

Surface Boundary Layers and Gravity Waves

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January 2013

Abstract

The paper focuses on the methodology and the consequences of including surface and subsurface, wave-induced, pressure-slope momentum transfer into the oceanic water column, a transfer process which competes with now-conventional turbulence transfer based on mixing coefficients. Focus is enabled by stipulating horizontal homogeneity as is customary when introducing a new surface boundary layer model or significantly new physics to an existing model. An introduction to pressure-slope momentum transfer is first provided by a phase-resolved, vertically dependent analytical model which is followed by a discussion of the consequences of phase-averaging; an appendix is an important adjunct to the discussion. Finally, a wave-circulation coupled model which includes pressure-slope and turbulence momentum transfer is presented and numerically executed.

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