



Meteorological observations of the coastal boundary layer structure by remote measurement methods for determining the impact of meteorological conditions on the breeze circulation

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Continuous measurements of the characteristics of atmospheric boundary layer and the characteristics of breeze circulation were initiated at the meteorological observatory of Ahtopol on the Black Sea coast (south-east Bulgaria) under a Bulgarian-Russian collaborative programme. Research observations started in July 2008 and go on. These observations are the start of high resolution atmospheric boundary layer vertical structure climatology at a Bulgarian Black Sea coastal site. Automatic weather station «MK-15» with an acoustic anemometer (mounted at 4.5m height) and Flat Array Sodar without RASS extension «Scintec» were installed on polygon of Ahtopol. A preliminary analysis was made of the experimental data on the thermodynamic structure of the atmospheric boundary layer in the coastal zone. Vertical profiles of wind speed, direction and spatio-temporal sectional were constructed according to the sodar data. Graphs of temporal variations of the direction and modulus of wind velocity, vertical velocity, the standard deviation of the acoustic temperature and time variation of air temperature (at a height of 2m – standard synoptic measurements) were constructed according MK-15. The momentum $u_* = \sqrt{-w'u'}$ and sensible heat $H = w'T'$ surface turbulent fluxes were calculated from MK-15 raw data. Prevailing weather conditions contributing to breeze circulation in the area were investigated. Blurred pressure field of high pressure with warm air mass, clear and (or) the overcast weather was characterized for treatment cases. The average wind speed near the ground was did not exceed 3 m/s, with a ripple rate of up to 4 m/s according to MK-15. The nature of the wind changed direction during the day has been practically the same (i.e., diurnal repeats) in all cases. The breeze front location was also detected based on standard measurements in the surface layer (mean values of temperature at 2 m and wind speed and direction from MK-15). In the zone of the front the wind speed increased dramatically and the wind direction varied between East and South. The air temperature showed typical for the sea breeze plateau shape in the noon hours. Understanding and parameterizing the turbulent exchange of momentum, heat and moisture between the earth's surface and the atmosphere is an important goal of the observations.

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