

Interactive comment on “Attribution of observed changes in stratospheric ozone and temperature” by N. P. Gillett et al.

Anonymous Referee #1

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This paper presents a detection/attribution analysis of stratospheric ozone and temperature changes, based on observations and an ensemble of simulations from the SPARC CCMval2 project. Observations include global column and profile ozone data from satellites, plus satellite temperature observations. Overall the analysis is straightforward and methodology appears reasonable (following standard detection/attribution statistical techniques). The key results identify statistically significant variability in ozone and temperature linked to ODS, GHG and natural forcings. The one important difference between observed and modeled behavior occurs for GHG effects on column ozone (Fig. 3a), and this is explained to result from a misfit of tropical ozone variability (where the models do not include tropospheric ozone), which seems reasonable. Overall this work is novel and interesting, and the paper is concise and well written. I have only a few comments/suggestions for consideration in revision:

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1) While the authors have extensive experience in the statistical methodology of detection and attribution, this may be less well-known to the stratospheric focus group of this paper. I recommend that the authors include a brief but explicit explanation of the details for less experienced readers (for example, state that regression coefficients from Eq. 1 equal to 1.0 provide the relevant attribution tests). Can you briefly explain the 40 EOF truncation?

2) I have other questions on data analysis details. Why are 3-year mean anomalies used in the statistical analysis? What is the sensitivity to other averages (2-year, 4-year, etc.). What are the details of the trend calculations? Are simple linear fits used, or is some sort of multivariate regression? What are the units of the trends in the various figures (stated as DU or K, but trends should include a unit of inverse time). How do you interpret the small natural cooling trends in Fig. 3b (perhaps linked to the El Chichon volcanic eruption in the early part of the record, and hence somewhat of an artificial trend?)

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 17341, 2010.