**Geoscientific
Model Development
Discussions**

# *Interactive comment on* "A new method to diagnose the contribution of anthropogenic activities to temperature: temperature tagging" *by* V. Grewe

**Anonymous Referee #1**

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Review of "A new method to diagnose the contribution of anthropogenic activities to temperature: temperature tagging" by V. Grewe

The paper describes a methodology to tag specific contributions of a quantity to another used in atmospheric chemistry but applied to temperature. I find the idea quite interesting and at least for a simple box model easy to use. But as also pointed out by the author the implementation to a GCM might be more challenging. I find the paper interesting to read and understandable. I just have a few minor comments and three questions. I therefore recommend publication of the manuscript as soon as the corrections are made.

General comments (also out of personal interest):

(i) You state that the quantities in Eq. 35 are split equally, i.e., 50% percent for each quantity. Is this really necessary or could you also use something different if you would use for example a different variable? And what about if you have three components influencing a variable? Would it be split in thirds?

(ii) In the method section you write that for a doubling of $CO_2$ you get a temperature change of 3.1K. In the section describing the doubling of $CO_2$ experiment you have a much lower value. Did I misunderstand something? Shouldn't they be the same?

(iii) This is a highly hypothetical question. If you would implement this tagging method in a GCM would it be worthwhile to derive the partial response as a function of height or is it better to use everywhere the same function and let it be zero? The only setting that I can think of that this would be the case is the influence of wind stress on temperature in the ocean.

Specific comments:

(i) pg 3196, first line: '. . . account. (. . .' should be '. . .account (. . .'

(ii) pg 3203, line 22: '. . . causes toi temperature . . .' should be '. . . causes to temperature . . .'

(iii) Fig. 3: Values on the right axis (Temp. change)?

(iv) Fig. 9: Are the labels correct? If so, I have the impression that the values of Fig. 8 and Fig. 9 do not correspond.

Interactive comment on Geosci. Model Dev. Discuss., 5, 3183, 2012.