Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2015-973-RC2, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Will a perfect model agree with perfect observations? The impact of spatial sampling" *by* N. A. J. Schutgens et al.

Anonymous Referee #2

Received and published: 22 February 2016

The manuscript analyzes the heterogeneity of aerosol properties within 200 x 200 km2 model grid boxes, using finer-scale simulations for six sets of region and time period. The goal is to reveal the impact of the spatial heterogeneity when combining global models with satellite observations. The main conclusion is that, while the impact depends on matching strategy, it is generally greater than the errors associated with satellite observations. This statement is commonly believed, but has rarely been demonstrated to my knowledge. I recommend publication after the authors address the following minor comments.

Some statements about ground-based observations need to be clarified. In Page 1, Line 5 "the field-of-view of ground-sites" is implied to be 10 km. In Page 2 Line 12 the AERONET is said to sample "no more than 5 km". In fact, most of current ground-based aerosol measurements sample significantly shorter lengths over their native integration

Printer-friendly version

Discussion paper

time (between ∼1s and minutes). The lengths are some centimeters or meters, depending chiefly on horizontal wind speed and secondarily on instrument flow rate and sunphotometer light collector width. Ground-based measurements represent a distance comparable to 10 km only if integrated over tens of minutes or a couple of hours. Perhaps the authors have an integration time of one hour in mind for the ground-based observations, as this is the temporal resolution of the simulations. This is very different from the native integration time and should be noted.

A few words on the expression of differences and errors would be nice. The expression (observation-model)/model (eq 4) produces numbers widely different from (model-observation)/observation (e.g., +160% vs -62%). The latter expression encounters division by zero when the observation is zero, but is nonetheless fairly commonly used. I would recommend stating explicitly that the present study treats the model as the reference against which the "observation" is evaluated, and not the other way around.

Page 3. Line 20. Remove one of the two “from”.

Page 3. Line 28. Replace “main island Japan” with “the largest island of Japan”. Japan has three more main islands.

Page 4. Line 10. Move the first parenthesis to immediately before 2013.

Page 4. Line 19. Move the first parenthesis to immediately before Seinfeld.

Page 7. Line 20. I do not see the exception in Figure 6.

Page 7. Line 29. “wet and dry and wet deposition” should read “wet and dry deposition” or “dry and wet deposition”.

Page 8. Line 17. Remove “e.g.”

Page 8. Line 26. I would think short life-time works to increase spatial heterogeneity, not decrease.

Page 10. Line 14. “Sofar” should read “So far”. Also Line 27.

Page 11. Line 25. Remove the hyphen from “More-over”.

Page 13. Line 21. Replace no with not.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-973, 2016.