Session 2.d: New Technologies to Study and Teach Climate Variability

Focus on Issue and Discuss Technologies
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Oceanographic gear deployment – NOAA Ship Delaware II – February 2011
Northeast U.S. Continental Shelf

Wide-array of observing activities
Research Vessels
Merchant Vessels
Fishing Gear
Nets
Instruments
Drifters
Technologies

- Long-term observations
- Ships
- Fixed Measurements (e.g., moorings)
- Satellites
- Models
- Autonomous Samplers
- Data Integration
Take Home Points

• Climate Variability and Change
• Fisheries Effective by Climate (and Fishing)
• Winners and Losers in the Region

15 mm lobster – Georges Bank – June 2012
2012 Warmest Summer on the Northeast U.S. Shelf
2012 Warmest Summer on the Northeast U.S. Shelf
Climate Variability and Change

**Change** – long-term difference (18%)  
> decades

**Variability** – short & medium term (82%)  
years, El Niño, North Atlantic Oscillation
Fisheries Effected by Climate (& Fishing)
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Fisheries Effected by Climate (\& Fishing)
Fisheries Effected by Climate (& Fishing)

Fisheries

Fishing      XX
Climate Change  X
Climate Variability  XX
Other           X(X?)

http://www.nefsc.noaa.gov/rcb/photogallery/sharks/sharks.html
Climate Variability and Change

Projected Northeast U.S. Marine Ecosystem Summer Temperature
Climate Variability and Change

General Circulation Models

Simulate Atmosphere-Ocean-Earth System

Used by IPCC to make global climate projections
Climate Variability and Change

Projected Northeast U.S. Marine Ecosystem Summer Temperature
Winners and Losers in the Region

Atlantic croaker – a potential ‘winner’ of climate change in the northeast region

Atlantic cod – a potential ‘loser’ of climate change in the northeast region
Climate Factors

- Temperature
- Salinity
- Stratification
- Ocean Circulation
- Ocean Acidification
- Primary Production

Projected Change in Temperature
1965-2005 compared to 2060-2099
Climate Factors

Hurricanes – Variability and Change(?)

Photo Credit: Stephen Coyne
https://www.facebook.com/NewportBuzz

List of New England hurricanes

<table>
<thead>
<tr>
<th>Storm</th>
<th>Category</th>
<th>Peak intensity</th>
<th>Intensity at landfall</th>
<th>Season</th>
<th>Date of landfall</th>
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<td>Category 3</td>
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Climate Factors

- Storm frequency
- Storm strength
- Sea level

http://www.sciencemag.org/content/327/5964/454.full
Climate Factors

- Storm frequency
- Storm strength
- Sea level


0.3 to 1.6 feet
Not including ice melt
Take Home Points

• Climate Variability and Change
• Fisheries Affected by Climate (and Fishing)
• Winners and Losers in the Region

Sunset – NOAA Ship Delaware II – February 2012
Technologies

- Long-term observations
- Ships
- Fixed Measurements (e.g., moorings)
- Satellites
- Models
- Autonomous Samplers
- Data Integration
For more information

- The Discovery of Global Warming ([http://www.aip.org/history/climate/](http://www.aip.org/history/climate/))
- Ecosystem Advisory for Northeast U.S. Continental Shelf Large Marine Ecosystem ([http://www.nefsc.noaa.gov/ecosys/advisory/current/advisory.html](http://www.nefsc.noaa.gov/ecosys/advisory/current/advisory.html))