11:25

1aAOa2. Effects of scattering layer composition, animal size, and numerical density on the frequency dependence of volume backscatter. Kelly Benoit-Bird (College of Oceanic and Atmospheric Sci., Oregon State Univ., Corvallis, OR 97331)

The mesopelagic boundary community around the Hawaiian Islands is a land-associated, sound scattering layer that undergoes diel migrations with both a vertical and horizontal component. A video camera system was developed to quantitatively examine the numerical density, size, and taxonomic composition of micronekton. The camera system was combined with a four-frequency vessel-mounted echosounder system (38, 70, 120, and 200 kHz) to document the full migration range of micronekton and describe the changes in composition and density throughout their diel migration. Migrating animals split into multiple, distinct layers at night with differences in micronekton density, composition, and size. These differences were correlated with differences in the frequency response of volume backscatter. The relationship between these variables and backscatter intensity relationship between frequencies is complex. The results suggest strong partitioning of habitat by these animals in space and time, which, along with the high densities of animals, indicate that competition is important in driving the behavior and structuring the community.

11:45

1aAOa3. Probing the deep: Acoustic characterization of the Mid-Atlantic Ridge ecosystem. John K. Horne, Cairistiona I. H. Anderson (School of Aquatic and Fishery Sci., Univ. of Washington, Box 355020, Seattle, Wa 98195), Olav Rune Godoe, and Ruben Patel (Inst. of Marine Res., Nordnes 5817, Bergen, Norway)

Implementation of the ecosystem approach to resource management potentially increases the use of acoustics during assessment surveys. A Census of Marine Life survey on the mid-Atlantic ridge during summer 2004 was an opportunity to develop a practical approach. The Norwegian vessel, *G. O. Sars*, is an acoustically-quieted platform equipped with a five-frequency (18, 38, 70, 120, and 200 kHz) echosounder, acoustic Doppler current profilers (ADCPs), multibeam sonars, and a deep-towbody. Paucity of information on species composition limited the ability to conduct a traditional acoustic survey. Acoustic structure independent of biological sampling was quantified and then integrated acoustic density and target strength observations with biological community composition and length frequency data. Species were not assigned backscatter thresholds or water column regions at the onset of analysis. Near-real-time products monitored biomass distributions: daily echograms, target strengths, and frequency-differenced echograms. Persistent biological layers at different depths occurred in the water column. Layers or components migrated toward the surface during dark hours. Modes of target strength frequency distributions and trawl catch compositions differed among layers. The use of acoustic and net technologies can be integrated with near-real-time analytic results to quantitatively characterize pelagic ecosystems. [Work supported by ONR, IMR, and NOAA Fisheries.]

TUESDAY MORNING, 28 NOVEMBER 2006 KAUAI ROOM, 11:00 A.M. TO 12:05 P.M.

Session 1aAOb

Acoustical Oceanography and Signal Processing in Acoustics: Acoustic Tomography for Coastal and Deep Water Applications I

James A. Mercer, Cochair
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Chair's Introduction—11:00

Invited Papers

11:05

1aAOb1. Current structure measurements by the coastal acoustic tomography. Arata Kaneko, Keisuke Yamaguchi, Ju Lin, Noriaki Gohda (Grad. School of Eng., Hiroshima Univ., 1-4-1 Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8527, Japan), Hong Zheng (SEA Corp., Ichikawa, Chiba 272-0127, Japan), and Yoshio Takasugi (Chugoku Ctr. of Natl. Inst. of Adv. Industrial Sci. and Technol., Kure, Hiroshima 737-0197, Japan)

The coastal acoustic tomography (CAT), coastal-sea application of deep-sea acoustic tomography (Munk and Wunsch, 1978), is proposed as an advanced technology to map current structures in the coastal sea. A sequence of successful experiments was recently carried out in the coastal seas with various oceanographic conditions around Japan (Yamaguchi *et al.*, 2005; Kaneko *et al.*, 2005; Lin *et al.*, 2005). In the Tokyo Bay experiment of November 2002, the 2-D tidal currents inducing a clockwise residual circulation were mapped by eight CAT systems, located at both the eastern and western coasts of the bay. The vortex-embedded tidal currents with a maximum velocity of 5 ms^{-1} were targets in the Kanmon Strait experiment of March 2003. In the Hiroshima Bay experiment of