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Interactive comment on "Rapid meridional transport of tropical airmasses to the Arctic during the major stratospheric warming in January 2003" *by* A. Kleinböhl et al.

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We would like to thank Dr. McCormack for his comment on our paper and for pointing out his work recently published in ACP.

We were surprised that the scheme by Cariolle and Deque (1986) and the Chem2D scheme (McCormack et al., 2004) should be superior to the LINOZ scheme. In the first case the parameterization is nearly 20 years old and the understanding of the ozone chemistry has made a lot of progress since then. In the second case the scheme is much simpler as it relies only on the residual ozone tendency (P-L) term and on the term dependent on the amount of ozone, neglecting terms dependent on temperature

and overhead ozone column. LINOZ had been successfully used in studies of atmospheric dynamics, (e. g. Sinnhuber et al., 2003). Also recent simulations by Kuttippurath (PhD thesis and manuscript in preparation) using a 3D chemistry transport model with the LINOZ scheme generally show reasonable agreement to measurements as well as to climatologies.

Considering the content of the work by McCormack et al. (2004) it indeed seems to be the case that the ozone loss calculated by the LINOZ scheme is too high for mid-stratospheric airmasses largely confined at high latitudes. However, this is not obvious for the case in which mid-latitude airmasses were transported towards the pole, in particular at timescales of 4-5 days where LINOZ gives very reasonable results (comp. Fig. 11 in McCormack el al. (2004)). As the latter case is the most comparable to the situation studied in our work it seems unlikely that uncertainties or inaccuracies in the LINOZ coefficients should have a larger impact than the other error sources discussed in our paper.

We would like to add that we performed calculations of back trajectories which clearly show that the origins of the airmasses measured on 23 January 2003 around 800-1000 K in the Arctic were located in the tropics close to a latitude of 20 deg N. Furthermore the trajectory calculations suggest that the timescales for this transport was about 4-5 days at 800 K, and about 3 days at 1000 K. We calculated the ozone change along these trajectories and found that the results were in reasonable agreement with our Arctic measurements.

As our paper is a study with a focus on the measurements in this interesting dynamical situation rather than a comparative study for different linearized ozone schemes we suggest for a revision of our paper that we use the trajectory calculations to assess the dynamics and the transport times. Hence we will use the linearized chemistry calculations solely as additional argument for plausibility, rather than a quantitative assessment of the transport times, and leave detailed comparisons of the performance of different linearized ozone schemes to more dedicated studies with a broader data

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base.

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