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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of horizontal model resolution in assessing the transport of CO in a middle latitude cyclone using WRF-Chem" *by* C. A. Klich and H. E. Fuelberg

Anonymous Referee #1

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I found this to be a very nice paper analyzing differences between regional model simulations at different resolutions. The analysis focuses on a typical mid-latitude cyclone over Asia, but is applicable to other locations and convection in general. The WRF-chem model was used, with simulations at 45, 15 and 5 km resolution. The meteorology of the 3 resolutions are compared to each other and observations. In addition, the transport is analyzed using HYSPLIT trajectories driven by each of the resolutions. The CO distributions are also compared and shown to differ greatly with resolution. The vertical mass fluxes are also determined, as a way of quantifying the model resolution impacts.

This paper does an excellent job of quantifying the impact model resolution can have on chemical distributions due to errors in convective parameterizations in 3D models. While the paper only examined CO, it is clear these conclusions are relevant to all atmospheric compounds.

The paper is very well written. The figures are clear and illustrate well the author's analysis.

Very minor points to address:

p. 14876, l.3: Lin et al. compared results from *a global model with* two high-resolution . . . models . . .

p.14879, l.19: What do you mean by "imported"? If the biogenic (isoprene) emissions were calculated online in WRF-chem using the MEGAN algorithm, then say that. If they were calculated with MEGAN offline and then read in, state that explicitly and explain exactly how that was done, or where the emissions were obtained.

p. 14894, l.24: "cold from" -> "cold front"

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 14871, 2013.