CFRF/WHOI Shelf Research Fleet

Glen Gawarkiewicz and Frank Bahr, WHOI
Aubrey Ellertson and Dave Bethoney, CFRF
Housekeeping for Google Meets

- You can enter questions in chat box. This will be seen by everyone.

- When someone is presenting, please keep yourself muted (red), and then unmute to speak.

- How to turn mic on
- Hang up call
- Raise hand
- Turn video on and off
Introductions

Salinity Intrusion Project

Shelf Research Fleet Update

Data Summary

Industry Input & Discussion

Pioneer Array Data Update

Future Directions

Discussion & Closing Remarks
Introductions

- I am going to unmute each of you and ask that you introduce yourself:
  - Name
  - Affiliation
  - If in the fishing community please say: where you fish out of, and for what species, gear type
SALINITY MAXIMUM INTRUSIONS ON THE NEW ENGLAND SHELF
• Use historical oceanographic data and reports from fishing partners to identify likely positions for these salty intrusions for research cruises to investigate.

• Map mid-depth salinity maximum intrusions and establish how far they travel inshore, at what depth, and thickness using Autonomous Underwater Vehicles (AUVs)

• Measure turbulence and mixing characteristics

• Determine nature of organisms riding onshore in intrusion (through acoustics, and net tows). Does it affect the fishery?
• Brochure: March 2021
  Project Description
  Results

Cruise Schedule

How You Can Participate- WE NEED YOUR HELP

Report Events: temperature, salinity, depth, location

• Workshop: Fall 2021
CFRF/WHOI Shelf Research Fleet

- Project Goals:
  - study the oceanographic conditions across the continental shelf off the coast of RI
  - Fishing vessels collect temperature, salinity, depth from six designated study zones
  - Each F/V samples 2 stations every other week
  - Currently funded through June 2021
Huge thank you to our fleet participants!

• Brooke C, Erica Knight, Excalibur, Finast Kind II, Harvest Moon, Mister G

• We would also like to formally welcome our newest member: Rob Walz, FV Finast Kind II
Progress to Date

691 profiles as of March '21
Numerous media interactions (WBUR Boston NPR, WHOI)

"It’s tough to define essential workers, but certainly monitoring the health of the ocean is essential.”
– Mark Sweitzer

Photo credit: Robin Lubbock/WBUR

Photo credit: Aubrey Ellertson
Temperature Data by Month and Zone

http://science.whoi.edu/users/seasoar/crfwhoi/
Salinity Data by Month and Zone
Glen Gawarkiewicz, Physical Oceanographer, WHOI
Shelfbreak Front

- Winter cooling, convection
- Summer heating
- Fresh water input
- Wind response
- Intrusion
- Seasonal pycnocline
- Shelfbreak processes

Salinity

Temperature

2016 REMUS, salinity

2016 REMUS, temperature
Pioneer Array- Inshore Mooring- At 45 fathoms
Pioneer Array - Data from Inshore Mooring
Depth - 21 feet

Salinity - Jan. 1, 2020 to Dec. 31, 2020

Shelf Water < 33 PSU  Frontal Water 34 - 35 PSU  Slope Water 35.0-35.2 PSU
Ring Water > 35.5 PSU

High salinity 35.0 October
Low Salinity- 31.5 First week August
Pioneer Array - Inshore Mooring - At 45 fathoms

Very warm!
First week August 80 Deg F

Still pretty warm
October 70 Deg F
Pioneer Array Inshore Mooring - 45 fathoms

Very buoyant water (low density) May be highest stratification (density difference with depth) recorded in first week of August
Sea Surface Temperature

August 1, 2020

October 16, 2020
Surface Temperature and Salinity
Last week July 2015-2020 (from L. Lobert)

2020 Very Warm!!!

2019 and 2020 Very Fresh!

2020 Very buoyant (low density)
Shelf Fleet Profile - August 1, 2020

Surface Temperature
73 Deg F

Surface Salinity
31.8 PSU
Shelf Fleet Profile - September 24, 2020

Zone 4, 2020/09/24 19:20, RBR 206

Salinity Maximum
Shelf Fleet Profile - December 27, 2020

Depth 38 fathoms

4 Deg. F jump
Near bottom

1.0 PSU Salinity
Jump near bottom

Region 4, 2020/12/27 23:37, RBR 206

- Delta T = 4.2 Deg F
- Delta S = 1.1 ppt

S upper = 33.8 ppt
S intrusion = 34.9 ppt

VERY LARGE!!!
Salinity Intrusions

• Mid-depth intrusions May-October
• 70% more frequent 2015-2019 than before 2003
• Profiles frequently have multiple salinity maxima (2-4)
• Big question- do squid or other species concentrate in the intrusions?
Warm Core Ring Update (Avijit Gangopadhyay)

Read the full scope of the study titled “Interannual and seasonal asymmetries in Gulf Stream Ring Formations from 1980 to 2019,” in *Nature Scientific Reports*.
Discussion:

• “58 on the bottom seemed to shut the crabs right off”
• “We caught the most octopus this year.”
• “Lots of jellyfish”
Pioneer Array Operations Summary

• 2020 Mooring service cruises were limited
  • Still maintained all seven mooring sites (plus gliders, but no AUVs)
  • Moorings left in the water longer, some data gaps
• Overall good operational status through 2020
  • One fishing vessel interaction at the Upstream Inshore site
  • Hope and Sydney (John Ainsworth), 8 Dec 2020
• New data delivery interface: “Data Explorer”
• Expect to return to full mooring service in 2021
  • First cruise of the year scheduled for Mar/Apr
  • R/V Armstrong out of Woods Hole
Potential Pioneer Array Relocation

- Conceived as a re-locatable observing system
  - Same assets could be deployed elsewhere in US coastal ocean
  - Address different science questions at the new location
  - Potential move would be in 2-3 years (e.g. Fall 2023)

- Also possible that the Array stays where it is
  - The NE Shelf is changing, strong motivation to keep observing

- Decision process is starting
  - National Science Foundation sponsoring workshops
  - Decision expected by the end of the summer
Collaboration with Shelfbreak Acoustics

- OOI is working with New England Shelf Break Acoustics (NESBA)
  - NESBA “Acoustic Telescope” mooring at the Pioneer Offshore site
  - Goal is to transfer data by WiFi from the NESBA mooring to the OOI mooring, then from the OOI mooring to shore
- NESBA mooring will be deployed in April for a short-term test
- Additional NESBA moorings will be part of a process study to be conducted in May
New England Shelfbreak Acoustics

Real-time Acoustic Propagation Experiment       Late April-early June (6 weeks)
NSF Coastlines and People Proposal

• Would fund Shelf Research Fleet for 5 years
• Would fund 2 graduate students (Lukas Lobert and Elena Perez)
• Tie-ins to Governor’s Offices and Sustainability Offices throughout New England
• Would fund research into storms as well as Warm Core Ring linkages to squid and other species
Future Communications

• Considering developing short videos on specific ocean processes (salinity intrusions, response to storms, marine heatwaves)

• Develop a video library that could also include topics like Autonomous Underwater Vehicles, the Pioneer Array, Jet Stream variability and link to Arctic warming
Thank you for joining us!

For Shelf Research Fleet data access and visualization please visit:

http://science.whoi.edu/users/seasoar/cfrfwhoi/