Dear Reviewer 3,

In response to your comments, we checked the autocorrelation function for the noise residual series $N(t)$ from the annual means of IWV for TROWARA and ERA5. There is only a small autocorrelation for time lags different than 0 lag.

Thus, it is justified that we can assume white noise for the residuals of TROWARA and ERA5.

According to [1], the variance $\sigma_N^2 = \frac{\sigma_\epsilon^2}{1-\Phi^2}$

where σ_ϵ is the uncertainty retrieved with white noise assumption, Φ is the correlation coefficient corr(N_t, N_{t-1}). In case of TROWARA, $\Phi = 0.2075$ and $\sigma_N = 1.02 \times \sigma_\epsilon$.

Thus, the uncertainty difference between red noise and white noise assumption is very small.

In the revised manuscript, we will add the autocorrelation figure.

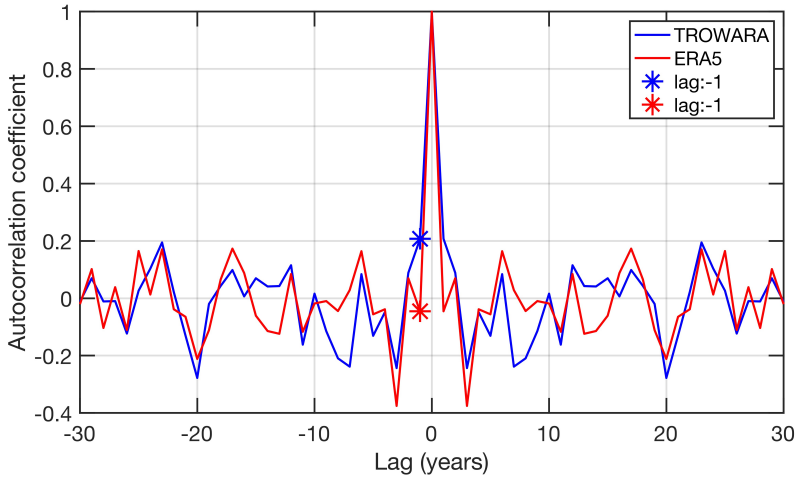

Figure 1: Autocorrelation coefficient of the noise residual series of TROWARA (blue) and ERA5 (red) as function of time lag.

New keypoints of our study:

1) We analysed a time series of IWV which is 7 years longer than in Bernet et al. (2020)

2) We described the interannual variability of annual means of IWV (Figure of the time series of annual means of IWV). Estimation of the impact of the interannual variability on the IWV trend value.

3) We found that there is possibly a dry winter bias of the TROWARA radiometer in some years before 2011. This explains why the trend of TROWARA is a bit larger than that of ERA5.

4) We confirmed the main results of Bernet et al. (2020).

References

[1] Weatherhead, E.C.; Reinsel, G.C.; Tiao, G.C.; Meng, X.L.; Choi, D.; Cheang, W.K.; Keller, T.; DeLuisi, J.; Wuebbles, D.J.; Kerr, J.B.; et al. Factors affecting the detection of trends: Statistical considerations and applications to environmental data. *Journal of Geophysical Research: Atmospheres* **1998**, *103*, 17149–17161, [https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/98JD00995]. https://doi.org/https://doi.org/10.1029/98JD00995.