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Bubbles at the top and bottom of the water column: the acoustical effects, and the use of acoustics to measure them

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Bubbles of atmospheric gas can be entrained by breaking waves at the top of the water column: this bubble population is dynamic, and will evolve through the effects of buoyancy, gas exsolution and dissolution, and the fragmentation and coalescence of bubbles. These processes are important to ambient noise, sonar operation, and the overall gas budget of the planet. At the base of the water column, methane bubbles can occur in marine sediments, a phenomenon important to the global methane budget, to the petrochemical industry, and to the stability of the sediment (e.g. for civil engineering purposes). This paper examines the acoustical effects of both of these populations, and the ways in which acoustics can be used to measure them. Data will be presented from field trials, including measurements of gassy marine sediments in UK waters, and of wave-generated bubble clouds measured by an 11 metre spar buoy deployed from 16th June to 18th July 2007 at a distance of 400 miles off the west coast of Portugal.