

Analysis of BC emissions in East Asia using inverse model

*Takashi Maki¹, Taichu Y Tanaka¹, Naga Oshima¹, Thomas Sekiyama¹, Keiichi Kondo¹, Jun-ichi Kurokawa², Keiya Yumimoto³, Toshimasa Ohara⁴

1. Meteorological Research Institute, 2. Asia Center for AirPollution Research, 3. Kyushu University, 4. National Institute for Environmental Studies

In addition to affecting climate change and global warming, Black Carbon (BC) brings impact on society and human health as well. However, changes in BC emissions in east Asia have yet to be fully understood. Attempts have been made by various institutions and researchers to estimate BC emission inventories from various statistics but there are problems such as lack of rapid reporting. In order to modify black carbon emissions inventory based on this statistic, we have constructed an BC emission inversion system for east Asia using aerosol transport model and surface observations. The analysis period for emissions is from 2011 to 2014. We adopt global aerosol transport model named MASINGAR mk-2 (Tanaka et al.). The model is a subset of MRI (Meteorological Research Institute) earth system model for climate research and can treat BC, OC, mineral dust, sulfate and sea-salt with external mixing. We divided tags of each province of China, South Korea, Japan into 33 regions and carried out tagged tracer transport experiments. We collected 5 surface sites daily observation data (Hedo, Fukue, Echizen, Happo and Lulin). A priori BC emission is provided by REAS 2.2 (Kurokawa et al.) at 2010. Inversion results suggested that BC emissions in East Asia between 2011 and 2014 are decreasing especially in China about 10%, compared to the 2010 emissions. There was no significant change in BC emissions in Japan and South Korea during the analysis period. However, the observation network could constrain mainly northern part of China. We need more observation data (ex. satellite data) to constrain BC emission amount.

Keywords: Inverse model, BC emission, Aerosol model