

2<sup>nd</sup> report on the revised manuscript “Investigation of Arctic middle-atmospheric dynamics using 3 years of H<sub>2</sub>O and O<sub>3</sub> measurements from microwave radiometers at Ny-Ålesund” by Schranz et al.

The revised manuscript was reorganized and properly improved by taking most of reviewers' comments into account. Complementary explanations and new supplemental analyses were added appropriately. Particularly, comparison between the apparent descending velocity of water vapor and the vertical velocity of the residual mean meridional circulation,  $w_{\text{star}}_{\text{bar}}$ , suggested by the referee #1 is a meaningful argument. There still remains large discrepancies between the both velocities, but the authors made detailed analyses and described the breakdown of the discrepancy; that the both velocities are agreed within 16-39% after some averaging processes within the SD-WACCM model, and that there is an average discrepancy of ~ 30 % between the observed velocity derived from MIAWARA-C and that from the SD-WACCM model. I think that complete understanding of the causes of the discrepancies is difficult only by the authors and that further discussions by the research community including specialists of model development and/or theoretical researchers of atmospheric dynamics are necessary.

The observed data and the analysis methods were properly presented, and the previous studies are well reviewed and compared with in the revised manuscript. The results and arguments are valuable enough to stimulate and activate the future discussion in the research community. Thus I recommend publication of this manuscript after minor revisions.

Minor and technical points:

Page 11, Line 31-32

“The relative difference .... Ozone sonde to MIAWARA-C.....” →

I think “GROMOS-C” is correct instead of “MIAWARA-C”.

Page 12, Line 18

“at around 7 hPa” → “at around 0.07 hPa”

Page 12, Line 23

“averaged mean vertical wind profiles” → “averaged zonal mean vertical wind profiles”

Page 30, the last sentence of Figure 9 caption

According to the main text in Page 18, line 18, the `w_star_bar` is averaged along the fit of the 5.5 ppm isopleths of SD-WACCM. So, the appropriate expression of the last sentence is “The points indicate the mean of the profiles over the altitude range of isopleth of MIWARA-C, and the stars indicate the mean along the fit of the 5.5ppm isopleths of SD-WACCM”, isn’t it?