



Effect of surface waves on energy and momentum fluxes across air-sea interface

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The momentum and turbulent kinetic energy (TKE) fluxes into subsurface currents are important boundary conditions for oceanic modeling. Traditionally, ocean models parameterize these fluxes in terms of the 10-meter wind speed using a bulk formula based on the following two assumptions: (1) The momentum and TKE fluxes are independent of the sea state; (2) The momentum and TKE fluxes from wind are identical to those into subsurface currents, that is, no net momentum (or energy) is gained (or lost) by surface waves. However, these assumptions are not valid when the surface wave field is not fully developed. The main objective of this paper is to investigate the effect of surface gravity waves on the energy and momentum transfer budget across the air-sea interface under medium to high wind conditions. Specifically, we focus on the difference between the TKE/momentum fluxes from wind and those into currents. By using a coupled wind-wave model we examine time dependent and fetch dependent conditions under steady uniform wind forcing, as well as more complex wind conditions in tropical cyclones where the surface wave field is fast varying in space and time.