Geophysical Research Abstracts, Vol. 7, 02863, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02863

Wave-driven scalar fields in marine atmospheric boundary layer

Tihomir Hristov

Department of Earth and Planetary Sciences, Johns Hopkins University,
Tihomir.Hristov@jhu.edu

Wave-induced fields in marine atmospheric boundary layer have long been considered central to understanding the wind-wave interaction. However, observational information of their structure has only recently started to emerge.

The present work analyzes meteorological data collected from an offshore tower within the Coupled Boundary Layers Air Sea Transfer (CBLAST) experiment during the summer of 2003. Specific focus is placed on the scalar fields of static pressure and atmospheric humidity in two air-flow regimes, of low and moderate wind speed.

In low wind regime turbulence and turbulent mixing have low intensity. Wave modulation is clearly observable in wind velocities, static pressure and humidity. We briefly discuss the effect of the wave-modulated humidity on the pattern of radio signals propagation over the ocean.

At moderate winds the species concentration (e.g. water vapor) and flow velocities are decidedly dominated by turbulence, while the pressure remains organized and coherent with the waves. Possible explanation of this distinct behavior of the pressure field is discussed. Comparing the intensity of turbulent and wave-coherent components in pressure allows to address experimentally the question of relative importance of the two previously proposed mechanisms for wave generation, the mechanism of random force and the mechanism of interfacial instability. The data also indicate that the wave influence decays with height much faster for the wind velocity than for the pressure — an observation pertinent to the ongoing discussion regarding the extent of the wavy boundary layer over the ocean.