Sea spray and its effects on near-surface turbulence

David Richter

NCAR

Sea spray has been suggested to be at least a partial explanation for the observed saturation and decrease of the bulk surface drag coefficient at increasingly high (tropical cyclone strength) winds. At these high wind speeds, a large amount of spray is ejected from breaking waves and carried throughout the atmospheric surface layer. Currently, modeling efforts to describe the effects of this ejected spray must approximate many unknown parameters, including the spray generation function, the mean fall speed of the droplets, and their concentration profile over the ocean surface. The work being presented is based on a more fundamental approach, which is to examine in detail the interaction of a dispersed phase such as sea spray with a turbulent, wall-bounded flow. Direct numerical simulations two-way coupled with individual Lagrangian spray elements are used to study turbulent, particle-laden Couette flow. It is found that the dispersed phase greatly changes the nature of the carrier-phase turbulence, and that fluxes of momentum carried by the particles must be taken into account when considering any changes in drag.

In collaboration with Peter Sullivan, NCAR