Abstract

Toothed whales have evolved impr essive echolocation capabilities that include the ability to acoustically detect and localize prey at great dept hs where visual detecti on is limited. Spectral analysis of biosonar echoes measured, in situ, from the prey field of a Blainsville's Beaked whale suggests these animals may use broadba nd sonar to not only locate, but also discriminate prey from non-prey in high rever beration environments. Modeling of acoustic backscattering by squid, a chief prey of beaked wh ales, provides clues to the benefits of these broadband signals. Navy sonar operators ar e similarly challenged in clutter-rich environments. Echoes from biologics, such as la rge schools of acoustically resonant fish, can mask targets or present false alarms to the ope rators. Employment of long-range, broadband (1.5–5 kHz) sonar in the Gulf of Maine shows the potential to spectrally discriminate between echoes from this class of wate r-column scatterers and othe r echoes in the water column. Furthermore, physics-based predictions of fa lse-alarm rates, based on sonar parameters, waveguide characteristics, and the spatial dist ribution of the fish schools, are presented.