



The effect of an internal wave on breaking surface waves and the oceanic subsurface bubble layer

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We model the effects of an internal wave on the structure of the oceanic subsurface bubble layer, generated by breaking surface waves. We consider two situations, when breaking is caused either by a strong sustained wind, or by the direct interaction of surface waves with an internal wave. We find that the effects are twofold; bubbles are driven by the internal wave field, and the injection of bubbles into the water is enhanced in downwelling areas behind the crests of the internal wave. We determine the energy released by wave breaking and available for the injection of bubbles, and derive an upper estimate for the source term for the bubbles injected through the ocean surface. We use an uncoupled problem formulation, substituting the solution for an internal wave in a two-layer fluid model into the equations describing the bubble dynamics. The latter equations are solved numerically, showing structure formation in the bubble layer for each of the two cases, when one of the aforementioned mechanisms dominates the other. The talk is based on a joint work with R.H.J. Grimshaw, L.A. Ostrovsky and A.S. Topolnikov (Phys. Fluids 22, 106603, 2010).