

Interactive comment on “Effects of wintertime polluted aerosol on cloud over the Yangtze River Delta: case study” by Chen Xu et al.

Anonymous Referee #2

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The manuscript attempts to investigate the effect of polluted aerosols on clouds over the Yangtze River using three-month satellite observations during wintertime. The manuscript is generally well written and the topic is of interest. It is essential to verify quantitatively the aerosol-cloud interactions based on measurements, particularly with regard to impacts of aerosols on cloud formation and development, which are determined by intricate thermodynamic, dynamical, and microphysical processes and their interactions. However, the reviewer would not like to recommend publication of the manuscript at the present form in ACP.

1) A comprehensive investigation about the aerosol-cloud interaction has been performed by Myhre et al. (2007, ACP) using the aerosol and cloud measurements from MODIS satellite data. They have found an enhancement in the cloud cover with increasing aerosol optical depth, which is most likely attributable to the aerosol-cloud

C1

interaction and a prolonged cloud lifetime. What is new in the present study compared to Myhre et al. (2007)?

2) Aerosols and clouds are generally interlinked through processes other than physical aerosol cloud interactions, such as that large scale meteorological conditions influence both the AOD and cloud properties. Does the high AOD correspond to high aerosol concentrations in the atmosphere? In addition, if assuming that AOD is well related to aerosol concentrations, can the observed aerosols by satellites be the same source with those influencing clouds?

3) Three-month analyses of satellite measurements are not sufficiently long to establish the relationship between aerosols and clouds. The region division is somewhat confusing because the 3-month mean AOD difference among the four regions is not significant.

4) How does IN affect clouds?

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C2