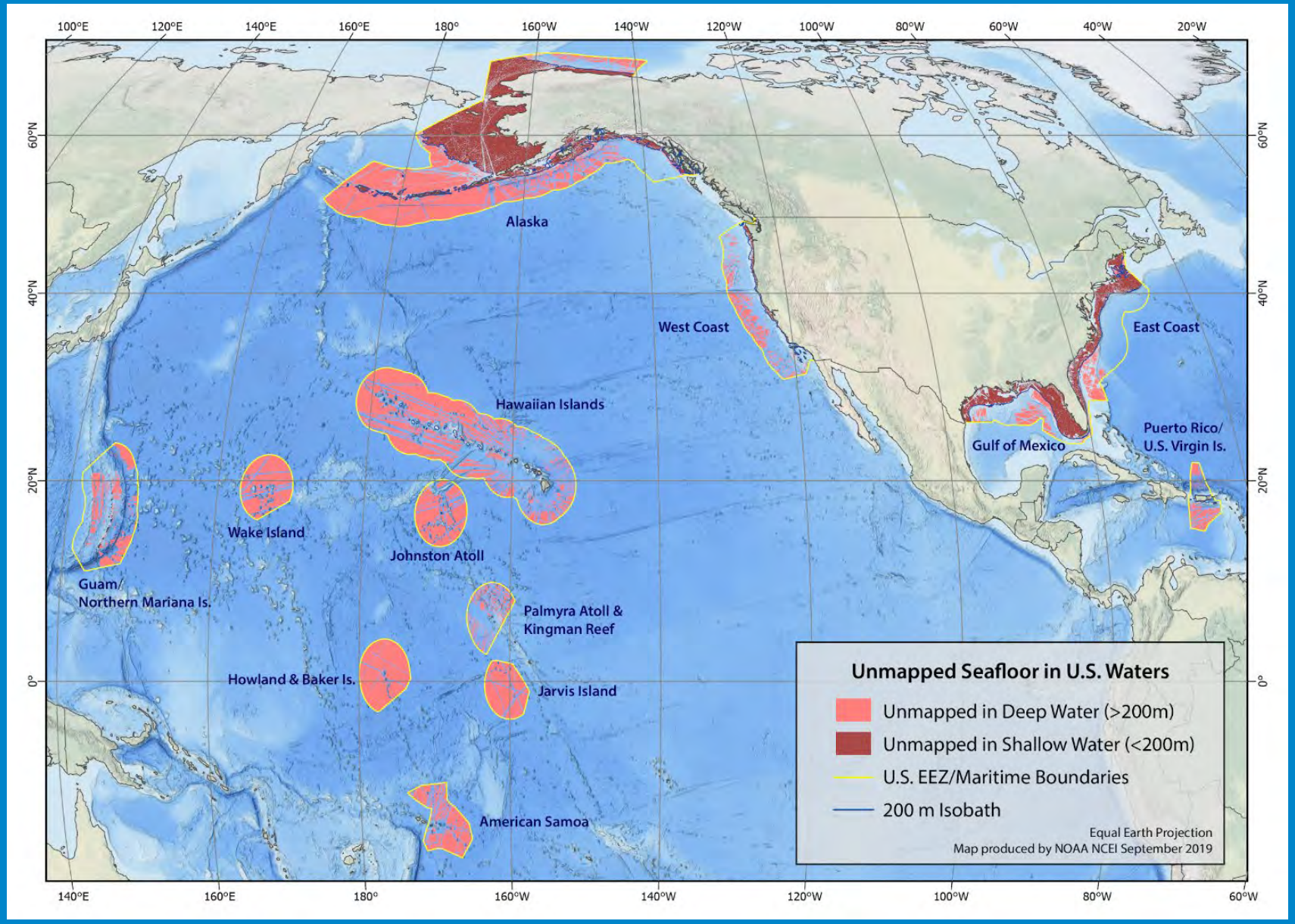


DEEP SEARCH
EXPLORE • INFORM • PROTECT

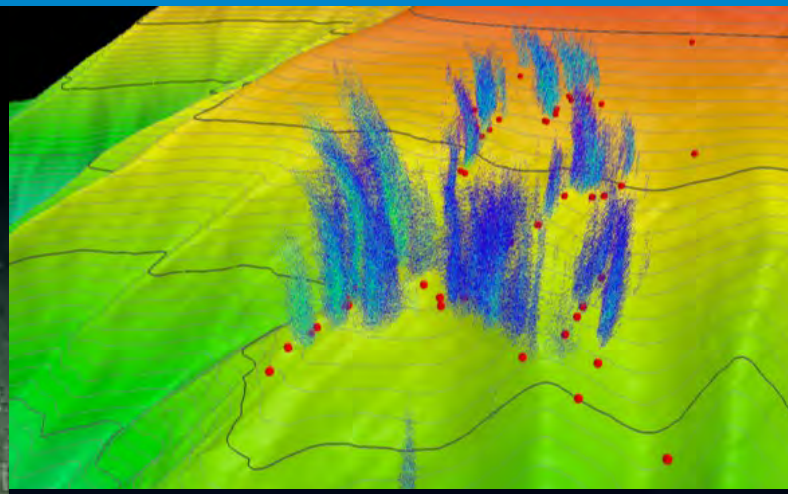

80°W
75°W
70°W
65°W
60°W
55°W
50°W
40°N
35°N
30°N
25°N
20°N
N
81.1% of US EEZ East Coast is now mapped
Majority of this area has been mapped through OER funded projects (77%)
0 50 100 200 300 400
Nautical Miles

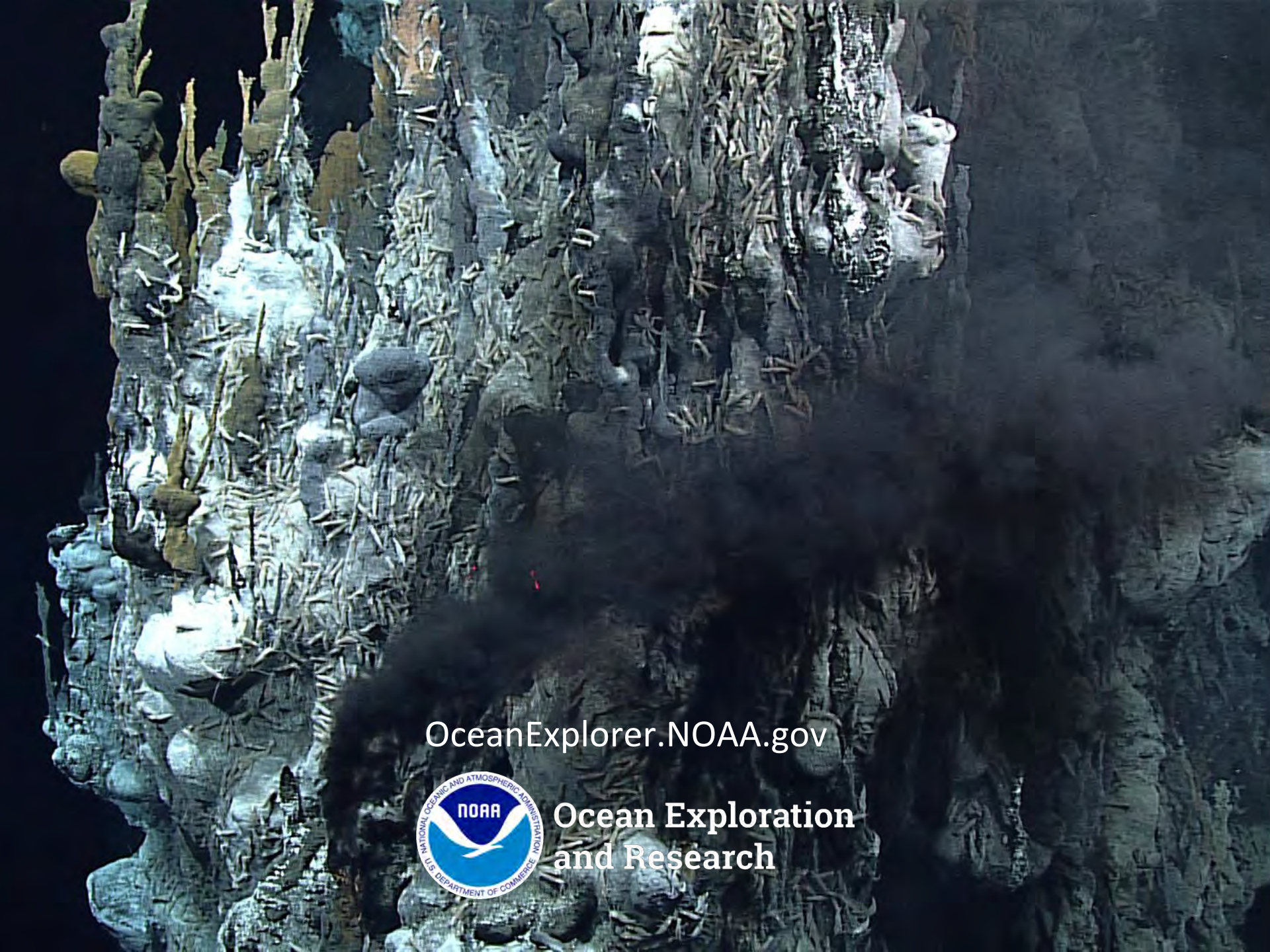

80°W
75°W
70°W
65°W
60°W
55°W
50°W
40°N
35°N
30°N
25°N
20°N
N
Upcoming Surveys
0 65 130 260 390 520
Nautical Miles

Looking to the Future



Campaign Strategies for Decision Support

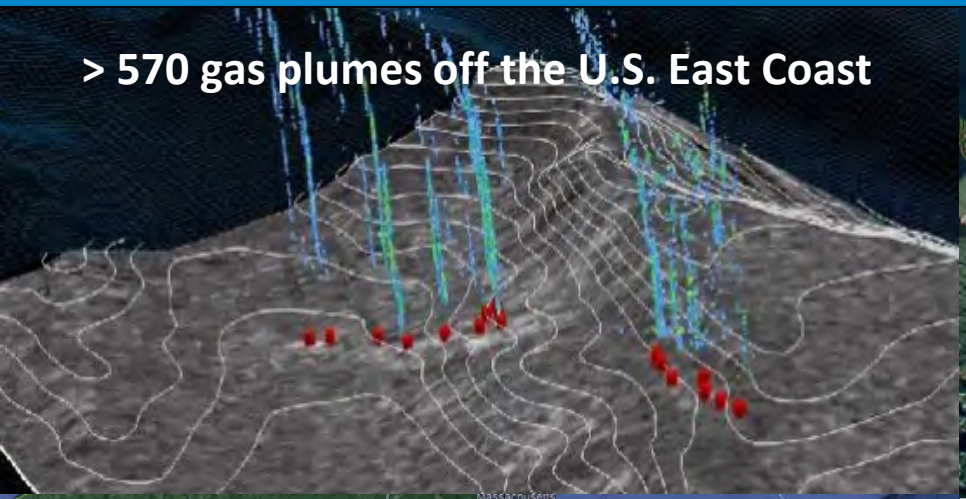


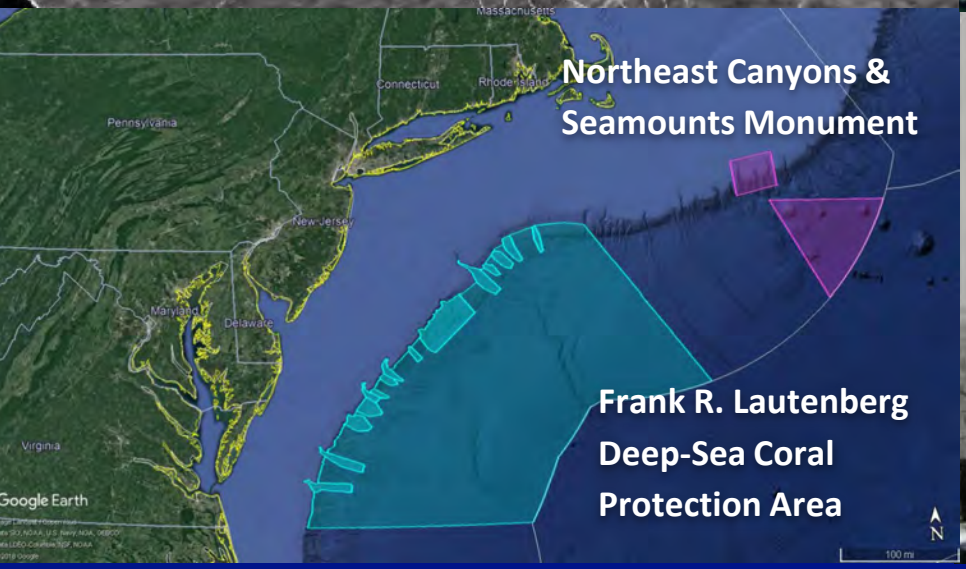

OceanExplorer.NOAA.gov
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
Ocean Exploration
and Research

Exploration Results for Management

Kelley Elliott
Expeditions and Exploration Division

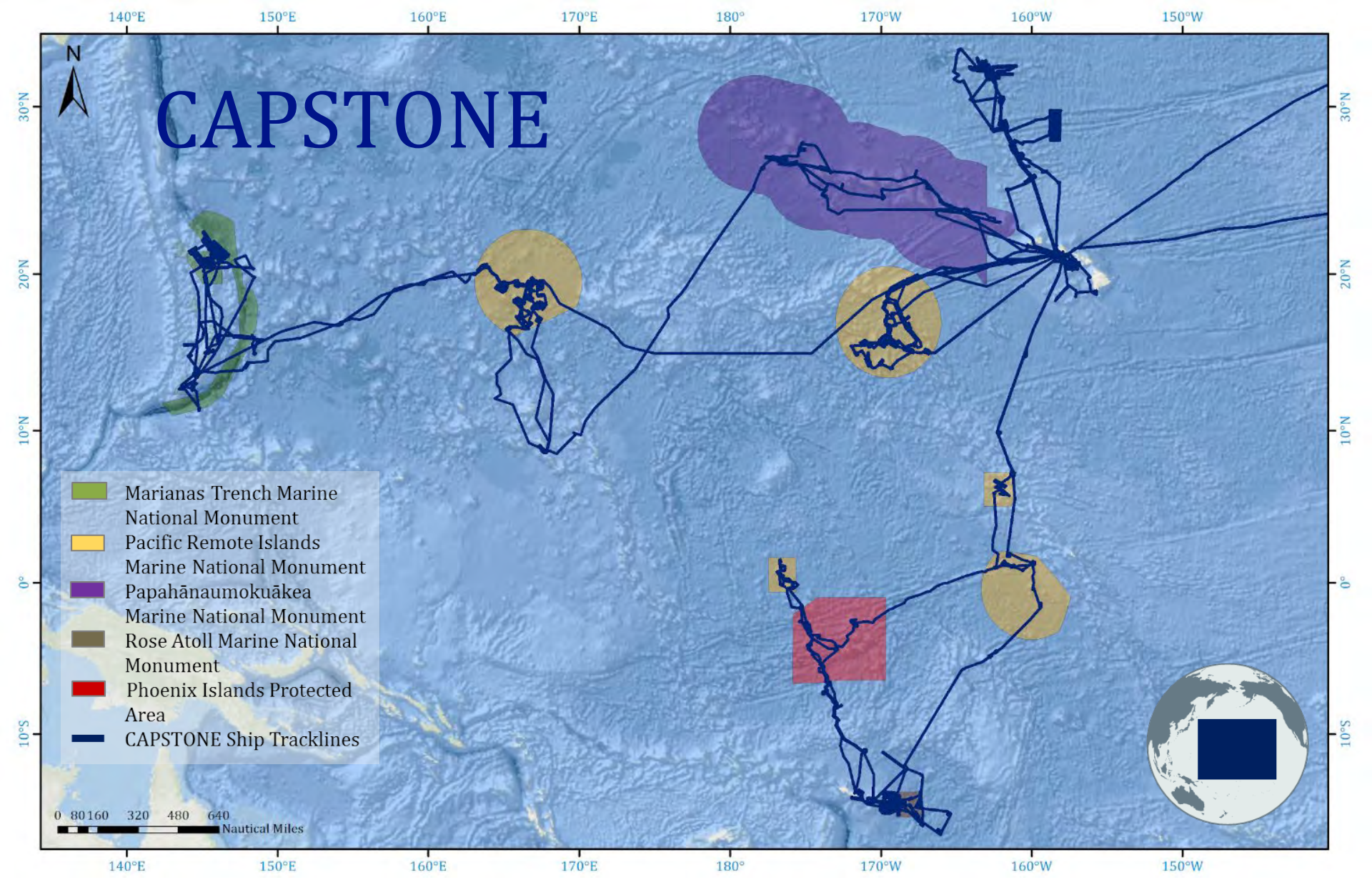
Northeast Canyons Management Highlights



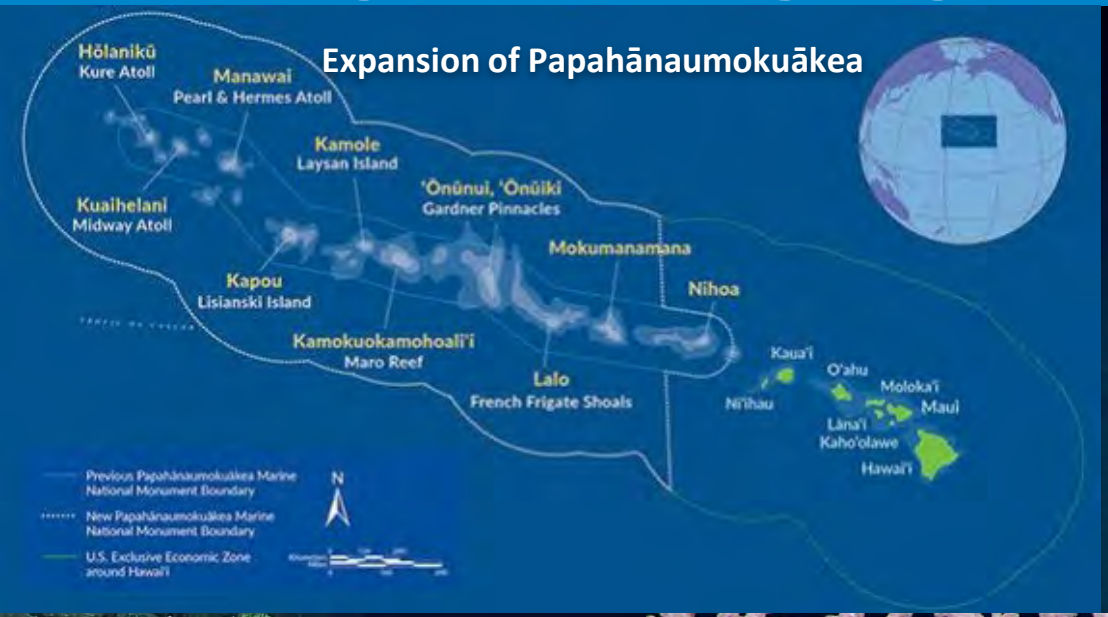


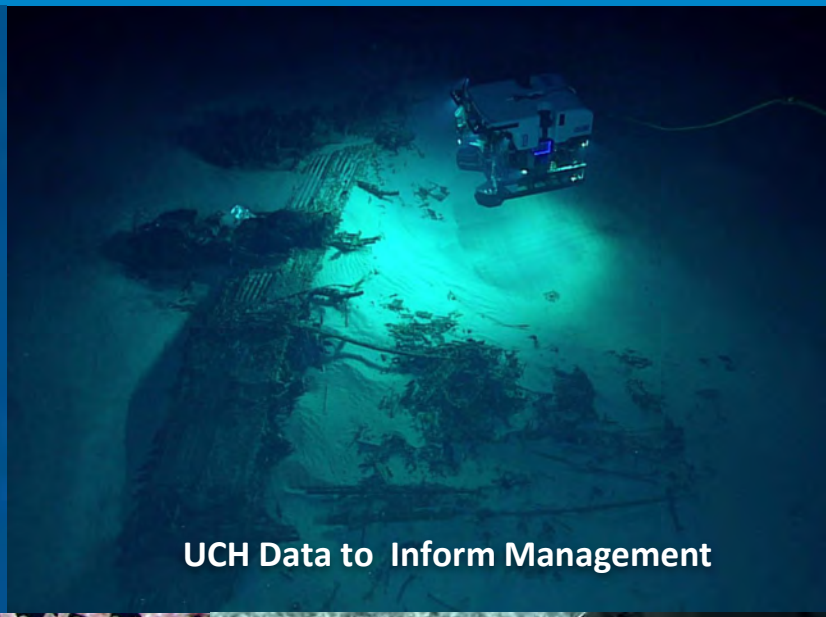
OceanExplorer.NOAA.gov

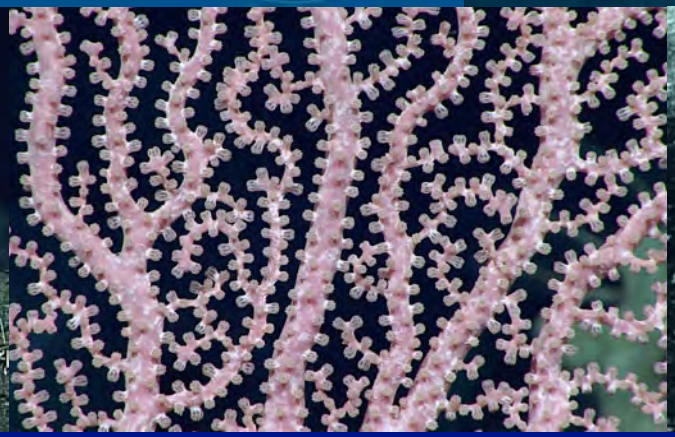
Ocean Exploration and Research


CAPSTONE
N
140°E
150°E
160°E
170°E
180°
170°W
160°W
150°W
30°N
20°N
10°N
0°
10°S
Marianas Trench Marine National Monument
Pacific Remote Islands Marine National Monument
Papahānaumokuākea Marine National Monument
Rose Atoll Marine National Monument
Phoenix Islands Protected Area
CAPSTONE Ship Tracklines
0 80 160 320 480 640
Nautical Miles

CAPSTONE Results: Management Highlights

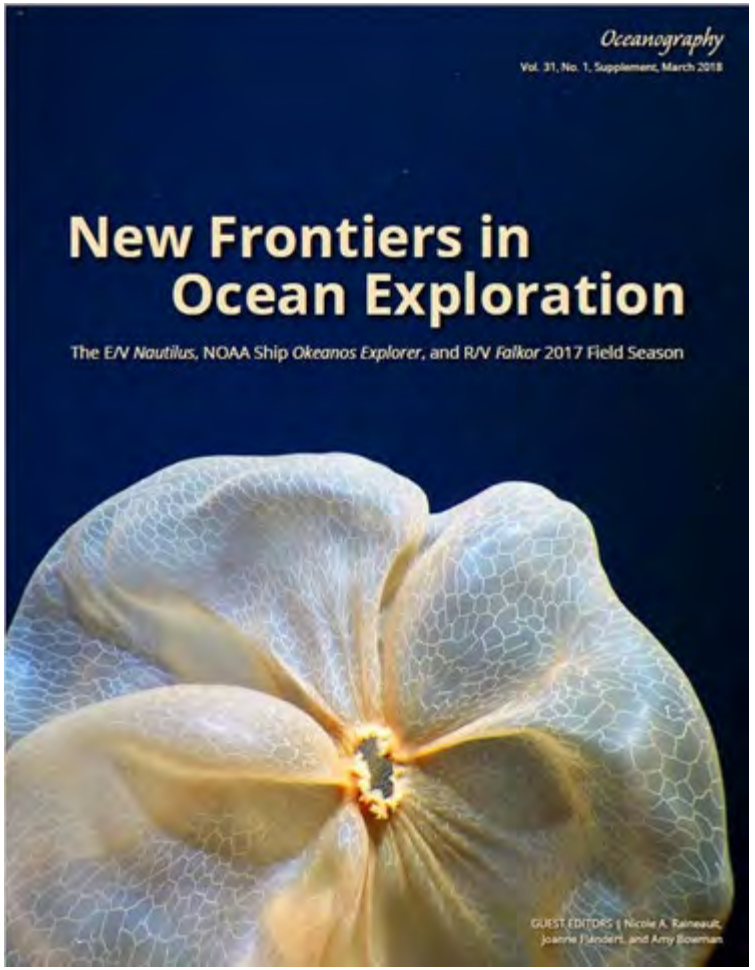




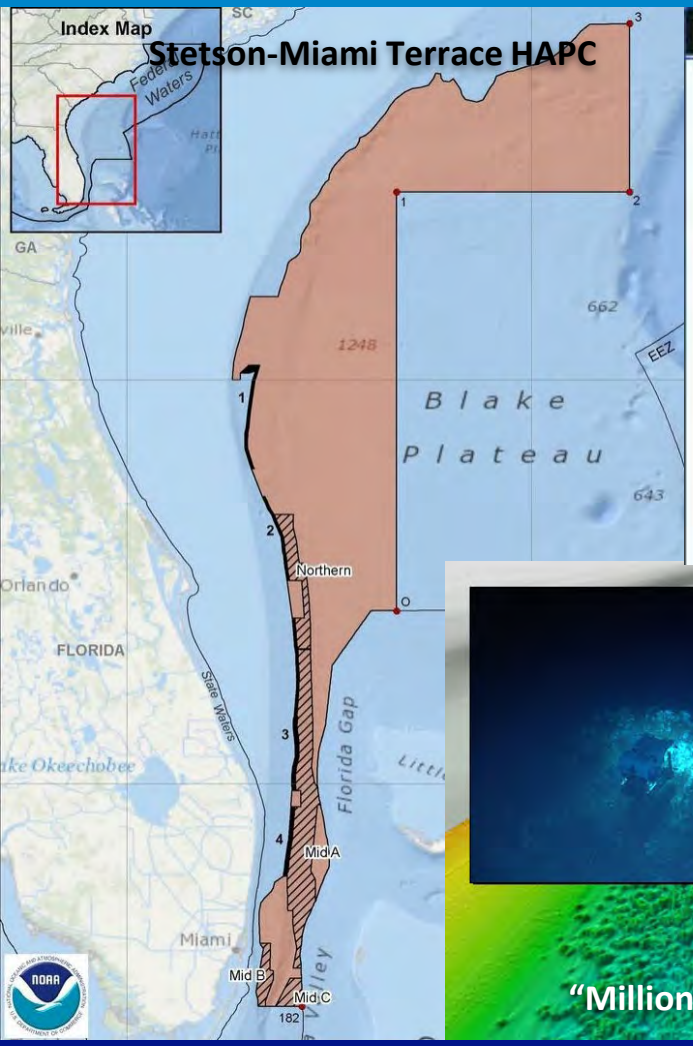


CAPSTONE Science Products

- Oceanography supplement
- Ocean Sciences session
- Frontiers in Marine Sciences research topic
- Deep-Sea Animal Guide
- DSCRTP database Annotations
- Cruise reports
- A foundation of public data

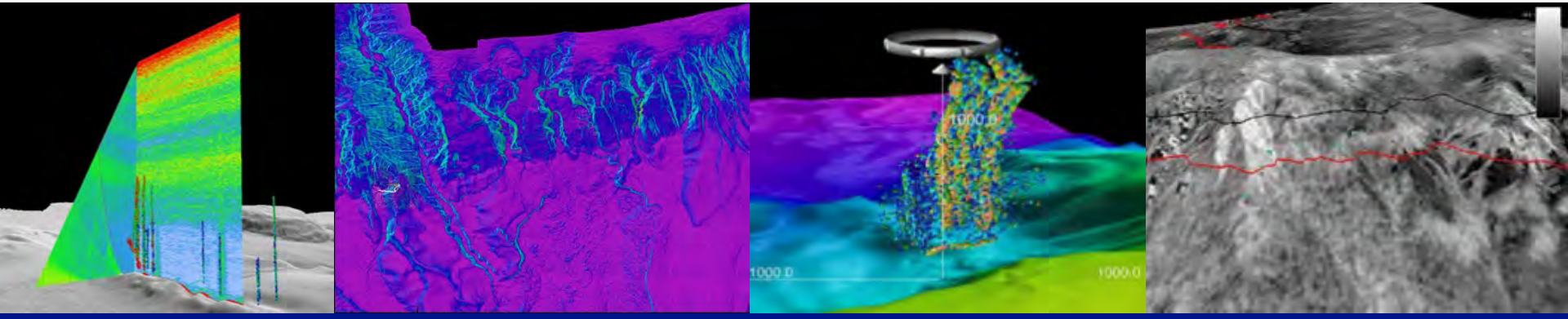


ASPIRE Results to Date



What's Next?

- CAPSTONE and ASPIRE Results Continued…
  - Additional lines of inquiry and analysis
  - Future management decisions and delineations
- Assessment of data & product improvements to enhance future data analysis



How technology can get us to the next level for decision making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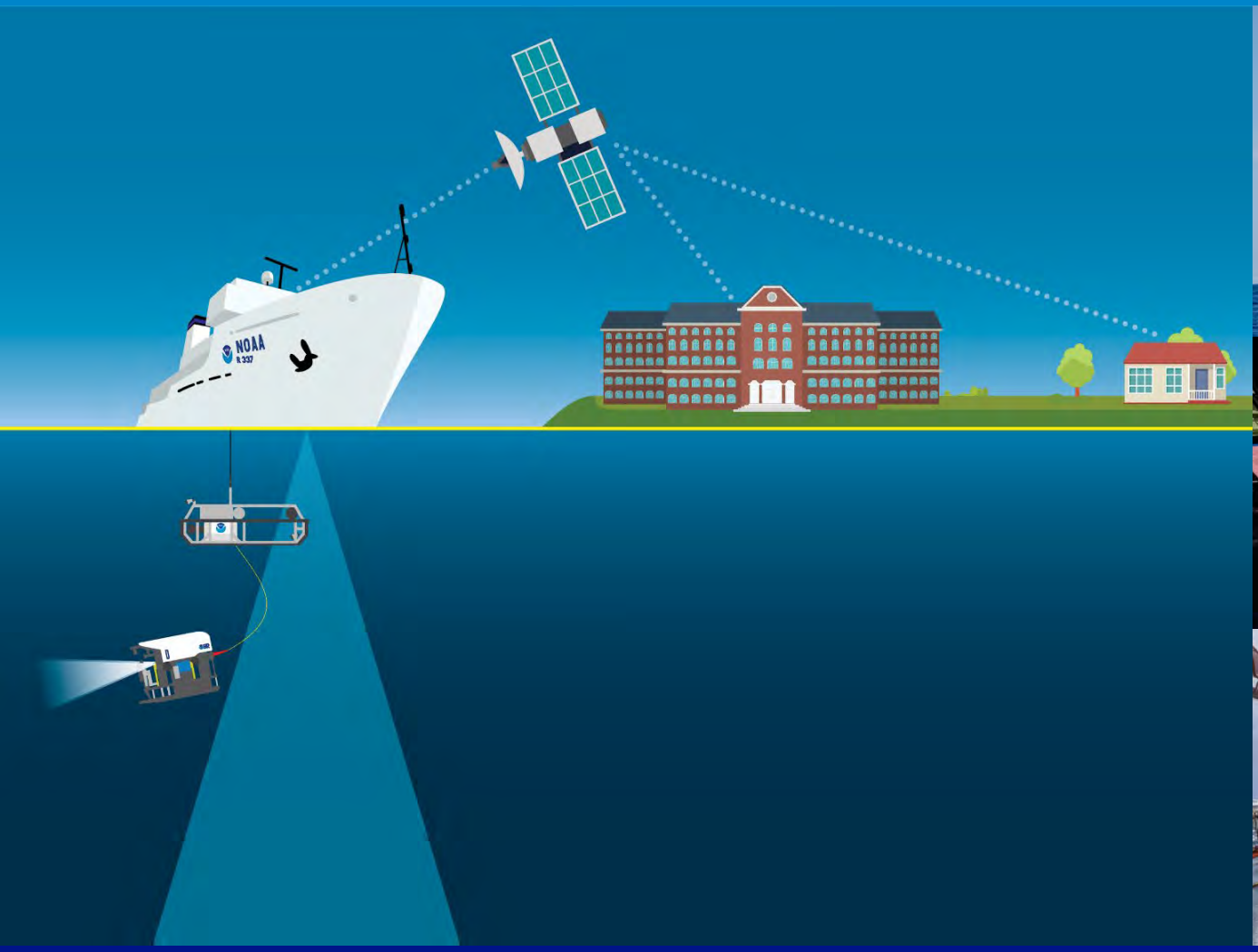
Ocean Exploration
and Research

Innovation for Exploration

Craig Russell
Okeanos Explorer Program Manager

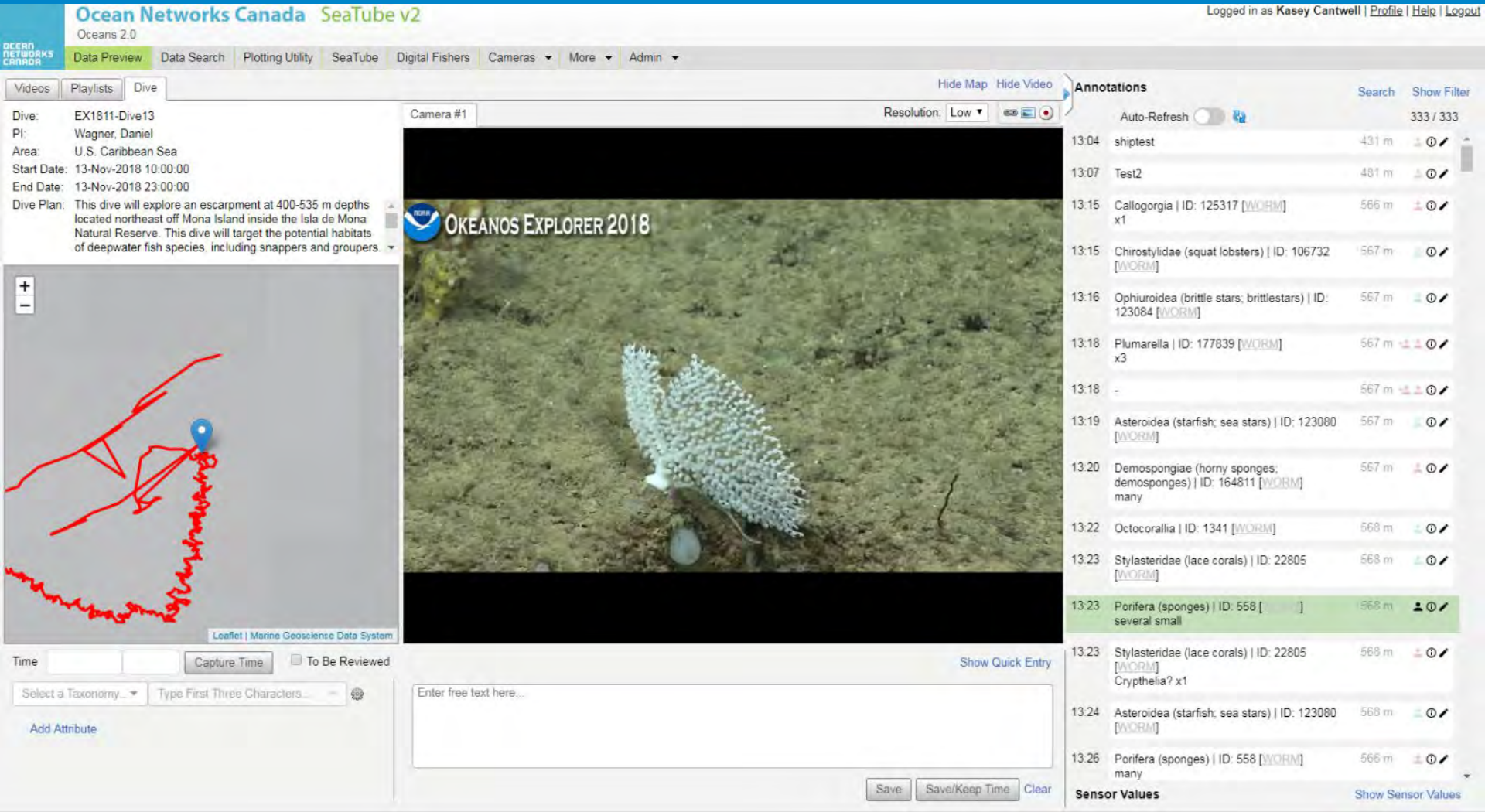
Dedicated Exploration Platform



Telepresence-Enabled Science

Telepresence-Enabled Science

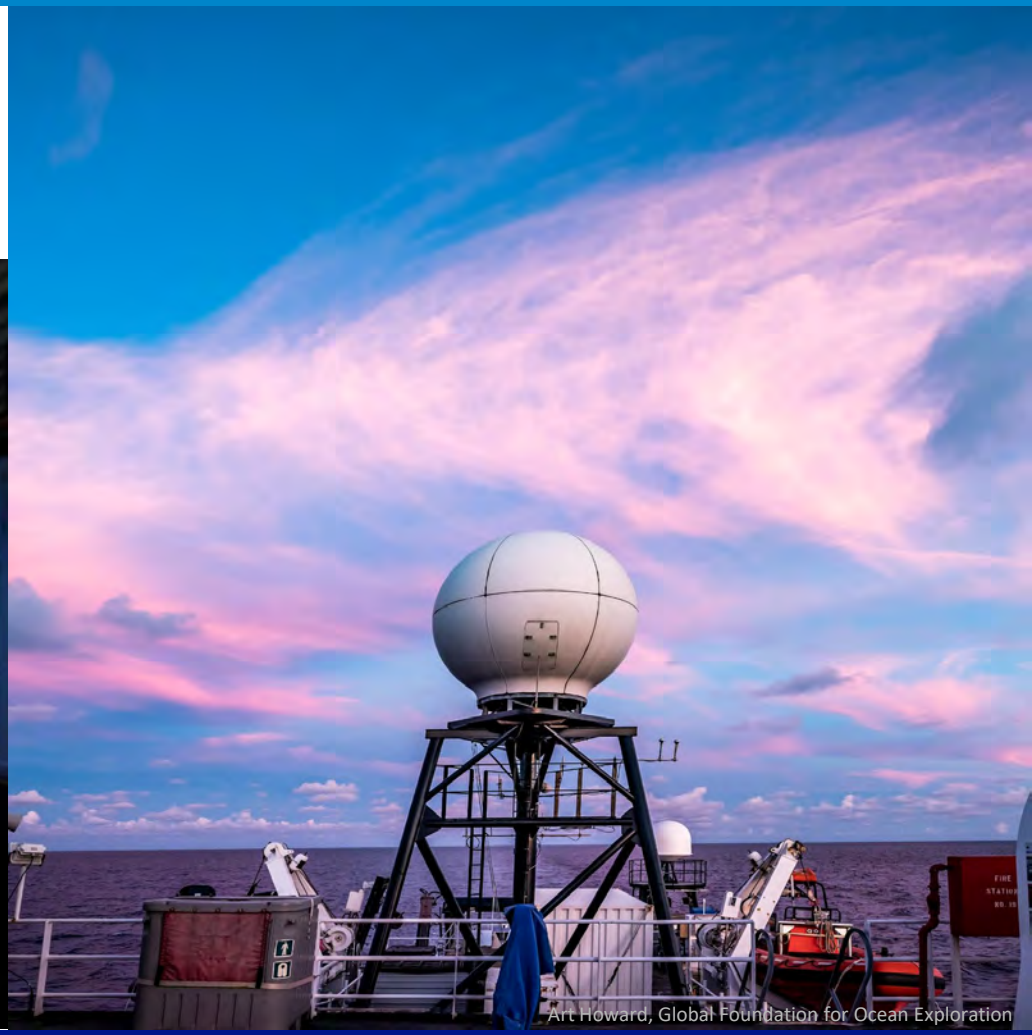
Standard Protocols and Tools



Advanced Telepresence Network

GLOBAL FOUNDATION FOR OCEAN EXPLORATION

VSAT & Network

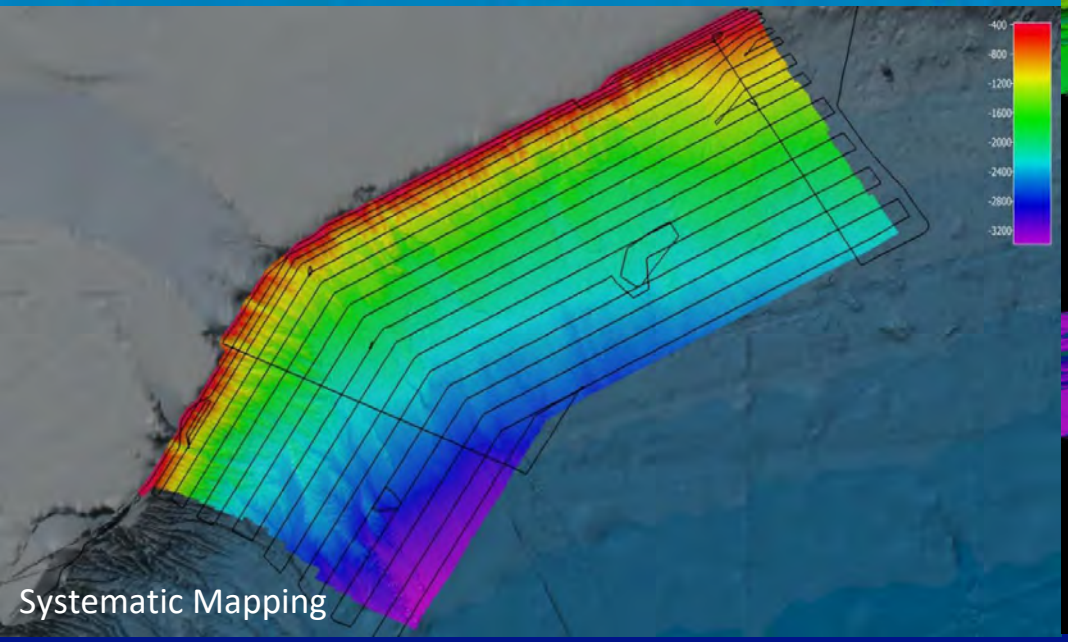


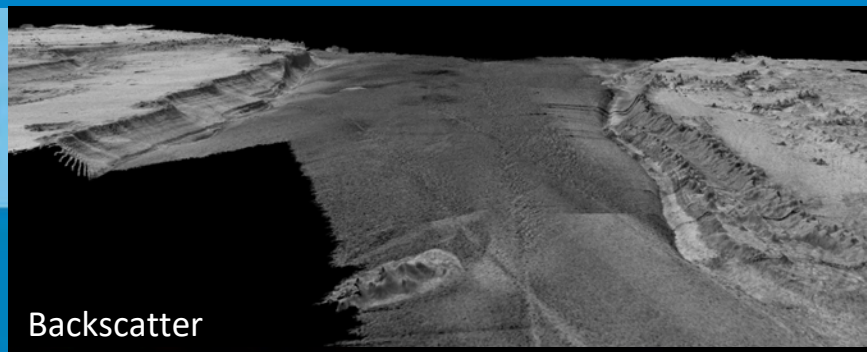
Art Howard, Global Foundation for Ocean Exploration

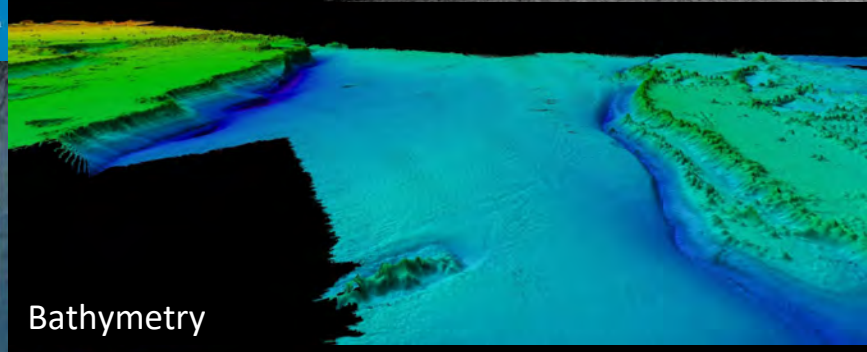
Catalyzing Others

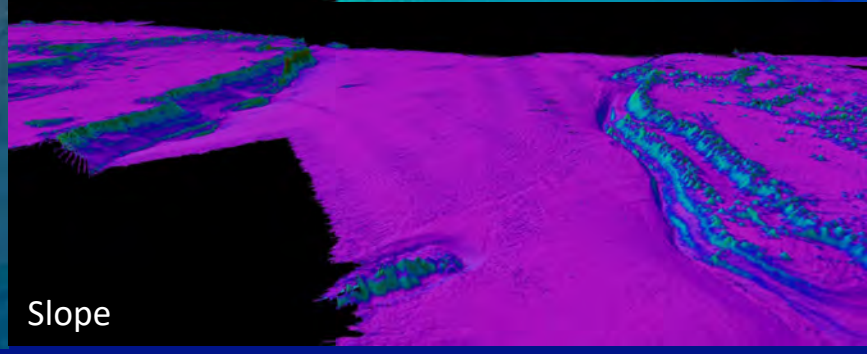
Fly-away VSAT for EXPRESS Campaign on NOAA ship *Reuben Lasker* - Underway

Ocean Mapping Innovation

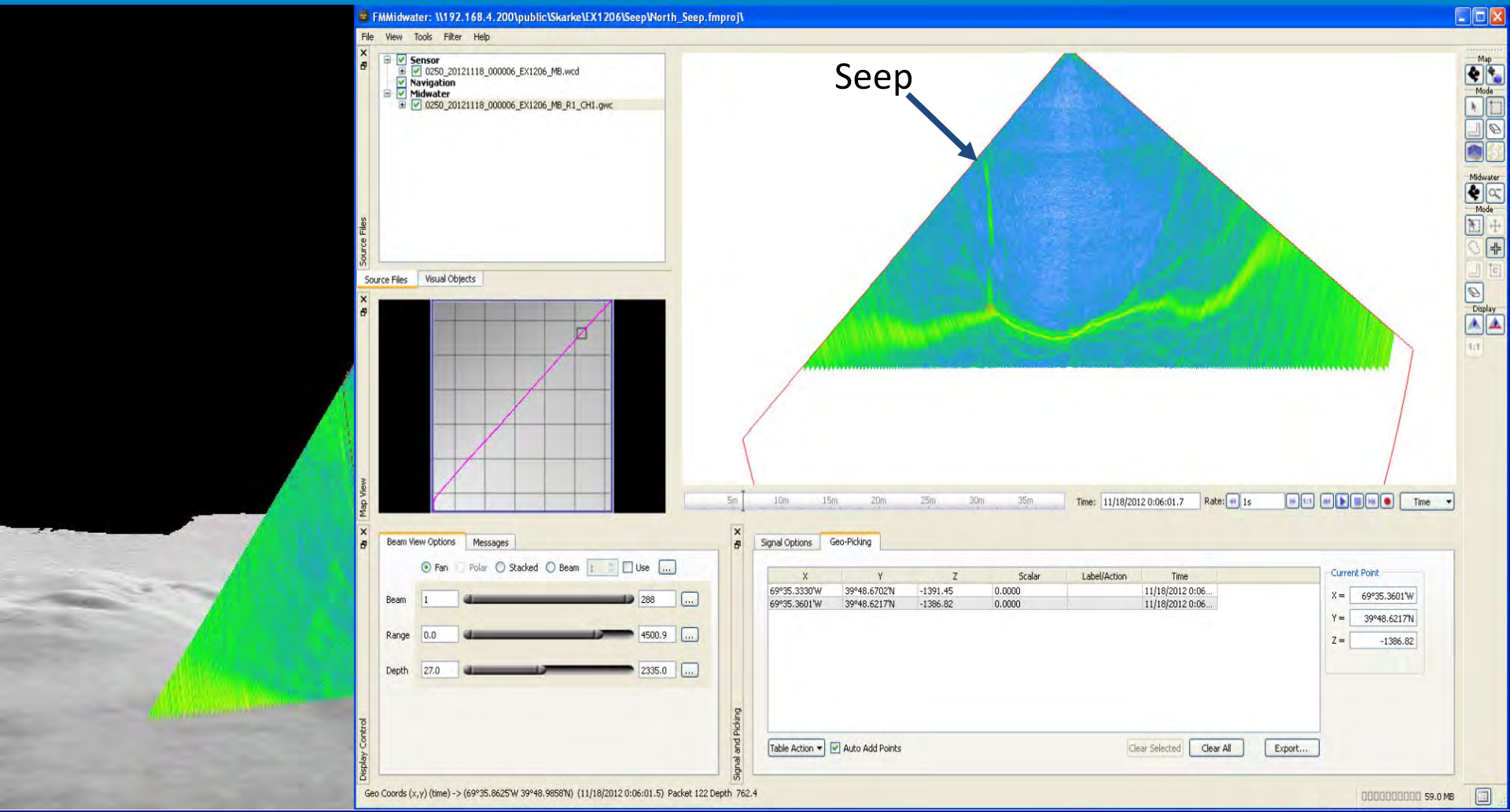






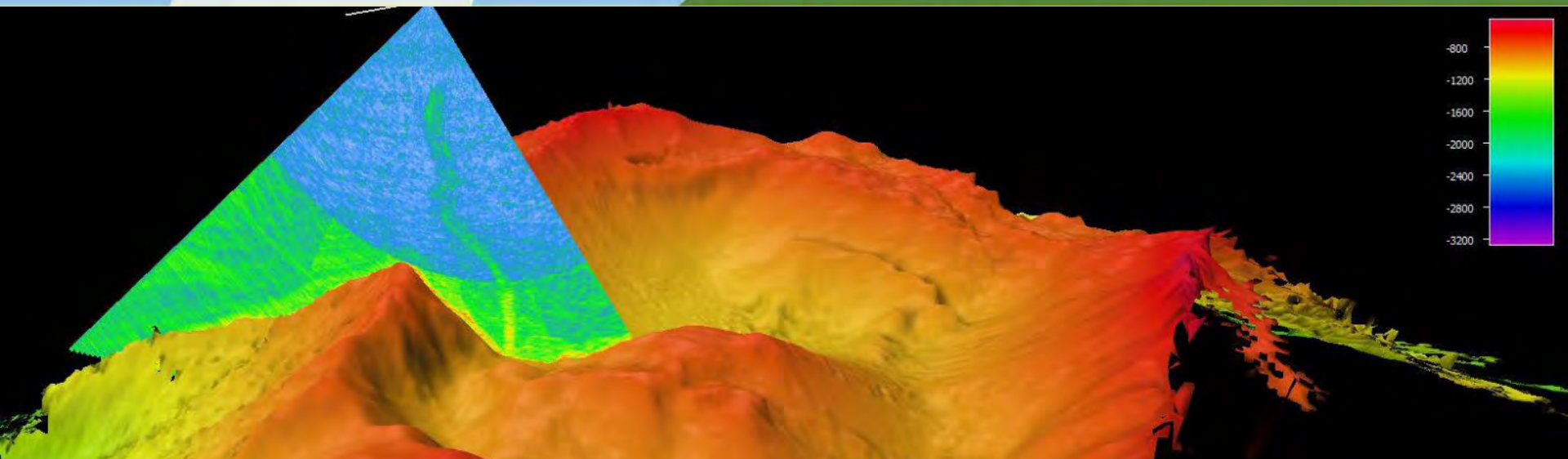


Ocean Mapping Innovation

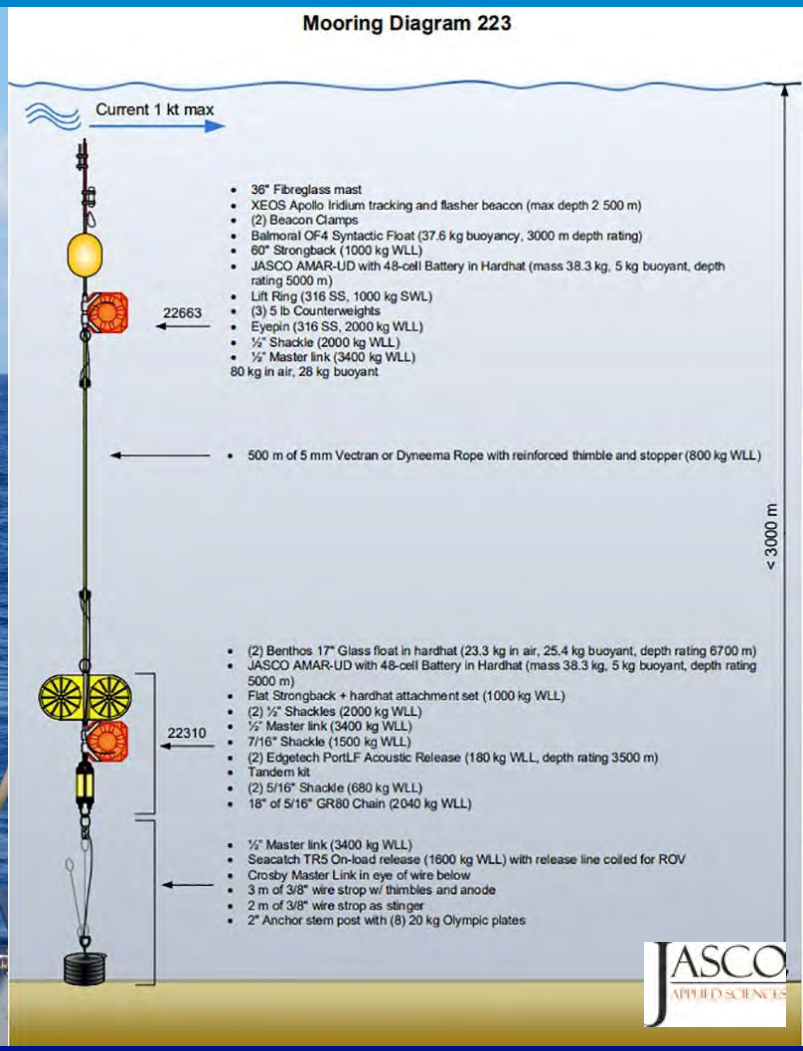


Acoustic Calibration Innovation

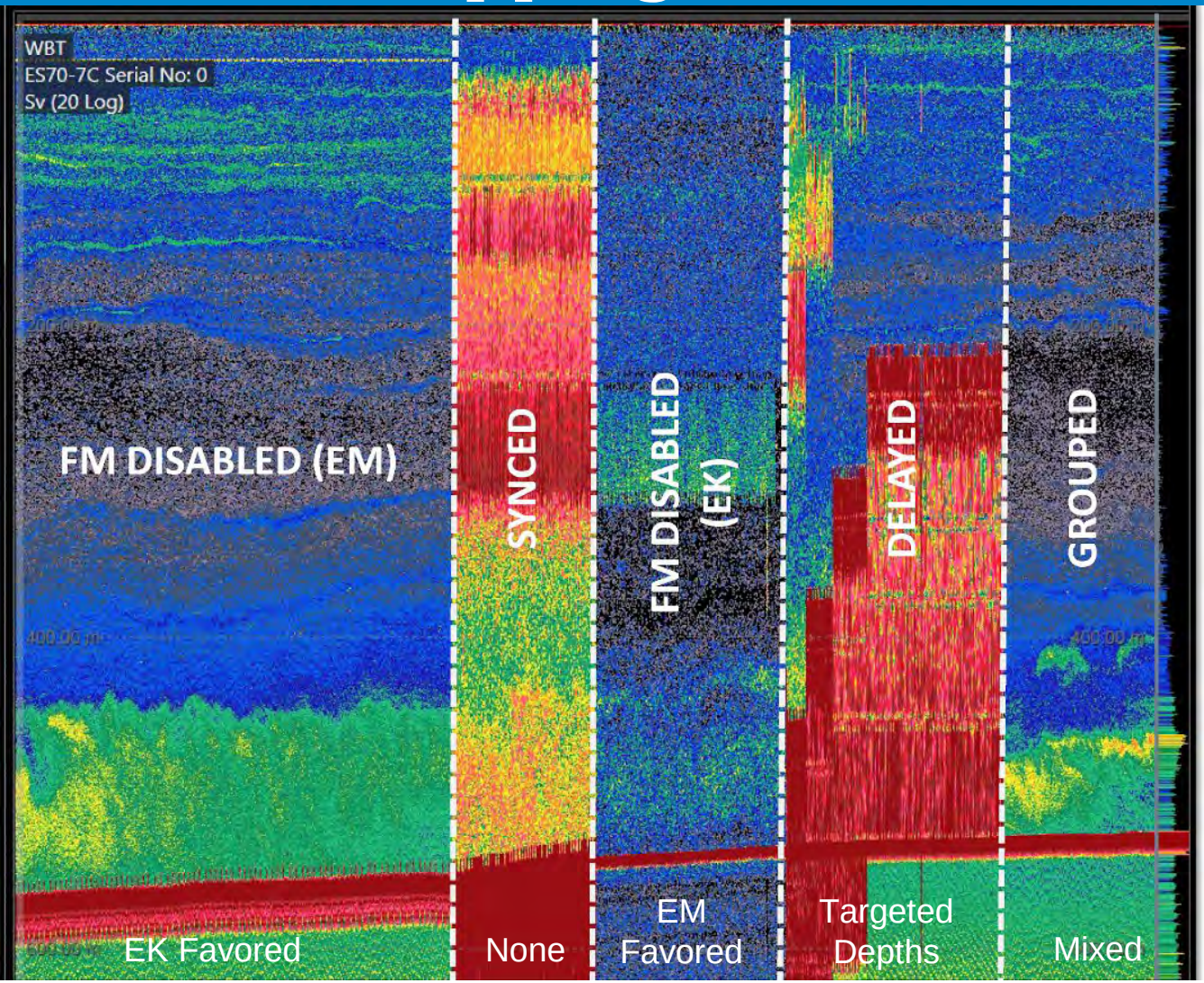
Tele-mapping Innovation



Ocean Mapping Innovation



Ocean Mapping Innovation



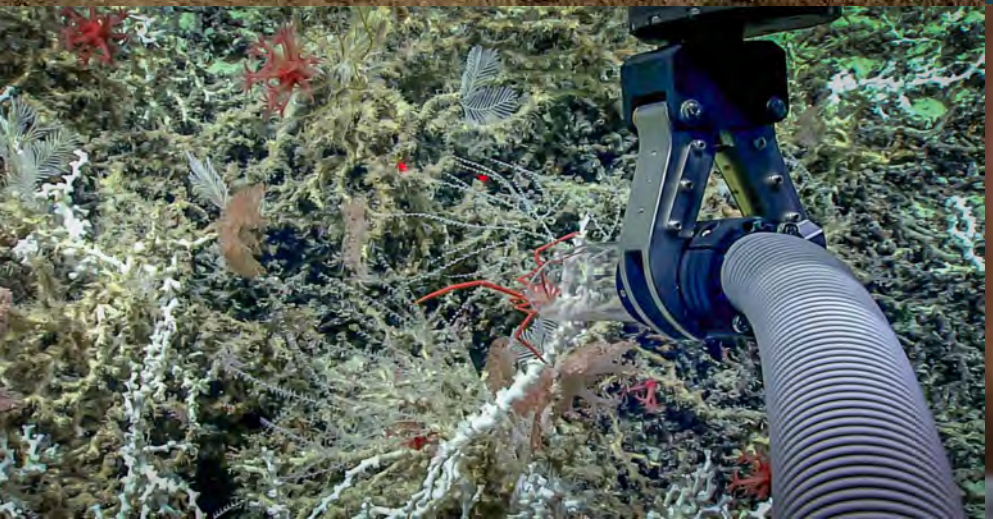
DEEP (FM) SYNCHRONIZATION OPTIONS

1. Disable FM in EM302
2. Synchronize all sonars to fire at once
3. Disable FM in EK80 70 kHz
4. Delay EK in EK80 software
5. Group in KSync

ROV Operations Innovation

ROV Operations Innovations

ROV Operations Innovations

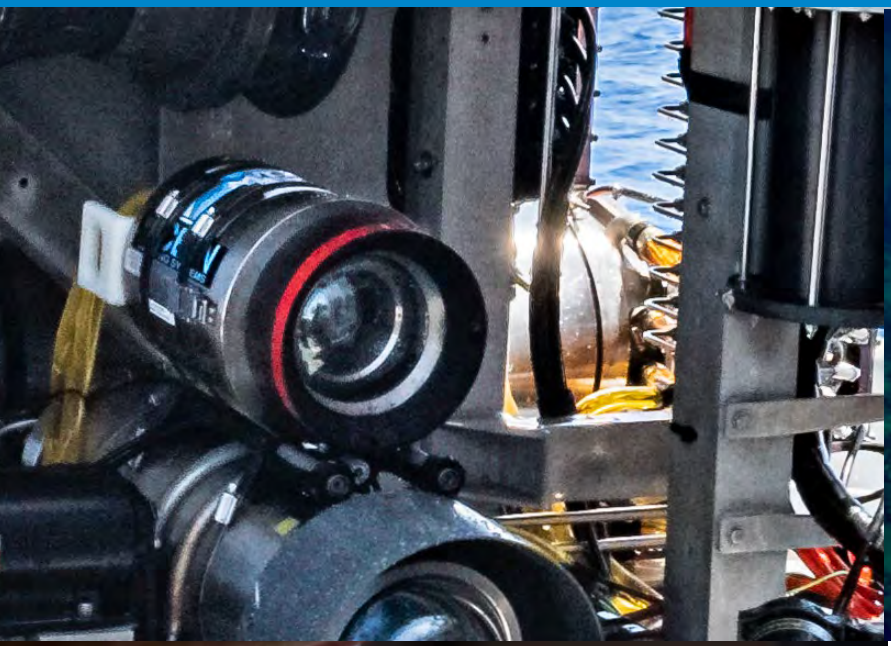


Sample Collections Legacy

1248 Biological Samples
(including associates)

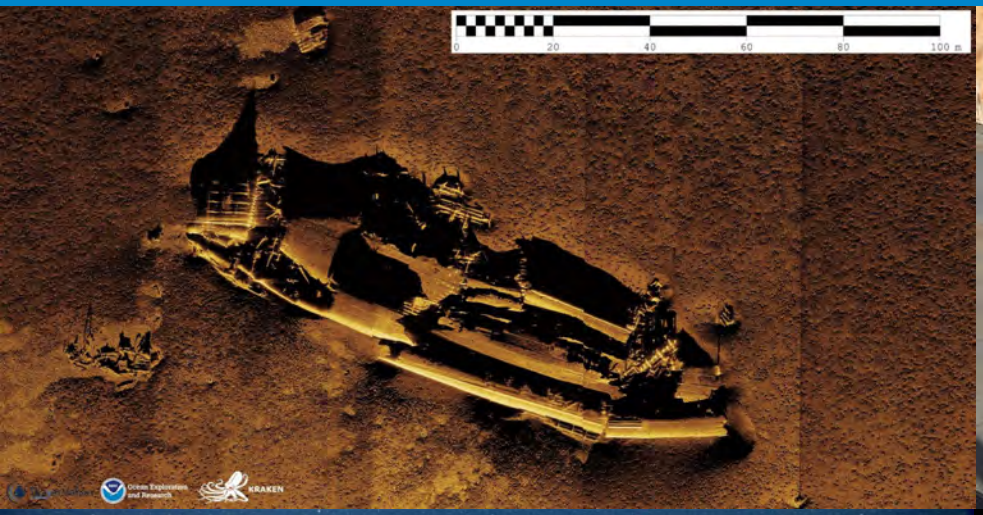
383 Geological Samples

ROV Operations Innovations

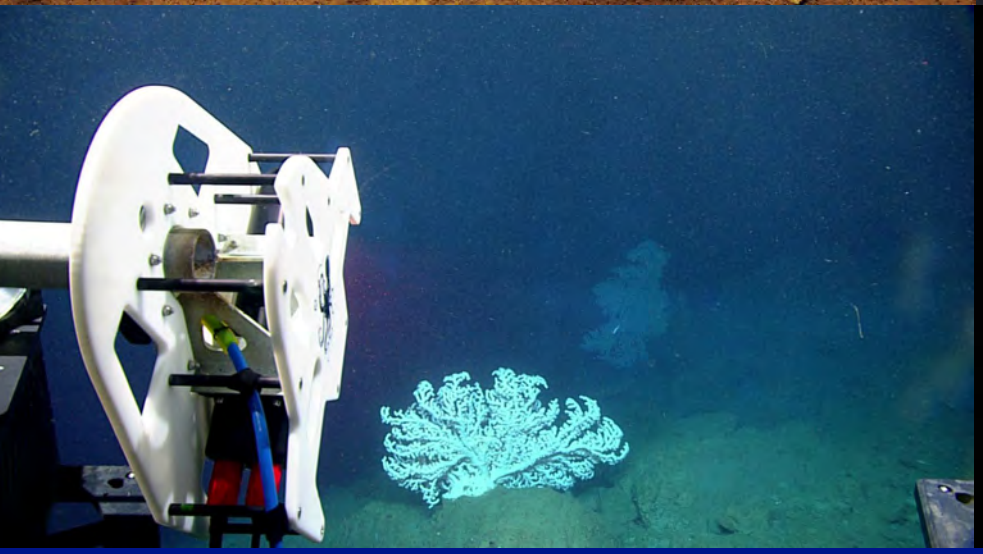


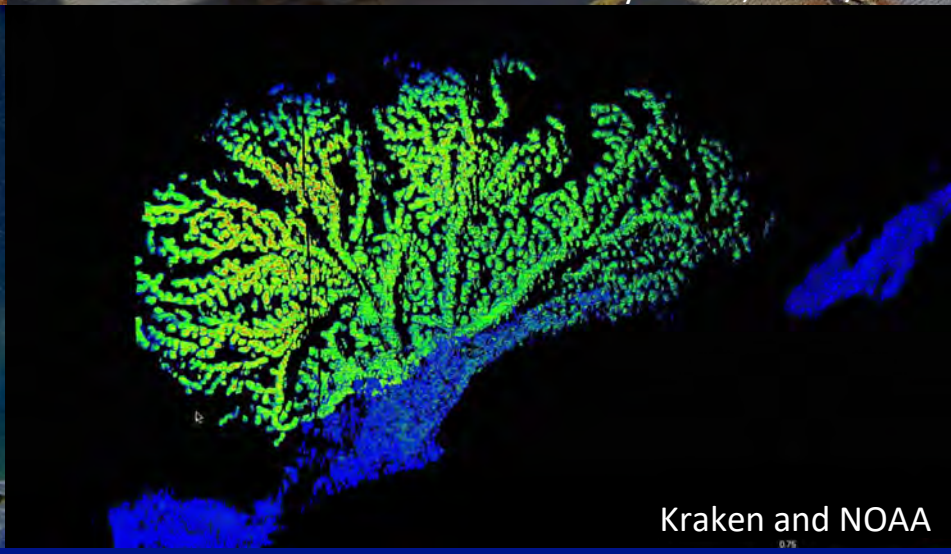
BOEM
Bureau of Ocean Energy Management

Technology Demonstrations



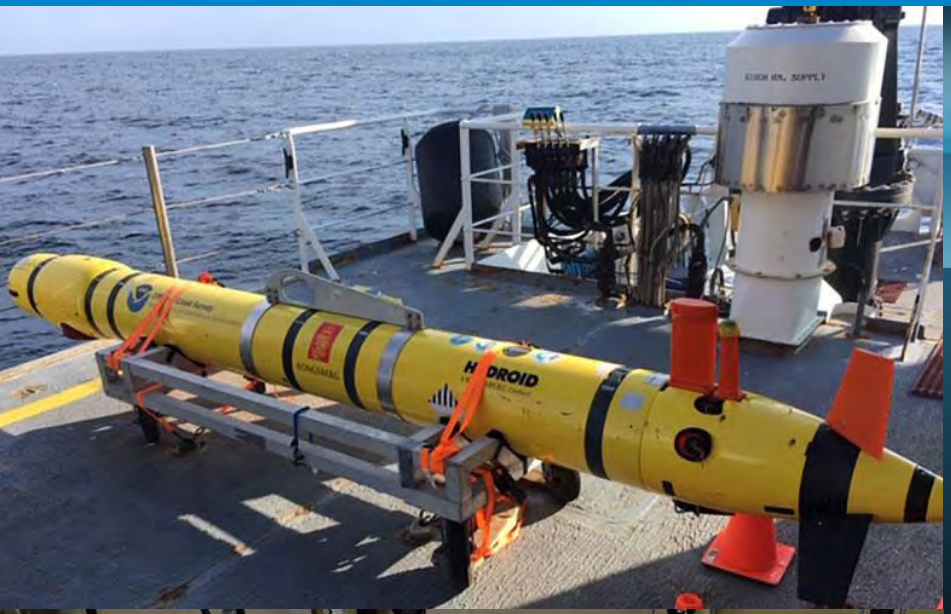
Barry Eakins, CIRES/NCEI

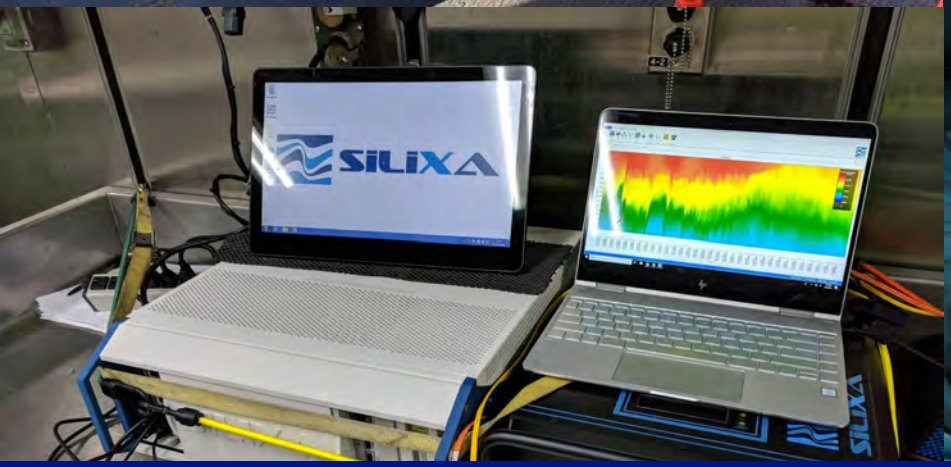


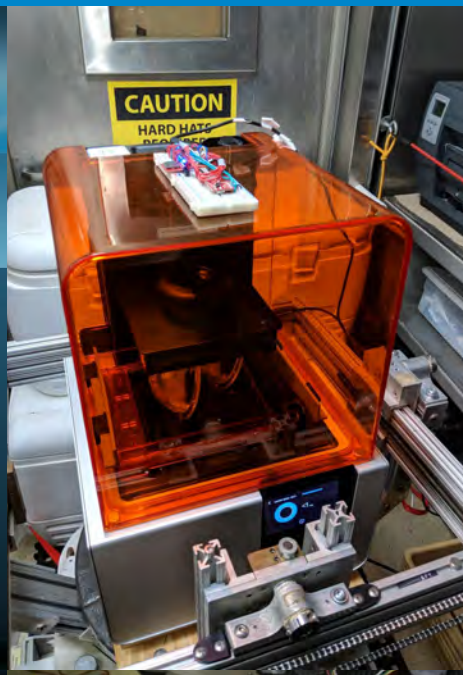


Kraken and NOAA

Technology Demonstrations







Looking to the Future

Full Tele-mapping Test

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