Geosci. Model Dev. Discuss.,
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Geoscientific Model Development Discussions

Interactive comment on "Improvements to the WRF-Chem model for quasi-hemispheric simulations of aerosols and ozone in the Arctic" *by* Louis Marelle et al.

Anonymous Referee #2

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The authors implemented six different improvements to WRF-Chem 3.5.1 in order to increase the simulation quality in the Arctic: a correction to the sedimentation of aerosol particles, emissions and gas-phase chemistry of DMS, improved representation of the dry deposition over seasonal snow, UV-albedo dependence on snow and ice cover for photolysis calculations, better representation of surface temperatures over melting ice in the Noah Land Surface Model, and a cumulus parameterization that includes the effect of cumulus clouds on aerosol and trace gas concentration. The effect of each of these improvements on simulated ozone and aerosol concentrations is discussed in the paper and compared against observations. In total, the paper describes excellent work, which contributes significantly to the development of WRF-Chem and to the

comprehension of processes which affect air pollution in the Arctic region.

Therefore, I have only a few minor suggestions:

Page 4, line 15: Please mention the projection

Page 7, lines 14-20: Please add some more details about the implementation of secondary activation

Page 15, last line: This is an important result, which should be emphasized and discussed in more detail and also be addressed in the conclusions.

Correlations should be discussed more extensively besides the RMSE.

The authors might consider an extension of the conclusions in order to keep up with the overall high quality of the paper and to enhance the readability of the second paragraph (just a suggestion how, no condition for acceptance of the paper).

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