REPLY TO REVIEWER # 1

I support publication of very valuable study if the following questions are adequately addressed:

Thank you very much for this appreciation and also for the time spent for this evaluation process.

1. I suggest to produce an overview table containing the relevant information of the frequency and availability of the ozone measurements of the different instruments (including periods of instrumental failure, showing overlapping periods, etc.)

Done. Please find Table 1 and lines 162—168.

2.Page 7084, line 11: Which types of Dobson observations (direct sun, moon and zenith sky) are included in this study ? What was the fraction of the types of the measurements (e.g. direct sun vs. zenith sky) used in this study ?

Direct sun (83%) and zenith sky (17%) observations. This has been mentioned in lines 105—107.

3. What was the reason to merge total ozone measurements of Dobson and SAOZ instrument ? It is well known that SAOZ and Dobson total ozone show different seasonalities: Could this difference be completely removed by deseasonalisation of the measurements?

Merging of the data sets reduces drift in individual observations and also extends the data record, which is important for trend analyses. There are slight differences in the observations from two instruments in June and July, which are significantly reduced by deseasonalising the data sets. These have been mentioned in lines 245—255.

4. Ozone vertical series: I miss some additional information on the quality of the combined ozone profile series over OHP based on LIDAR, ozonesonde and satellite measurements. On page 7091, line 3-4 the reader learns: “Since these data sets have different vertical resolution they are interpolated in 1 km vertical grid”: Were the different uncertainties of the individual data series considered? Finally the analysis is based on a series “by averaging the monthly mean anomalies (page 7091, line 12, f): Were possible drifts between the individual series checked? Did you try to estimate uncertainties in the merged series? Was weighting of the different types of measurements considered, possibly based on uncertainties of the measurements and on frequencies of measurements?

The relative drifts of individual data sets are checked with lidar data as reference and are found to be less than +/-0.5 %/year in most cases. The drifts of merged data are also analyzed and are found to be insignificantly small of order +/-0.2 %/year. Weighting of various data sets depending on the frequency of measurement has been done just for finding the number of profiles near the station. A detailed discussion of these is already published in Nair et al. (2012). However, a short description is also given in lines 375—379 and lines 394—401.

5. Page 7091, line 19, f: Is there any plausible explanation why 5 month smoothing increased the correlation between ozone anomalies and model performance?

The 5-month smoothing reduces the discontinuity of ozone anomaly and suppresses unreasonable peaks. This is mentioned in text in lines 410—414.

6. Was it considered to include ENSO as an additional explanatory variable?

The ENSO and NAO are highly correlated and have a cross-coherency. Also, ENSO has a strong influence on NAO as discussed by Huang et.al. (1998). Therefore, we considered NAO in the regression analyses. However, we have also tried ENSO and NAO together, and the resulting trend values are within 3%. This has been mentioned in the text in lines 363—370.

Please note that we have also used another data set (GOZCARDS data) to check the robustness of the derived vertical trends. These results are presented in lines 525—571. Thank you.

Reference:

Huang, J., K. Higuchi and A. Shabbar: The relationship between the North Atlantic Oscillation and El Nino-Southern Oscillation, Geophys. Res. Lett., 25, 14, 2707-2710, 1998.