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Interactive comment on "Extrapolating future Arctic ozone losses" *by* B. M. Knudsen et al.

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Some of the points raised by John Austin in part 3 of his comments to our paper are mostly reiterations of points raised previously, and we shall not comment on them until our final comments. Our remarks are grouped under the same headings as in his comment.

General remarks

John Austin states that we select data, which favour slow ozone recovery. This is not true: we are trying to use all the available information to get a balanced view of what the future holds. The PSC areas end in 2001 because the calculations were originally performed in 2002, and because the FU-Berlin data stop there. If we wanted to produce large future ozone depletions we would not have chosen a warm year as 2001 as the end year. We can extend the calculations to present day, but this would in fact represent a statistically unfair favouring of warm years since 5 of the last 6 winters have had major mid-winter warmings, which lead to small PSC areas. On average

every 2nd winter experiences a major warming. If we wanted to produce large future ozone depletions we would have used the FU-Berlin data only because they produce a much larger PSC trend. As we have argued in the paper, there is some rationale for doing that. The effect of the decreasing ozone trends has been investigated in the sensitivity analyses. As for the H2O trends we have taken the only published long-term trends, and we have made a thorough sensitivity analysis of the effect of the trend.

CCMs

OK, we will change our remark about CCMs neglecting denitrification. However, the denitrification schemes implemented cannot be based on physical principles since the formation mechanism of solid PSCs is not known, and could presumable not model denitrification by 'NAT rocs' (Fahey et al., 2001; Austin et al., 2003). John Austin criticizes our extrapolations of the future, but the CCMs are based on trace gas scenarios, which are also uncertain guesses of the future.

Since we predict only little ozone recovery, the effect of including transport impacts is presumably quite small in our calculations.

Water vapour trends and volcanoes

Concerning the results of Joshi and Shine (2003): An age of air of 5 years in the lower Arctic stratosphere is consistent with published estimates, while an age of 10 years is not.

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Interactive Comment