

Interactive comment on “Dynamical modes associated with the Antarctic ozone hole” by B. C. Weare

Anonymous Referee #1

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The author applies the Generalized Maximum Covariance Analysis to diagnose the dynamical modes associated with variations in the Antarctic spring ozone hole. In the first data set, there are combined temperature, zonal meridional and vertical velocities between 100 and 10 hPa and regions south of 30S for the months August, to December. The second data field consists of 50-hPa spring ozone. The author discusses the first two coupled modes and investigates differences between the years 200 and 2001 in more detail, by carrying out budget calculations. He determines that transport processes contribute substantially to the ozone and temperature changes in the middle stratosphere over the Antarctic continent. I have some concerns regarding the applied statistical approach that should be addressed before publication. The author discusses the sensitivity of the results to specific parameters like number of EOFs

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used and time lags included. He does not discuss the dependence of the results on the large trends in the original data. The important questions are: Will the first mode look more like a wave 1 disturbance when the trends are removed before calculating the coupled modes? The heterogeneous pattern of the ozone field for the first mode has a wave one component that is most likely masked by the zonal contribution of the ozone trend. Will the second mode disappear completely because its temporal loading is strongly dominated by the trend? The outcome of such a de-trended analysis has strong implication for the interpretation of the results. The current analysis mixes different processes that cannot be separated by the current analysis. In case that the spatial structure of the modes depends strongly on the trend, I cannot consider these modes in its current form as dynamical;

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5055, 2009.

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