Atmos. Chem. Phys. Discuss., 15, C9751–C9753, 2015
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Using proxies to explore ensemble uncertainty in climate impact studies: the example of air pollution" *by* V. E. P. Lemaire et al.

Anonymous Referee #1

Received and published: 25 November 2015

A methodology to "screen" regional climate projections in terms of their expected impact on future ozone and PM2.5 levels using a statistical model is presented. For PM2.5 the method only works for three out of eight regions in Europe which is a major concern, while for ozone i works better, six of eight regions.

Validation of the methodology was only done for one climate projection. Including one more of the regional climate projections in the validation of the methodology would make the paper more interesting and lend more confidence to the results presented.

The regions for which no robust relationships were found should be mentioned in the abstract. Given that the statistical model only works for three regions for PM2.5 the

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phrase "The climate benefit for PM2.5 was confirmed" seems too strong. Also in view of what is presented in the introduction about the divergence of previous estimates of the climate benefit for PM2.5 in Europe.

Although the focus of the paper is on the impact of climate change on air pollution it has been shown that projected European air pollution emission reductions has the potential to reduce both PM and ozone pollution in Europe to a large extent. This needs to be mentioned in the introduction and the derived climate penalty/benefit should be contrasted to what could be achived from emission reductions.

Section 2.2. The performance of the CTM for the historical period must be discussed. To what extent is the model capable of capturing observed variability in PM2.5 and ozone in a statistical sense? More information is needed here or reference to previous work documenting the performance.

Europe should be included in the title.

There is a need for language editing. Some suggestions are listed below but there is more to do to improve the readability.

Technical/language comments p28362 l8: dataset from a deterministic p28363 l12: cost of such technique p28363 l16: amounts p28364 l5: dataset from a deterministic p28364 l19: such a p28364 l25: projections p28366 l3: decrease of concentrations p28366 l28: square based on using p28367 l3: have been p28369 l13: to obtain a strong climate signal and significant results. p28373 l20: can also give an p28374 l10: latter p28374 l12: displayed in p28374 l21: in Fig. 3 p28374 l25: in Fig. 3 p28375 l1: compared p28375 l2: episodes p28375 l17: similar to the p28376 l1: a deeper p28376 l9: of the selected p28376 l20: axis p28377 l12: rise differs between p28377 l13: largest difference p28377 l18: which shows the lowest increase p28377 l22: is associated p28377 l24: In Fig. S5 p28378 l8: meteorological drivers p28378 l9: projections p28378 l10; climate change p28378 l15: meteorological drivers

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