Geophysical Research Abstracts, Vol. 9, 10274, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10274

The relationship between PBL winds and scale-dependent uncertainty in land-surface heterogeneity in a mesoscale model

J. Hacker

National Center for Atmospheric Research, Colorado, USA

Quantification of uncertainty in mesoscale PBL wind forecasts is of primary importance to decision makers using those forecasts. Land-surface specification is typically handled deterministically in numerical weather prediction (NWP) models, but uncertainty in those specifications exists at many scales. This work seeks to quantify the effects of uncertainty in land-surface specification, imposed at multiple scales, on PBL wind forecasts in a state of the art mesoscale model. Monte-Carlo simulations with the Weather Research and Forecast (WRF) model are performed to quantify PBL wind uncertainty. Scale-dependent perturbations to soil moisture are constructed in separate experiments, where large scales are considered known and uncertainty in small scales is saturated. The cut-off between large and small scales is varied in different experiments, and different synoptic regimes are investigated. The scale-dependent response in 0-48 hour ensemble forecasts of PBL winds is quantified is spectral space, where it is evident that the short-time-scale uncertainty concentrates at a preferred spatial scale, which shows intermittent nonlinearity. Mechanisms for the growth of uncertainty at the preferred scale are explored.