Sailing to the Shelfbreak: Education and Science from the MIT/WHOI Joint Program Orientation Cruises

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Outline

- Background
- Educational Benefits
- Shelfbreak Environment
- Research Highlights
- Future Opportunities
Background

• Orientation cruise typically occurs last week of June for entering graduate students
• First opportunity for incoming students to meet each other and work together
• For many students, it is the first opportunity to go to sea
• Sponsored by the Academic Programs Office at WHOI and dedicated to Jake Peirson
• Cruise takes place on the SSV Corwith Cramer and the cruise is run by the Sea Education Association (since 1990)
SSV Corwith Cramer
Educational Benefits
Bonding and building Camaraderie
Educational Benefits
Seamanship and Shipboard life
Educational Benefits
Seagoing Observational Techniques
J. Benthuysen
Shelfbreak frontogenesis and buoyancy transport over a sloping bottom
Shelfbreak Environment

Regional Circulation

Shelfbreak Jet - Key circulation feature in NW Atlantic
Continuous Feature from Labrador Sea to Cape Hatteras

Frontal Structure and Jet

- Alongshelf Jet near Shelfbreak
- Cross-shelf scale is roughly 20 km
- Offshore mean flow in Bottom Boundary Layer

Climatology (C. Linder)
Research - Repeat Hydrography

Figure 2a (alternative)

Nitrate

Salinity
Research - Phytoplankton Assemblages

H. Sosik and Rob Olson
Flow Cytometer, June 2007
Observations have been reported of dense aggregations of euphausiids (i.e., krill) in New England shelf break canyons.

Such aggregations likely are a key prey source for commercial fishes and marine mammals.

The regularity of these aggregations and the bio-physical processes underlying them are unclear.

Our goal is to work with SEA and the JP-SEA cruise to establish a time series of net sampling to characterize inter-annual variability in the zooplankton community in Atlantis Canyon.

In July 2009, the first year of this partnership, the students, scientists, and crew conducted 2 Tucker Trawls (under sail!) at the head and mouth of the canyon, 25 km apart.
Research - Zooplankton distributions in canyons

- Euphausiids were the dominant taxon sampled in both trawls, and were present at high abundance/biomass.

- Interesting variability in community composition over the scale of the canyon.

- Head of the canyon sample was characterized by a cold-water community, including abundant *Meganycithanes norvegica*, a large species thought to be an important prey item in the food web.

- At the mouth of the canyon, *M. norvegica* was absent and the sub-tropical species *Euphausia tenera* was present. Abundant jellyfish were also sampled.

- Overall, this has been a very successful collaboration, resulting in interesting data that have also guided the design of upcoming field work.
Future Opportunities - OOI Pioneer Array

- Prototypical shelfbreak system (buoyancy-driven current)
- Links to climate forcing (NAO)
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