



**HAL**  
open science

## **Influence of aerosol-radiation interactions on air pollution in East Asia**

Øivind Hodnebrog, Camilla W. Stjern, Louis Marelle, Gunnar Myhre, Ignacio Pisso, Shuxiao Wang

► **To cite this version:**

Øivind Hodnebrog, Camilla W. Stjern, Louis Marelle, Gunnar Myhre, Ignacio Pisso, et al.. Influence of aerosol-radiation interactions on air pollution in East Asia. EGU General Assembly 2022, May 2022, Online, Austria. 10.5194/egusphere-egu22-5828 . insu-03634675

**HAL Id: insu-03634675**

**<https://insu.hal.science/insu-03634675>**

Submitted on 7 Apr 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

EGU22-5828

<https://doi.org/10.5194/egusphere-egu22-5828>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Influence of aerosol-radiation interactions on air pollution in East Asia

**Øivind Hodnebrog**<sup>1</sup>, Camilla W. Stjern<sup>1</sup>, Louis Marelle<sup>1,2</sup>, Gunnar Myhre<sup>1</sup>, Ignacio Pisso<sup>3</sup>, and Shuxiao Wang<sup>4</sup>

<sup>1</sup>Center for International Climate Research (CICERO), Oslo, Norway ([oivind.hodnebrog@cicero.oslo.no](mailto:oivind.hodnebrog@cicero.oslo.no))

<sup>2</sup>LATMOS/IPSL, Sorbonne Université, UVSQ, CNRS, Paris, France

<sup>3</sup>Norwegian Institute for Air Research (NILU), Kjeller, Norway

<sup>4</sup>School of Environment, Tsinghua University, Beijing, China

Black carbon (BC) aerosol emission is an important contributor to particulate matter (PM) pollution in China, leading to adverse health effects and premature deaths. BC aerosols can also affect boundary layer meteorology by heating the atmosphere, due to the unique property of BC to absorb solar radiation. In contrast, sulphate aerosols reflect solar radiation and thus cool the surface. How individual aerosol pollutants influence boundary layer meteorology on a multi-year timescale is not well known. A particularly important aspect of this influence is a potential feedback process, where changed boundary layer conditions may influence present aerosol concentrations, potentially exacerbating near-surface pollution levels. In this work, we use the Weather Research and Forecasting model with Chemistry (WRF-Chem) at 45 km horizontal resolution covering East and South Asia, and at 15 km resolution covering East China. Simulations are driven by the ECMWF Reanalysis v5 (ERA5), and anthropogenic emissions are from the latest version of the Community Emissions Data System (CEDS). Multi-year simulations are evaluated against observations of meteorological parameters and air quality data for China. Preliminary results show that aerosol-radiation interactions due to BC lead to higher annual near-surface PM concentrations, underscoring the importance of mitigating black carbon aerosol emissions. The elevated PM concentrations can be explained by a shallower boundary layer and reduced turbulent mixing near the surface associated with BC. Possible effects of aerosol-radiation interactions on extreme pollution events, including not only extreme PM events but also extreme ozone (O<sub>3</sub>) events, will be examined.