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Discussions

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Interactive comment on "Two mechanisms of stratospheric ozone loss in the Northern hemisphere, studied using data assimilation of Odin/SMR atmospheric observations" *by* Kazutoshi Sagi et al.

Anonymous Referee #2

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General:
The paper presents the analysis of stratospheric ozone loss in the Northern hemisphere during the period 2002-13 as derived from the DIAMOND model simulations which are assimilated to the Odin/SMR satellite observations. It compares the chlorine-induced with NOx-induced ozone loss and shows that the second effect is extremely important during the warm NH winters which are disturbed by the SSWs. This important contribution is well-written and is supported by well-performed figures. The paper should be acceptable after minor revision with some minor points listed below.

Minor points:

1. Par. 2.2
   You use the DIAMOND model that contains only the isentropic transport. On the other side the cross-isentropic transport is also implemented in form of the diabatic heating rates. In total, you have a full 3d transport that is certainly more than the DIAMOND model. ...so maybe "extended version of the DIAMOND" model describes better your approach.

2. Table 1
   It would be also desirable to list in Table 1 the integrated ozone loss (in Dobson units) for both considered regions. This would quantify the respective contributions to the column ozone loss and is for me a more reliable (or more comparable) quantity than the mean ozone loss

3. Table 1, caption
   ..., value of the maximum loss and the corresponding date

4. P5 L28
   1th April

5. P5 L33
   "3" typo

6. P6 L14
   ..in magnitude to the typical ozone loss in the Antarctic...

7. Figure 2 and 4
   In the last column you show the isentropic view of the cumulative insolation, i.e. between 600 and 800K as well as between 425 and 500K. Maybe you should explain why the highest values start in the polar region (where the polar night is

still expected) and move to the south where the sun activity should be the highest. Is it because of the Earth geometry in the relation to the position of the Sun? This insolation effect seems to be similar for the cold and warm winter. Few additional sentences would help.

8. P12 L13
   PT-range, I would prefer θ-range

9. P13
   I would recommend to write out the abbreviations MLT and ES because they are only sporadically used.

10. P13 L31
    "using the off-line wind driven isentropic transport" - I think your transport is 3d (diabatic heating), and this effect is important for the here considered time periods of the order of few months

11. P15, L5-15
    Here, once again Dobson units defining the contribution to the total column would be better

12. P16, L3
    This loss begins at higher altitudes in late January.