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WRF simulations against sodar measurements of extreme winds and local breeze circulations serial events

Damyan Barantiev (1), Hristina Kirova (2), and Orlin Gueorguiev (2)

(1) Climate, Atmosphere and Water Research Institute at Bulgarian Academy of Sciences (CAWRI-BAS), Sofia, Bulgaria, (2) National Institute of Meteorology and Hydrology, Sofia, Bulgaria

About 40 percent of the world's population live within 100 km of the coastal line. Coastal zones are changing because of the interaction between the oceans and the land as well as human activities. Studying the processes in coastal Atmospheric Boundary Layer (ABL) is continually research it is important for ecosystems, recreational activities, fishery and economics.
An acoustic sounding of ABL with MFAS SCINTEC sodar has being performed at Ahtopol station at Southeast Bulgaria since 2008. The Intergovernmental Panel on Climate Change (IPCC) criteria for "rare" events has been applied to the period August 2008 - October 2016 of the remote sensing measurements and a reference extreme wind speed profile has been obtained. In this study, we test the ability of the Weather Research and Forecasting (WRF) model to simulate extreme wind events followed by development of sea breeze. The evolution of the vertical wind field structure by the sodar measurements during the studied period (17-19 March 2012) has shown the presence of 4 nocturnal periods with low-level jets (LLJ) located up to 300 m above the ground with maximum wind speeds of about 15 $ms^{-1}$and followed by closed sea breeze cells with small spatial scales (up to 400 m including the calm zone). The WRF is run with local ABL scheme (with TKE closure) Mellor-Yamada-Janjic (MYJ) for parametrization coupled with the Eta-similarity surface layer scheme. As a measure of the ability of the used model configuration to reproduce the spatial and temporal structure of these complex weather situations Pearson's correlation coefficient has been used. The results have shown relatively good agreement between measured and modeled wind speed but no local breeze development has been reproduced by the model.