

Measurements of the Influence of Ocean Surface Kinematics on Air-sea Heat Fluxes

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We present results of several field experiments on the kinematics of small-scale surface turbulence, the influence on the surface skin layer, and the resulting transfers of heat across the diffusive layer at the surface of the ocean. A variety of optical and electro-mechanical instruments are used to measure the evolution of the surface and sub-surface velocity, and temperature fields. These include visible and infrared imaging of the surface, thermal/IR surface velocimetry, and fast-response thermometry. We show that at low wind speed, it is the small-scale turbulence at the surface of the ocean, rather than breaking waves that most influence and disrupt the surface skin layer. We find that the enstrophy of the surface turbulence correlates with the surface heat flux, and that the surface wave field modulates a component of the total air-sea heat flux.

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