

Contribution of Siberian forest fires to PM_{2.5} pollution in Japan

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We examined the contribution from Siberian forest fires to PM_{2.5} pollution in Japan using a regional chemical transport model. In May 2003, several events resulting in PM_{2.5} concentrations exceeding Japan's air quality standard for daily mean value ($35 \mu\text{g}/\text{m}^3$) were observed at Rishiri in northern Japan. The model generally well reproduced the temporal variations of PM_{2.5} including the elevated events. The simulations demonstrated that the PM_{2.5} enhancements during the events were mostly attributed to biomass burning in Siberia, suggesting that the contribution from Siberian forest fires had a critical impact on the high PM_{2.5} days ($>35 \mu\text{g}/\text{m}^3$). The contributions from Siberian biomass burning to the monthly mean PM_{2.5} concentrations were estimated to be 64% at Rishiri and 45% at both Nonodake and Oki located in eastern and western Japan, respectively, suggesting that Siberian forest fires had a large impact on air quality for the whole of Japan. Especially at Rishiri, the observed PM_{2.5} concentrations and aerosol optical depth (AOD) from MODIS in May 2003 were much larger than those of the 10-year average in May from 2001 to 2010. The trend in horizontal distribution for May 2003 was opposite to the long-term average; PM_{2.5} and AOD in May 2003 were the highest in northern Japan.

Keywords: PM_{2.5}, aerosol, forest fires, Siberia, transboundary pollution