



Analysis of modified MYJ and YSU boundary layer schemes in WRF-Chem with respect to simulated boundary layer heights and pollutant concentrations

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To improve the performance of boundary layer schemes currently applied within WRF-Chem (Grell et al., 2005), the Mellor-Yamada-Janjic (MYJ) model (Mellor and Yamada 1982) and the Yonsei University (YSU) PBL scheme (Hong et al. 2006) have been updated using data from a 100 m high offshore measurement tower called FINO1. The turbulence intensity in the Mellor-Yamada-Janjic model has been enhanced as described in Foreman and Emeis (2012). An alternative to the exchange coefficient for stable stratification in the YSU scheme is described in Foreman et al. (2014). These modifications to the two schemes have been applied and are compared with the existing schemes. For example, the updated MYJ scheme results in an improved representation of the turbulent kinetic energy throughout the boundary layer as compared with the measurements at FINO1. The modified MYJ and YSU schemes, which have been originally developed for wind energy applications, have been implemented into version 3.5 of the WRF model. Simulations with WRF-Chem were carried out for Europe and the region of Augsburg in order to evaluate the effect of the modified PBL schemes on simulated PBL heights, gas phase pollutant and aerosol concentrations.

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