

4.060 Case study of aerosol optical and radiative properties during a haze event over the northern Thailand region using WRF-Chem..

Early Career Scientist

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Abstract:

Particulate matters (PM) has a crucial role in regional and global climate change by modifying cloud optical properties and radiative forcing. The climatic effect of aerosols is determined by their radiative forcing, which is a function of their optical properties, including scattering and absorption. The dynamical nature of PM causes direct and indirect effects on the radiation budget, circulation pattern and cloud albedo. In the present study, the temporal variation of aerosol optical and radiative properties are presented and discussed.

The model simulations were performed for 10 to 20 April, 2016, considered as a haze period over the northern Thailand region using Weather Research and Forecasting model coupled with Chemistry (WRF-Chem). The simulated optical and radiative effects of aerosol during the event are compared with AERONET (Omkoi, a semi-urban location in northern Thailand) and the aerosol mass concentration is compared with observation obtained from the Pollution Control Department (PCD) of Thailand. The correlation coefficient between simulated and observed AOD is found to be 0.66, associated rmsd (root mean square difference) is 0.2. The atmospheric short-wave radiative forcing estimated from the model is compared with observations and the correlation is 0.51, rmsd is 7.3 W/m². WRF-Chem showed an overestimation (10-30 %) in simulated AOD and atmospheric radiative forcing when compared to the observations. Substantial increase of AOD during dry season (March-April_May) are mainly due to the uncontrolled burning habit of agricultural waste and forest fires over the northern Thailand region, which is the predominant fuel during these haze conditions. Aerosol optical and radiative properties such as single scattering albedo, asymmetry parameter, short-wave radiative forcing at the surface and on top of the atmosphere are also studied over the study region and it will be presented and discussed.