1.072 The characteristics of natural NO emission from soil and its effect on secondary pollution over China: modelling study.

Early Career Scientist

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Abstract:

NO, as one of the most active precursors, plays a significant impact on secondary pollution, e.g., O_3 and SOA. Anthropogenic emissions (e.g. fossil fuel combustion, mobile) are the key NO emission sources in the urban area, while soil is considered to be the major natural source of NO in the suburban and remote area. A new algorithm, which has considered the controlling factor of soil temperature, soil moisture, precipitation, nitrogen fertilizer application and nitrogen deposition, has been coupled and improved in the WRF/Chem-MEGAN model, and used to estimate soil NO emission and further study its influences on secondary pollution over China in 2014. The results show that soil NO emission is 1.4, 10.4, 48.6 and 6.3 Tg N over China in Jan., Apr., Jul., and Oct. 2014, respectively. Highest soil NO emission is found during summer season due to the large amount of nitrogen fertilizer, and the impact of precipitation and higher soil temperature and moisture. Since the high load of nitrogen fertilizer and deposition, higher soil NO emission is distributed in North China. Soil NO affects O_3 and SOA more significantly in the summer season than that in the autumn season. During the summer season, soil NO decrease daytime O_3 concentration with a value of 5.0 $ug{\cdot}m^{-3}$ over north China, central China and southern China, where have higher concentration of anthropogenic NOx and belongs to VOCs-sensitive region. While soil NO tends to increase daytime O_3 concentration in the rest of the region with the value of 5.0 $ug{\cdot}m^{-3}$ above. In general, soil NO weakens the formation of SOA with a value of 1.0 $ug{\cdot}m^{-3}$ in central and southern China due to the competition of oxidant with NO. Soil NO significantly increases SOA formation significantly in southwest China with a value of 2.0 $ug{\cdot}m^{-3}$.