

Comments on:

A revised dry deposition scheme for land-atmosphere exchange of trace gases in ECHAM/MESSy v2.54

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General comments:

This manuscript presents a revised dry deposition scheme in EMAC model. Revision includes improved stomatal deposition dependence on vegetation density, two meteorological factors and soil moisture, and improved non-stomatal deposition dependence on meteorological and environmental factors. Then authors evaluated the impact of this revision on ozone dry deposition on daily and seasonal scales and explored the effect of each separate parameterization.

In general, I think this manuscript is really well written, and it meets the criteria for publication on Geophysical Model Development:

- the manuscript contributes to the modeling of boundary layer dynamics and atmospheric chemistry
- scientific approach and methods used are valid, results are discussed in an appropriate way
- simulation is reproducible because of data and code availability, and detailed description in the main manuscript and supplements

Just a few questions and details need to be further addressed before accepting for publication:

Specific comments:

- Abstract could be revised to better summarize (shorten) the model development details and leave room for model performance improvement and impact on global ozone budget, etc.
- Authors selected 6 land types out of 11 in the model. Could authors add in the reason for including or excluding certain land types?
- Mismatching meteorology: in Sect. 4.2, authors choose/have to use meteorology data from ERA5 to assess the impact of stress factors on the diurnal cycle of dry

deposition. And in line 371-372, ‘..., as the humidity over the Amazon forest **is probably too low** in the model’. Same argument is presented in line 415-417. Could these mismatches/comparisons in meteorology be shown in appendix as figures?

Technical corrections:

- Line 92, ‘The the’.
- Line 286, is ‘what’ a typo here?