Sensitivity Studies of Meteorological Data on WRF-Flexpart Model Simulations in East China

Mengwei Jia, Aijun Ding, and Xin Huang
Science of Atmosphere,Nanjing University,Nanjing,China

This research discusses the sensitivity of WRF-Flexpart model to different meteorological driving fields, and try to improve the accuracy of simulations. Two common reanalysis data and assimilation of observation data, are used to drive the WRF-Flexpart model to simulate the air transport in two eastern Chinese cities. The potential source contribution (PSC) of CO from different simulation experiments are compared with the observed data from December 5, 2017 to January 5, 2018. The results show that the simulations of WRF-Flexpart model driven by ERA5(EXP-ERA5) and FNL(EXP-FNL) have little difference, and the foorprint of polluted time is obviously underestimated due to overestimation of near-surface wind speed. However, the meteorological driving field which assimilated observation data(EXP-FDDA) improves the simulation performance in boundary layer, especially the horizontal wind speed below 950hPa.The accuracy of the WRF-Flexpart model improves significantly in EXP-FDDA, especially in inland cities(NJ) with relatively complex boundary layer structures. During polluted periods,the slope of fitting curve increased from 0.108 to 0.912 and the average accuracy rose to 74.9%.Therefore, when using WRF-Flexpart to calculate the particle backward trajectory, the meteorological field with assimilation of observation data is more recommended.