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Satellite measurements oversee China's sulfur dioxide emission reductions from coal-fired power plants

Siwen Wang (1,4), Qiang Zhang (2), Randall Martin (3), Sajeev Philip (3), Kebin He (1), and Hang Su (4)

(1) State Key Joint Laboratory of Environment Simulation and Pollution Control, School of Environment, Tsinghua University, Beijing, China, (2) Ministry of Education Key Laboratory for Earth System Modeling, Department of Earth System Science, Tsinghua University, Beijing, China., (3) Department of Physics and Atmospheric Science, Dalhousie University, Halifax, Nova Scotia, Canada, (4) Multiphase Chemistry, Max Planck Institute for Chemistry, Mainz, Germany

To evaluate the real reductions in sulfur dioxide (SO_2) emissions from coal-fired power plants in China, Ozone Monitoring Instrument (OMI) remote sensing SO_2 columns were used to inversely model the SO_2 emission burdens surrounding 26 isolated power plants before and after the effective operation of their flue gas desulfurization (FGD) facilities. An improved two-dimensional Gaussian fitting method was developed to estimate SO_2 burdens under complex background conditions, by using the accurate local background columns and the customized fitting domains for each target source. The OMI-derived SO_2 burdens before effective FGD operation were correlated well with the bottom-up emission estimates (R=0.92), showing the reliability of the OMI-derived SO_2 burdens as a linear indicator of the associated source strength. OMI observations indicated that the average lag time period between installation and effective operation of FGD facilities at these 26 power plants was around 2 years, and noFGD facilities have actually operated before the year 2008. The OMI estimated average SO_2 removal equivalence (56.0%) was substantially lower than the official report (74.6%) for these 26 power plants. Therefore, it has been concluded that the real reductions of SO_2 emissions in China associated with the FGD facilities at coal-fired power plants were considerably diminished in the context of the current weak supervision measures.