ELSEVIER

Atmospheric Research

Volume 118, 15 November 2012, Pages 435-444

The chemical composition and sources of $PM_{2.5}$ during the 2009 Chinese New Year's holiday in Shanghai

Jialiang Feng, Peng Sun, Xiaoling Hu, Wei Zhao, Minghong Wu, Jiamo Fu

Show more

https://doi.org/10.1016/j.atmosres.2012.08.012

Abstract

China is virtually shut down during the week-long Chinese New Year's holiday. This implies that the anthropogenic emissions would be greatly decreased

during the period thus providing an opportunity to study the air quality in China under reduced emissions, and the drastic emission changes during a short period of time allows the comparison of source contributions under significantly different conditions. Seventeen $PM_{2.5}$ samples were collected during the 2009 Chinese New Year's holiday in Shanghai to study the composition and sources of the fine particles. Organic carbon (OC), elemental carbon (EC), eight water-soluble ions, fourteen metals and solvent extractable organic compounds (SEOC) including alkanes, hopanes, polycyclic aromatic hydrocarbons (PAHs) and fatty acids were measured. Diagnostic PAH ratios, correlation analysis of OC, EC, *n*-alkanes, hopanes and PAHs showed that vehicle emissions were the main source of *n*-alkanes and EC, and an important source of the locally emitted particulate PAHs in urban Shanghai, while coal burning should be the main source of the transported PAHs from the inland areas. The composition of *n*-fatty acids also provided some clue on the significance of the contribution by kitchen activities. In the New Year's Eve's sample, 75% of the particle mass was estimated to be from fireworks, and K^+, SO_4^{2-}, Cl^-, OC, Al and Ba were the main components. Firework fine particles had high OC/EC ratio and low NO_3^-/SO_4^{2-} ratio.

Highlights

▶ $PM_{2.5}$ during the Chinese New Year's holiday could give baseline information on the air quality in China. ▶ Comparison of source contributions under two significantly different conditions was made. ▶ Vehicle emissions should be the main source of *n*-alkanes and EC in urban Shanghai. ▶ Environmental impact and composition of fine particles from fireworks were estimated.

Previous article

Next article

Keywords

$PM_{2.5}$; Fireworks; Ions; Elements; OC/EC; Solvent extractable organic compounds