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Vertical Ecology of the Pelagic Ocean: Quantified Patterns and New Perspectives

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THURSDAY 11th July

09:15 Keynote lecture

VERTICAL ECOLOGY OF THE PELAGIC OCEAN: QUANTIFIED PATTERNS AND NEW PERSPECTIVES

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Applications of acoustic and optical sensing and intensive, discrete-depth sampling, in concert with collaborative international research programs, have substantially advanced our knowledge of pelagic ecosystems in the 17 years since the last Deep-water Fishes FSBI Symposium. Although the epipelagic habitat is the best-known, and remote sensing and high-resolution modeling allow near-synoptic investigation of upper layer biophysical dynamics, ecological studies within the mesopelagic and deep-demersal habitats have begun to link lower and upper trophic level processes. Bathypelagic taxonomic inventories are far from complete but recent projects (MAR-ECO and CMarZ, supported by the Census of Marine Life program) have quantitatively strengthened distribution patterns previously described for fishes and provide new perspectives. Synthesis of net and acoustics studies suggests that the biomass of low-latitude mesopelagic fishes may be 2-3 orders of magnitude greater than the total global commercial fisheries landings. Inclusion of high-latitude mesopelagic and global bathypelagic fish biomass estimates suggests that the majority of Earth's fish biomass may be deep-pelagic. Acoustics studies have detected pronounced deep-scattering layers well below 1000 m, while discrete-depth net sampling has documented deep-pelagic fish biomass maxima below 1500 m in some regions. Investigations of bathypelagic ecosystems demonstrate that gelatinous zooplankton, as well as other "alternate pathways," are key trophic resources for deep-water fish production. Lastly, perhaps the most exciting discovery is that vertical interconnectivity among fishes throughout the water column is widespread. As Peter Herring (2002) remarked, "*Every time we think we understand the [deep ocean] ecosystem and the organisms they manage to produce a new rabbit out of the oceanic hat, so that we are required to readjust our previous perspective.*"

10:30 Theme session: Deep-pelagic ecology

LENGTH STRUCTURE OF DEEP-PELAGIC FISHES SHEDS NEW LIGHT TO THEIR LIFE HISTORIES

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Here we use a new technique to study life history variation in deep-pelagic fishes from a mid-ocean ridge system. Shape of length distribution in a population is to a significant