

Behavior of WRF PBL schemes and land-surface models in 1D simulations during BAMEX

M. Pagowski, J. Hacker, and D. Rostkier-Edelstein

NOAA Research - Earth System Research Laboratory* Global Systems Division, R/GSD1 325
Broadway, Boulder, CO 80305-3328 Tel: (303)497-6443, Fax: (303)497-7262 e-mail:
Mariusz.Pagowski@noaa.gov

The Weather Research and Forecasting (WRF) model is used broadly in the USA in weather prediction and regional climate simulations. In this study, the WRF planetary boundary layer (PBL) and land-surface schemes (LSMs) are compared with measurements collected at an observational site during the Bow Echo and Mesoscale Convective Vortex Experiment (BAMEX) over Oklahoma in May, June, and July 2003. The WRF PBL schemes include YSU, Hong and Dudhia, MYJ, Mellor-Yamada-Janjic, and MRF, Hong and Pan which are coupled with any of the three LSMs: the simple force-restore with a bucket model, the Noah, Mitchell et al., and the RUC (Rapid Update Cycle), Smirnova et al. A 1-D version of WRF is used to perform 12-hourly forecasts that start in the mornings and in the evenings during the BAMEX experiment. These simulations are initialized with vertical profiles of wind, temperature, mixing ratio, and soil temperature and moisture that are obtained from observations. External forcings for the 1-D WRF simulations, including short- and long-wave radiation and geostrophic wind are derived from observations and weather analyses. In addition, simulations are performed using measured sensible and latent heat fluxes as forcings in place of the LSMs. This study focuses on the assessment of the averaged performance of the PBL schemes and LSMs with respect to winds, temperature, moisture, and fluxes under the same atmospheric and surface forcings.