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Impact of biogenic emissions on ozone and fine particles over Europe: Assessing the effect of temperature increase and the role of anthropogenic NO_x emissions reduction

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The role of biogenic emissions on ozone and PM2.5 levels over Europe is assessed for July 2006 using the CMAQ modeling system. Biogenic emissions are simulated to increase the daily maximum 8 hour ozone ($Max8hrO_3$) mixing ratios and to decrease PM2.5 average concentrations over Europe. Since climate change will lead to higher temperatures increasing subsequently biogenic emissions, sensitivity analysis to temperature is performed. Higher temperatures suggest an average increase in $Max8hrO_3$ mixing ratios over Europe by about 3% and an average decrease in PM2.5 concentrations by about 6%, related to a temperature increase by 3 K degrees. Temperature increases are simulated, also, to increase the organic part of PM2.5 and to decrease the inorganic one on average over Europe. In order to examine if abatement measures for anthropogenic emissions could offset ozone increases in a warmer environment and their effect on PM2.5 concentrations, simulation with a domain wide reduction of anthropogenic NO_x emissions by 10% is performed. This is estimated to reduce $Max8hrO_3$ mixing ratios on average over Europe, however, in VOCs limited areas there is an increase. The reduction in anthropogenic NO_x emissions is simulated to reduce PM2.5 concentrations on average over Europe enhancing the reduction simulated in a warmer environment but further modifying PM2.5 component concentrations.

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