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Impact of different emission inventories on simulated tropospheric ozone over China: a regional chemical transport model evaluation

J. Ma[1] and J. A. van Aardenne[2]
[1]Chinese Academy of Meteorological Sciences, People's Republic of China
[2]Max Planck Institute for Chemistry, Mainz, Germany

Abstract. The importance of emission inventory uncertainty on the simulation of summertime tropospheric ozone over China has been analyzed using a regional chemical transport model. Three independent emissions inventories, that are (i) emission estimates from the Emission Database for Global Atmospheric Research (EDGAR) for the year 1995, (ii) a regional emission inventory used in the Transport and Chemical Evolution over the Pacific (TRACE-P) program with emissions for the year 2000 and (iii) a national emission inventory used in the China Ozone Research Program (CORP) with emission estimates for the year 1995, are used for model simulation over a summer period. Methods used for the development of the inventories are discussed and differences in simulated ozone and its precursors with these emission inventories are analyzed. Comparison of the emission inventories revealed large differences in the emission estimates (up to 50% for NO_x, ~100% for NMVOC and ~1000% for CO). Application of the different emission inventories in three model simulations showed minor differences in both surface O_3 in rather unpolluted areas in China and at higher altitudes (500mbar). In polluted areas, differences in surface O_3 are 30-50% between the different model simulations which seem rather small taking into account the large differences in the emission inventories. Additional sensitivity runs showed that the difference in NO_x emissions as well NMVOC emissions is a dominant factor which controls the differences in simulated O_3 concentrations while the impact of differences in CO emissions is relatively small. Although the CO emission estimate by CORP seems to be underestimated, there is no confidence to highlight one emission inventory better than the others.

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