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Investigation of the effect of evaporating ocean spray on the air-sea heat fluxes in high-wind conditions[1] YEVGENII RASTIGEJEV, North Carolina Agricultural and Technical State University, SERGEY A. SUSLOV, Swinburne University of Technology, Australia — We have studied the effect of evaporating ocean spray droplets of typical sizes on air-sea heat fluxes in a marine atmospheric boundary layer (MABL) with various vertical profiles of air temperature and moisture and values of turbulence intensity in high-wind conditions. We have found that the vertical latent and total heat fluxes are strongly enhanced by large spray droplets with radii 0.5mm because their presence results in steep vertical gradients of moisture and temperature in a MABL. The effect of small droplets on the total heat flux is not as profound: fine spray primarily redistributes thermal energy between its latent and sensible components. We have shown that spray affects the turbulent kinetic energy (and thus the intensity of the vertical turbulent transport) mostly mechanically (by altering the vertical distribution of mass density of the air-spray mixture) rather than thermodynamically (by changing vertical distributions of the air temperature and moisture). We have compared the dependence of the total vertical heat flux on the wind speed produced by the current model with the observation data that show seemingly anomalous growth of the vertical heat flux with the wind speed. We showed that this may be explained by the presence of ocean spray in a MABL.

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