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When "deep water" is not deep enough for wind waves?

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Wind waves in the ocean are commonly viewed as an essentially surface phenomenon. Indeed, orbital velocities of water waves decay with depth quite rapidly: for a monochromatic wave with a wavenumber k in a fluid of total depth h, the amplitude of the horizontal velocity variations just above the bottom is $cosh(kh)$ times smaller than at the surface and, hence, is at least one order of magnitude smaller for depths exceeding just a quarter of the wavelength. On these grounds, very often waves in the water of moderate depths are treated as deep water waves, that is, it is presumed that neither such waves feel the bottom, nor the bottom is affected by the presence of these waves. In reality, wind waves are more than a mere superposition of monochromatic components, due to wave field nonlinearity there always exist wave groups, which induce specific low frequency motions, often referred to as the *zero harmonic*, *beat oscillations* or *induced currents*. These induced currents, although at the surface being an order of magnitude smaller than the orbital velocities, decay with depth much slower, and, hence, can penetrate to significantly greater depths. In our study such commonly neglected induced currents are viewed from the perspective of their potential effect on the bottom. Upon estimating their magnitudes by employing the well established formulae, we outline the range of parameters when the conditions, that the bottom boundary layer is turbulent, are satisfied. The existence of a turbulent boundary layer (in contrast to the laminar one) affects the bottom through a much more intense sediment transport. It is found, that at least in this context, the notion of "deep water" should be revised: wind waves could affect much deeper parts of the ocean than it was commonly believed.