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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of the absolute regional temperature potential" *by* D. T. Shindell

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The ARTP introduced by Shindell and Faluvegi in two previous papers is a great advance on the global AGTP concept by proving impact information on a regional scale. This paper is useful in that it expands on the earlier work; I particularly like the separation into land and ocean effects.

This paper importantly attempts to provide some corroboration of the robustness of the regional breakdown by comparing full model results of several GCMs with the predictions from the ARTP method. I would however like to understand more about how strict a validation it is. There are 16 elements in the k_x,y response matrix so they can't all be constrained by examining the responses to 20th C aerosol changes, presumably mostly in the northern mid-latitudes.

I have a slight quibble about the terminology used, if the ARTP is analogous to the AGTP then it should relate emissions to temperature change with units K/kg. What are actually being evaluated in this paper are not the ARTPs, but the k_x,y which relate forcing to temperature change. These k_x,y are also referred to as "RTP coefficients" which would further imply a normalisation by the CO2 response. "Regional response coefficients" would be a more accurate description (the author may be able to come up with something snappier).

I recommend that the paper should be published after minor changes.

Abstract: This needs rewording as the ARTPs need to be defined as responses to emissions, not responses to forcing changes.

Introduction, first paragraph: Need to define the ARTP as response to emissions, "RTP" is used where I think "ARTP" is meant.

Introduction, third paragraph: Use a different term to "RTP coefficients".

Page 13816, line 1 : To define the ARTP, the Fs need to be forcing responses to unit emission changes.

Page 13816, line 26: The relation to emissions needs to come at the beginning of the section as it is part of the ARTP definition.

Page 13817, line 2: I think the normalisation by CO2 needs a little more discussion. It should be made clear that this normalised quantity is the "RTP". How uniform exactly is the CO2 forcing? The temperature response to CO2 isn't uniform, so the RTPs aren't simply a scaling of the ARTPs.

Page 13819, line 16-17: Can the author be more quantitative than "fairly robust". How many of the 16 response coefficients (not RTP coefficients) are being tested here?

Page 13819, line 18-19: What is the difference between these coefficients and the Shindell and Faluvegi ones? What does the fact that the correlations are "nearly the

same" tell us? If it's not much, I would cut this sentence.

Page 13820, line 1-14: This should be a bit clearer as to which elements of the response matrix are being discussed, i.e. the SHext and Arctic responses to which forcing latitudes.

Page 13820, line 20-25: The uncertainty range seems to go below zero whereas the full ranges from the models are all positive. Does this mean the uncertainties should be asymmetric?

Section 5: Does the 20% uncertainty range refer to the all the elements in the Tropics and NHml rows in table 1, or just the diagonal elements, or just to the sum of the elements?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 13813, 2012.