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Interactive comment on "Aerosol-radiation feedback deteriorates the wintertime haze in North China Plain" *by* Jiarui Wu et al.

Anonymous Referee #1

Received and published: 20 February 2019

In this study, authors used WRF-Chem model to simulate a heavy haze pollution episode from 05 December 2015 to 04 January 2016 in the North China Plain (NCP) to study contributions of the aerosol shortwave radiative feedback (ARF) to near-surface PM2.5 mass concentrations. The topic is within ACP scope. Although such studies have been done for Europe (Forkel et al., 2012) or Eastern China (Zhang et al., 2015), this study focused a high PM2.5 event at the NCP. I would like to see my below comments well addressed before the official publication of the manuscript in ACP. Forkel, R., Werhahn, J., Hansen, A. B., McKeen, S., Peckham, S., Grell, G., and Suppan, P.: Effect of aerosol-radiation feedback on regional air quality–A case study with WRF/Chem, Atmospheric environment, 53, 202-211, 2012. Zhang, B., Wang, Y., and Hao, J.: Simulating aerosol–radiation–cloud feedbacks on meteorology and air quality

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Discussion paper

over eastern China under severe haze conditionsin winter, Atmospheric Chemistry and Physics, 15, 2387-2404, 2015. Comments: 1. The paper has certain unprofessional usages that hinder the reading, examples from Abstract are: a. WRF-Chem is the official name, avoid using WRF-CHEM b. Line 18: Atmospheric aerosols are different from fine particulate matters c. Line 30, there are two "during the episode" separated by a "." d. Line 34, how do you "cooling the temperature" e. Lines 32-36, this sentence has mixed verb tenses, not clear what leads to leads. f. In Line 32, "Sensitivity studies have revealed" while in Line 37 "ensemble analysis indicates" g. How "near-surface" is defined? h. I don't think "the" is needed in front of ARF, but it is needed in front of NCP i. Do not use [PM2.5] j. Line 98, correct the WRF name– the Weather Research and Forecasting (WRF) 2. What is the definition of haze pollution? I understand the authors want to say high PM2.5 concentration. But is haze pollution some well-defined concept, any criteria to that? 3. What version of WRF-Chem is used? We do appreciate the authors' efforts on improving the model, but the WRF-Chem has been developed much further since 2005 version. How did the authors incorporate the new features of the new versions? The authors also need provide reasons why the old things are used when new versions have been out for many years for the parts they modified, i.e., CMAQ aerosol module (AERO5 or AERO6?), ISORROPIA 1.7 as ISORROPIA II has been out since 2007. 4. Lines 176-182, put these equations to appendix. 5. What is the difference between summary and conclusions? Reduce the length of this section, do not repeat the main results. 6. The results are normal and well described, although the main findings (Figures 11-15) are much less compared to the model validation figures (1-10). It is suggested to consider adjusting that if ACP is sensitive to the length of articles.