

Ambient noise and geo-acoustics in deep water

Kevin D. Heaney, Harry Cox, Gerald D'Spain, and Achintya Madduri

Ambient noise in deep water is a combination of nearby surface wind and local as well as distant shipping. The relative importance of each of these components is driven by the acoustic frequency, the wind-speed and the presence or absence of a depth excess. Lower frequencies are dominated by shipping due to the high shipping source levels and long-range propagation of low-frequency sound in shallow water. The transition region between dominance of overhead wind and distant shipping is critically driven by the sediment properties of the deep seafloor near the receiver. Soft silt sediments, generated by long-term sedimentation of detritus, lead to low reflection coefficients and effectively remove bottom interacting acoustic energy from the water column. A simple geo-acoustic inversion is performed by comparing the fall off in omni noise level vs. depth. A hybrid deep-water ambient noise model is also presented. The model uses analytic noise representation for overhead wind, Parabolic Equation for ranges out to several water depths and normal modes for ranges out to 1000 km. Ambient noise measurements using a fully spanning vertical line array deployed for 2 weeks in the Central Pacific will be used to perform local geo-acoustic inversions