D13

4:55

1pAO13. Fine-scale diel migration dynamics of an island-associated sound-scattering layer. Kelly Benoit-Bird and Whitlow Au (Hawaii Inst. of Marine Biol., P.O. Box 1106, Kailua, HI 96734)

The Hawaiian mesopelagic boundary community, an island-associated, midwater sound-scattering layer, undergoes diel vertical and horizontal migrations. To understand the dynamics of the community's migration at small temporal scales and large spatial scales, five bottom-mounted, 200-kHz active-acoustic mooring that transmitted ten signals every 15 min, from dusk until dawn for 5 days. Two layers within the boundary community were observed to undergo simultaneous diel vertical and horizontal migration. Vertical migration rates were measured at 0–1.7 m/min, while the horizontal rate averaged 1.67 km/h, swamping the vertical movement. The vertex of the migration pattern was observed 45 min before the midpoint between sunset and sunrise. Until the vertex, animal density increased relatively constantly as the animals migrated towards shore, with the highest animal densities found in the shallowest areas at midnight. Animal abundance estimates at the leading and trailing edge of the layer support the hypothesis that increased animal densities near shore are related to packing, as mesopelagic animals avoid the surface and the bottom. We observed high levels of biomass moving rapidly, over a great distance, into shallow waters very close to shore, providing insight into the significant link the mesopelagic boundary community provides between near-shore and oceanic systems.

5:10

1pAO14. Tidal matched field processing inversion for water depth and source range in the Intimate96 test. A. Tolstoy (ATolstoy Sci., 8610 Battailles Court, Annandale, VA 22003, atolstoy@ieee.org), S. Jesus, and O. Rodríguez (Univ. of Algarve, Faro, Portugal)

Examining Intimate96 hydrophone data (300 to 800 Hz) we see clearly the effects of tidal changes, i.e., of changing water depths. In this work we will examine Matched Field Processing (MFP) sensitivity at that range of frequencies to expected tidal changes (the depth varies ± 1.0 m from the nominal of 135 m). Is it possible to invert such data to accurately and uniquely estimate water depth D as a function of time (tides)? What about accurate, unique, *simultaneous* estimates of source range r_{sou}? What happens when we use multiple frequencies and when D is known to shift in a predictable fashion? Can the r_{sou} vs D ambiguity ever be resolved for a successful, unique MFP inversion for those parameters?

5:25

1pAO15. Influence of fetch limited surface roughness on mid-to-high frequency acoustic propagation in shallow water. Robert Heitsenrether, Mohsen Badiey (Ocean Acoust. Lab., College of Marine Studies, Univ. of Delaware, Newark, DE 19716, rheits@udel.edu), James Kirby (Ctr. for Appl. Coastal Res., Univ. of Delaware, Newark, DE 19716), and Steve Forsythe (Naval Undersea Warfare Ctr., Newport, RI 0234)

Surface waves are among several environmental parameters that can influence broadband mid-to-high frequency (1–18 kHz) acoustic wave propagation. Understanding the interaction of sound waves at a rough surface requires a detailed description of the ocean wave spectrum. In shallow water regions, due to proximity to land, surface waves are usually fetch and duration limited with reduced spectral level and higher frequency components. A model that approximates the wave spectra for a fetch limited sea has been combined with acoustic ray-based method for analysis of forward scattered acoustic signals in such a coastal environment. Numerical modeling is employed to investigate time-frequency-angle characteristics of ray paths reflected from a rough sea surface. Temporal variability of acoustic signal fluctuations has been examined as a function of varying sea surface. To validate this model, results are compared against a unique set of experimental data collected in a fetch limited region. The experimental design allowed an examination of time evolution of a single surface bounced ray path. Simultaneous wind speed and acoustic propagation measurements allowed correlation between the individual ray paths and the sea surface at varying sea state conditions. For low wind speed conditions, model results predict the temporal fluctuations of the measured acoustic signal propagation.

MONDAY AFTERNOON, 2 DECEMBER 2002 — CORAL GARDEN 1, 1:00 TO 3:55 P.M.

Session 1pBB

Biomedical Ultrasound/Bioresponse to Vibration and Signal Processing in Acoustics: Acoustic Microscopy

Joie P. Jones, Chair
Radiological Sciences, University of California, Irvine, California 92697-5000

Invited Papers

1:00

1pBB1. A short history of acoustical microscopy. Joie Jones (Dept. of Radiol., Univ. of California, Irvine, Irvine, CA 92697-5000, jpjones@uci.edu)

Optical microscopy has a long and interesting history, going back thousands of years to discoveries made in both Assyrian and Mayan cultures. Acoustical microscopy, on the other hand, has had a much shorter but equally interesting history, going back only to the mid-20th century. This presentation traces the development of acoustical microscopy from its very beginnings to the present. Comparisons with other microscopic techniques will point out the unique features offered by acoustical microscopy. A wide range of application areas will be reviewed and future prospects and potentials discussed.

Cancun - Mexico