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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modelling the impacts of climate change on tropospheric ozone over three centuries" *by* G. B. Hedegaard et al.

Anonymous Referee #1

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This is an interesting study and contributes to the knowledge body of atmospheric chemistry and climate change. However, one of my major concerns remain about the paper is the presentation. The qualify of figures definitely needs to be improved. For example, I don't understand why the white strips and quite some strange patters in the figures (almost in every figure) - these were not explained in the text and I don't know whether they are just some technical problems or any scientific reasons for that - this makes it extremely hard to evaluate the results presented.

In addition, I am not convinced with the discussion on ozone trends in the free troposphere (the level at 5km altitude) (P6825, L16-29).

I am very surprised with the authors" conclusion of "The ozone distribution in the free troposphere (last plate of Fig. 10) indicates that the effect from enhanced ozone pre-

cursors like isoprene exceeds the decrease in ozone concentration due to increased water vapour in and north of the subtropics and vice versa in the equatorial regions - and I don't see any evidence for this.

I think some better description on model setup, in particular the treatment of boundary conditions (including both meteorology and chemistry) could help the readers better understand and interpret the results. The description in the text is not clearly enough: "Boundary conditions for the model domain depend on the direction of the wind, such that free boundary conditions are used for sections where wind flows out of the domain. Constant boundary conditions are used for sections of the boundary where wind is flowing into the domain; in this case, the boundary value is set to the annual average background concentration. For ozone these are taken from ozone soundings and are the same for all simulations in this study (Logan, 1999)."

I guess I figured out what the authors meant by "Boundary conditions for the model domain depend on the direction of the wind" but this could really be confusing. Also what's the boundary conditions for tracers other than ozone? Were they obtained from a separate model?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 6805, 2011.