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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impacts of historical climate and land cover changes on tropospheric ozone air quality and public health in East Asia over 1980–2010" *by* Y. Fu and A. P. K. Tai

Anonymous Referee #1

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This study quantifies the contribution of changes in land cover and vegetation to changing surface ozone over East Asia between 1980 and 2010, comparing the effects with those of changing climate and changing anthropogenic emissions over the same period. While the effects on ozone are relatively small, they are found to decrease summertime ozone and therefore to counteract the effects of changes in climate. The study also finds that changes in dry deposition of ozone dominate over the effects of changes in biogenic emissions, in contrast to what has been found over other parts of the world.

On the whole this is an interesting and scientifically valuable paper that is worthy of publication in ACP. It is clearly structured, well written, appropriately illustrated and is

commendably concise. The introduction is particularly clear and well written. I have highlighted a few points below that need to be addressed, but these are relatively minor in nature.

General Comments:

My principle concern regards the robustness of the results. The study actually addresses the difference between two five-year periods, and it is not clear how well this represents the changes over 1980-2010. How variable is the surface ozone within each 5-year period, and how does this variability compare with the difference between the periods? Are the spatial distributions and magnitudes of the changes robust if 3- or 4-year periods are selected from within each 5-year run to compare? Two specific years are selected for LAI (1982 and 2010), but how representative are these years of their respective 5-year periods? A brief exploration and discussion of these issues is needed to convince the reader that the results described are solid and robust.

The climate-driven ozone changes presented in Fig 4 appear very large (although they seem consistent with the large temperature and humidity changes identified). Is this just is a consequence of the short periods considered? Is so, then the difference between these periods does not represent longer-term climate changes realistically. How do the climate changes compare with other assessments over this part of the world?

Substantial additional information is provided in the supplement, and some of this information could usefully be included in the main text of the paper. A few additional summarizing comments could be added to Section 5 of the paper to help interpret the effects of climate changes, for example.

Specific Comments:

p.14116, l.14: What emissions were used for 1985, and what measures were taken to ensure that they were consistent with the 2005 inventory described? Also, how was

methane treated in these studies: consistent with the climate period, the anthropogenic emissions, or fixed?

p.14117, l.28: What measures were taken to ensure the self-consistency of the PFT definitions across the period? Different classification of PFTs into the limited MEGAN and Wesely categories may lead to inconsistencies if the sources of PFT data differ.

p.14119, l.27: Changes in agricultural practices are suggested here. Do you have any suggestions for what these might be? The changes in seasonality affect the seasonality of ozone, so some interpretation here would be particularly valuable.

p.14120, l.9: If the region is VOC-limited, then increased isoprene emissions should increase ozone. The explanation here needs to be clearer.

p.14123, Section 7: This section is rather too brief given that the health impacts are highlighted in the title of the manuscript. The section would benefit from a brief description of how the health effects were calculated (this can be taken from the Supplement).

Minor Comments:

l.14113, l.6: Add "with" after "albeit"

l.14118, l.12: It is not necessary to list the five simulations here, as they are already listed in the table and are described adequately in the following sentences.

l.14122, l.5: parenthetic alternatives should be avoided, please remove "(reduced)" and "(lower)" and/or rephrase the sentence.

l.14130, l.9: The Raquel reference lists many of the authors first names in place of their surnames! (This also needs correcting in the Supplement).

l.14135, Figs 2 and 3: panel (c) has units of cm/s, should these be mm/s? Panel (d) needs an area unit, are these per grid square?

p.14139, Fig 6 incorrectly duplicates Fig 5; this has already been corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 14111, 2015.