

***Interactive comment on* “The influence of polar vortex ozone depletion on NH mid-latitude ozone trends in spring” by S. B. Andersen and B. M. Knudsen**

Anonymous Referee #3

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General comments:

This paper is an extension of paper by Knudsen and Andersen, Nature, 2001. Compared to their previous work, authors added ozone dilution for years 1995, 1996, and 2000 to the statistical model, calculated positions of vortex remnants, and also estimated the effect of dilution on the zonal mean trends. Quantitatively, first of the estimates provided by the authors (39% for the period 1979-1997 and 54% for the period 1979-2002) seem to be highly uncertain due to several unaccounted factors mentioned by the authors themselves (BD circulation, mid-latitude in-situ ozone depletion). The

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second ones are probably more correct but also suffer from the ignoring of depletion in other winters. However, the model explains quite a significant fraction of the longitudinal differences in trends that lends more credibility to the calculations. Also, I find information on geographical distribution of dilution (shown in Figure 1) valuable on its own and therefore worth publishing. In summary, I recommend the paper for publication after consideration the minor comments listed below.

Specific comments:

Page 1796, line 1 "The ozone depletions in 1993, 1995, 1996, and 2000 were taken from Rex et al. (2004) while the ozone depletions from 1997 were taken from Knudsen and Gross (2000)."

Why you do not take all depletions from Rex et al. (2004) for the sake of homogeneity? Does your depletion differ from that by Rex et al.?

Page 1796, line 5 "The ozone depletions were regridded every 7th day."

Since you have different starting dates do you also have different ending dates or do you run last calculation for less than 7 days?

Page 1796, line 15 How do you get averages for April and May? Do you calculate mean values of all regridded depletions? Please, clarify.

Page 1797, line 24 "When the average wind speed at the edge of the vortex gets below 15.2ms⁻¹ for at least two consecutive days the vortex is considered broken down."

Do break up dates in years 1993,1995,1996,1997 and 2000 are those listed in Table 1?

Page 1798, line 12

Figure 3 needs further discussion in regard to the differences between left and right columns. I would also suggest drawing the continents.

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"However there is a strong correlation between a linear decrease with time (or equivalent effective stratospheric chlorine (EESC) proxy) and the dilution proxy."

Do you mean that there is a trend in the dilution proxy between 1993 and 2000 or the correlation comes from the fact that there is no dilution (in the model) in 80s?

Page 1800, line 6 "Note that since the total trend is smaller in the period 1979-2002, the part of the variation that remains unexplained is not larger than for the period 1979-1997."

The purpose of this sentence is not clear to me. You do not want to say that the model for 1979-2000 is as good as that for 1979-1997, do you? I would suggest rephrasing or avoiding the sentence, otherwise it sounds a little bit misleading.

Page 1800, line 16 "However, Prather et al. (1990) found that the reduction of the ozone transport into the troposphere is only a minor fraction of the photochemical recovery during the Antarctic spring."

I do not understand how this sentence is related to the previous sentences in the paragraph.

Technical corrections:

Change period in Fig.4 from 1979-1979 to 1979-1997.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1793, 2006.

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