# General Comments

The study by Blessmann et al. addresses an important issue in the research on stratospheric polar ozone, namely the question what determines the ozone concentration in the forming polar vortex in autumn. This paper could be eventually an important contribution to ACP.

But I have also some problems with the paper. First, in the discussion in the paper (e.g. conclusions) the paper seems to address the issue of "polar ozone". However, the paper presents only a case study of one particular *Arctic* winter. It needs to be discussed in the paper in how far the results presented here are relevant to other Arctic winters, e.g., those with less polar ozone loss. Alternatively, would the same conclusions have been reached if the Arctic winter 2010/2011 had been analyzed?

Second, it should be stated in how far the results of the paper carry over to the southern hemisphere polar vortex. Lee et al. (2001) have reported a transport barrier within the forming Antarctic vortex. Is anything resembling this feature found for the Arctic in 2000 as well? Alternatively, if the results of the paper are *not* relevant for the Antarctic, it should be clearly stated in the paper.

Third, my impression is that throughout the paper citations to important, classic papers are missing. Some examples are given below.

Finally, I'd suggest that throughout the paper more precise language is used. I.e., instead of saying "brief period" state XX weeks; instead of saying "in autumn" state mid-September. Etc...

In summary, I suggest that the paper should be revised along the lines suggested. A revised version of the paper should be a suitable contribution to ACP.

# Comments in Detail

p.32286., l. 4: state how brief.

p.32286., l. 16: is this true also for winters with strong ozone loss? E.g.the winter 2010-2011?

p. 32287., l.6: This sentence is unclear. what is meant by "more realistic"? Give a citation.

p. 32287., l. 10: The paper by Carslaw et al. (1995) is only on liquid particles, it is not sufficient as a citation for various PSC particles.

p. 32287., l. 13: What is the reason to deviate from the JPL recommendation here? If this should be done I recommend using the new cross sections from (Papanastasiou et al., 2009).

p. 32287., l. 20: Only a 30% ozone perturbation is considered here. More discussion is needed here. How realistic is 30%? Do you have a citation to back up this choice? How sensitive are the results presented here to the exact number of 30% assumed here. I.e., how different would the conclusions of the paper be if, say, a 15% perturbation would have been assumed.

p. 32288., l. 9: Is this the correct citation? I could not find the information on the tracer-tracer relationship in this paper.

p. 32288., l. 16: please compare this number (19.9 ppt) to the assessment of the range of possible values in WMO (2011)?

p. 32288., l. 24: Is not the mixing strength also determined by the time step with which the mixing is employed? Please discuss more clearly.

p. 32288., l. 25: be more explicit about the diabatic terms used. Just clear sky?

p. 32288., l. 27: Which diabatic heating terms?

p. 32289., l. 20: balance? please provide a citation.

p. 32289., l. 25: the citation provided here for NOx induced polar ozone is not appropriate. What about Farman et al. (1985).

p. 32291., l. 18: is really the best citation for "isolation of the vortex"?

p. 32292., l. 5: "dominated": provide a citation.

p. 32292., l. 23: SCISAT is not the same thing as ACE.

# References

Carslaw, K. S., Clegg, S. L., and Brimblecombe, P.: A thermodynamic model of the system HCl-$HNO_3$-$H_2SO_4$-$H_2O$, including solubilities of HBr, from 328 K to $<$ 200 K, J. Phys. Chem., 99, 11 557–11 574, 1995.

Farman, J. C., Murgatroyd, R. J., Silnickas, A. M., and Thrush, B. A.: Ozone photochemistry in the Antarctic stratosphere in summer, Q. J. R. Meteorol. Soc., 111, 1013–1025, 1985.

Lee, A., Roscoe, H., Jones, A., Haynes, P., Shuckburgh, E., Morrey, M., and Pumphrey, H.: The impact of the mixing properties within the Antarctic stratospheric vortex on ozone loss in spring,, J. Geophys. Res., 106(D3), 3203–3211, doi:10.1029/2000JD900398, 2001.

Papanastasiou, D. K., Papadimitriou, V. C., Fahey, D. W., and Burkholder, J. B.: UV Absorption Spectrum of the ClO Dimer ($Cl_2O_2$) between 200 and 420 nm, J. Phys. Chem. A, 113(49), 13 711–13 726, 2009.

WMO: Scientific assessment of ozone depletion: 2010, Global Ozone Research and Monitoring Project–Report No. 52, Geneva, Switzerland, 2011.