

Temporal and spatial variability of vertical diel migration from ADCP backscatter intensity in the Northern Arabian Sea

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Previous studies have shown that backscatter intensity collected from ADCPs can estimate zooplankton and mesopelagic fish biomass over time and space. As part of the Lighthouse Ocean Research Initiative (LORI) project, three 75-kHz upward-looking ADCPs were recently deployed in the Northern Arabian Sea and the Sea of Oman, in coordination with the Oman Ministry of Agriculture and Fisheries Wealth. These ADCPs have collected velocities and acoustic backscatter intensity (ABI) beginning March, 2010. Sampling occurs hourly and data are transmitted via fiber optic cable to a shore facility in real time and delivered nearly instantaneously to Houston via satellite and fiber optic cable.

The most abundant fish species in the mesopelagic layer in the Sea of Oman are myctophids. *Benthosema Pterotum* is the most abundant myctophid species; others include *B. fibulatum*, *Myctophum spinosum*, *Symbolophorus evermanni*, *Lampanyctus tenuiformes*, *Bolinichthys longipes*, and *Diaphus* spp. (Gjøsæter 1981; 1984; Shotton 1997). Saeter (1984) also found that along the southern Omani coast, *B. Pterotum* could dominate trawl collections and acoustic surveys. Our ABI data document substantial diel vertical migrations. The fish ascend into shallow (<130m) water at night and return to deep water (200 to 450 m) during the day. Two daytime layers and two nighttime layers are typically found. The upper daytime layer is centered at 230 m and densely concentrated. The lower daytime layer ranges between 350 m and 450 m. The upper nighttime layer is above 130 m and the lower nighttime layer is between 220 and 270 m. Fish vertical migration speeds are independently estimated from the slopes of the volume scattering layers and compared with the direct measurements of the vertical velocities from ADCPs. Seasonal and spatial variations of vertical migrations and total biomass are compared between stations and different monsoon seasons. The vertically integrated backscatter intensity (in dB), the layer depth and the layer thickness are closely related to the phase of the Moon. This information will be helpful to multiple end users; for example, fishermen will know when best to fish and quantitative biomass estimates will result in better management of fisheries resources.

Z. Wang 1, S. F. DiMarco1, L. H. Al-Kharusi and S. Ingle. Temporal and spatial variability of vertical diel migration from ADCP backscatter intensity in the Northern Arabian Sea. 2011 ADCPs in Action2011 User's Conference. October, 2011.