Nested high-resolution atmospheric boundary layer simulations for the Perdigao Experiment using WRF-LES

Gokhan Kirkil (1), Erkan Yılmaz (2), and Sukran Sibel Mentes (3)

(1) Department of Industrial Engineering, Kadir Has University, Istanbul, Turkey (gokhan.kirkil@gmail.com), (2) Department of Meteorological Engineering, Istanbul Technical University, Istanbul, Turkey (erkanyi12@gmail.com), (3) Department of Meteorological Engineering, Istanbul Technical University, Istanbul, Turkey (mentes.ssibel@gmail.com)

WRF model provides a potentially powerful framework for coupled simulations of flow covering a wide range of spatial and temporal scales via a successive grid nesting capability. Nesting can be repeated down to turbulence solving large eddy simulation (LES) scales, providing a means for significant improvements of simulation of turbulent atmospheric boundary layers. We will present the recent progress on our WRF-LES simulations of the Perdigao Experiment performed over a mountainous terrain. We performed multi-scale simulations using WRF's different Planetary Boundary Layer (PBL) parameterizations as well as Large Eddy Simulation (LES) and compared the results with the detailed field measurements. WRF-LES model improved the mean flow field as well as second order flow statistics. Mean fluctuations and turbulent kinetic energy fields from WRF-LES solution are investigated in several cross-sections around the hill which shows good agreement with measurements.