The authors have made changes to the manuscript to remove potential biases and improve the overall message as well as include a section about the impact on trends. However, it appears that only a limited amount of work went into this new analysis and the methodology applied is far from robust. Additionally, while the addition of a section on trends was necessary in order to try to substantiate the claims made in the paper, the lack of any additional work means that the scope of this manuscript remains very limited as stated in the previous review. As such, I would agree with Reviewer 3 in that this work, subject to additional corrections outlined below, would be better suited for publication in AMT rather than ACP. However, I will defer the decision on which journal this manuscript belongs in to the editor.

Comments:

Pg. 07, Ln. 22: "These poor metrics imply that any trends derived at these pressure levels will also be impacted by quality screening induced biases: the magnitude of the trends will be affected because of the change in the slope, and the number of years of observations required to conclusively detect trends will considerably increase due to the noise associated with the worsening of the coefficients of determination (e.g., Millán et al., 2016)."

As stated in the previous review, changes in the correlation slope do not necessarily mean that the trends are affected. In fact, a comparative analysis of figures 7 and 8 show this. The slopes for ozone in the tropics in Fig. 7 show large departures from 1 (just as much as water vapor) between 100 and 300 hPa and yet no significant differences in the trends in this region. Similarly, the relationship between the coefficients of determination and the years of observations required to detect trends is also questionable. The coefficients for ozone appear to progressively degrade below 100 hPa along with an increase in the number of years for trend detection. However, the number of years also increases significantly above 100 hPa with no corresponding significant change in any of the correlation parameters. Granted, the ozone trends are small here but they are also small for water vapor and there does not appear to be any degradation in trend results there.

The new trend section states that the impact of sampling bias on the water vapor / ozone trends are up to 80% / 20% and that the number of years for robust trend detection changes by 150 / 40 years respectively. These changes appear to be the largest possible, which are well into the middle troposphere. However, the manuscript only makes mention of results in the upper troposphere. In the case of ozone, restricting the quoted analysis results to the upper troposphere yields negligible differences in trend results and much smaller changes in years required.

In general I am pleased that the authors decided to include a section in this work on trend analysis at the request of all of the reviewers. However, I am disappointed in the limited amount of work that went into this. For starters, the resulting trends do not have any uncertainties, making it impossible to determine if the changes in trends between sampling patterns are statistically significant. Second, the choice of regression model for trend determination (assuming it to be the one used in Millán et al., 2016) is far too simple to yield robust results, particularly for ozone or water vapor in the troposphere. The authors should include additional dynamical proxies that tend to have large influences on atmospheric species via transport to better characterize variability (common choices are related to the QBO, ENSO, volcanism, the Asian monsoon, and eddy heat flux). This simple choice of trend model will have a detrimental

impact on the computation of the number of years of observations necessary for robust trend detection. The calculation from Tiao et al. and Weatherhead et al. is strongly dependent upon the nature of the residuals and such a simple trend model in the presence of strong dynamical influences will artificially inflate the resulting values. Unfortunately, including additional proxies in the regression model will require a rederivation of this equation as the one derived in those references and used by the authors is only valid for the simplified regression model.