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Comment on acp-2022-689

Anonymous Referee #1

Referee comment on "South Pole Station ozonesondes: variability and trends in the springtime Antarctic ozone hole 1986–2021" by Bryan J. Johnson et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-689-RC1, 2022

Review of "South Pole Station ozonesondes: variability and trends in the springtime Antarctic ozone hole 1986-2021" by Johnson et al., 2022 for ACP

GENERAL COMMENTS

This is a straightforward paper written by a group of authors who have been doing this work for several decades. My comments are therefore very minor and shouldn't require more than a couple of hours to address. The paper will then be suitable for publication in ACP.

SPECIFIC COMMENTS

Line 19: What do you mean here by a 'minimum ozone profile'? Do you mean the ozone profile with the lowest integrated vertical column of ozone in any given year?

Line 40: I thought that the Montreal Protocol focused primarily on phasing out the production of ODSs not the emission of ODSs. But maybe I am wrong.

Line 54: Do you not want to be noting the importance of sudden stratospheric warmings here?

Line 66: Is it the case that at the 89 hPa layer ozone is most sensitive to ODSs, or is it

that it is at the 89 hPa layer a change from negative to positive ozone trend shows the most statistical significance? If the former, then this can be called ozone recovery. If the latter then it can only be referred to as ozone increases as the attribution would not be available to refer to it as recovery.

Line 99: I know that at other stations, when the CMR method is used to estimate the partial column above the balloon burst altitude, the CMR is integrated from the burst pressure to 1 hPa, not to 0 hPa as that showed better agreement with the SBUV residual method. I wonder if this may be contributing to your ozonesondes having slightly too high TCO?

Line 108: By 'Met Service' do you mean the National Weather Service of the USA?

The rightmost axes in Figure 2 need to be labelled with pressure (hPa).

Line 144: Replace 'potential recovery' with 'potential recovery of ozone from the effects of ODSs'.

I think that the Y axis in the top panel of Figure 3 should be labelled "Ozone partial column (DU)"

Line 167: Replace 'slow recovery' with 'slow increase'. When you say 'slow recovery' it begs the question of 'recovery from what?'. I this case it wasn't clear what the ozone would be recovering from during this period. Likewise, when you say 'was the slowest recovery', recovery from what? Maybe you just mean the slowest increase in ozone concentrations?

Line 185: Replace 'by recovery in' with 'by increase in' since you have not done the attribution to declining ODSs to call this recovery.

Line 216: Record high over what period? The full ozonesonde record period?

Line 222: Can you be clear about what your definition is for 'ozone recovery' as it is used here?

Lines 257-258: Given your sentence 'Then in 2020 and 2021 ozonesondes observed the

optimum cold polar vortex conditions in September to late October along with extensive near-zero ozone within 13.5 to 20.5 km altitude', would you say that over the period 2001-2021 that ozone, over this altitude range (13.5-20.5km), has been recovering form the effects of ODSs?

GRAMMAR AND TYPOGRAPHICAL ERRORS

Line 15: Replace 'from surface' with 'from the surface'.

Line 21: Replace 'minimum' with 'annual minimum'.

Line 23: Shouldn't this be 'loss saturation' since it is the loss that is being saturated?

Line 73: Replace 'proportional to ozone' with 'proportional to the ozone concentration'.

Line 75: The hPa acronym has already been used above so perhaps should be defined there (if required at all).

Line 126-128: There is something grammatically wrong with this sentence.

Line 132: Replace 'data was' with 'data were'. Likewise in the caption for Table 1.

Line 153: Replace ', this' with '. This'.

Line 192: Replace 'the 14-21 km' with '14-21 km'.

Line 213: Replace 'year in 2002' with 'in 2002'.

Line 235: Replace 'degree' with '°C' since that is what you use elsewhere.

Line 262: IUPAC convention is sulfate rather than sulphate.

Line 279: Replace 'year in 2006' with 'in 2006'.

Line 291: Replace 'appears to' with 'appear to'.