ACOUSTICS2008/344
Fine-grained sediment layers: an acoustic lens for sub-bottom sediment processes and structures

Charles Holland
Penn State University / Applied Research Lab, Applied Science Bldg., State College, PA 16804, USA

In many coastal and deep water regions, there is a layer of fine-grained sediment (e.g., clay and silty-clay) over coarser grained sediments or rock. This layer may range from scales of centimeters to hundreds of meters thick. Fine-grained sediments typically have a sound speed less than that of the interstitial fluid (i.e., overlying water column) with modest attenuation and thus act as a refracting lens for the acoustic field as it interacts with sub-bottom structures. The presence of fine-grained sediments frequently opens an effective window for acoustically probing very small-scale processes within the sediment. The presence of fine-grained sediments also has a profound impact on seabed reflection and scattering, hence propagation, reverberation, and clutter. The effect of fine-grained sediment layers (along with concomitant sub-bottom processes) on reflection and scattering is discussed using both theory and measurements. [research supported by ONR OA321].