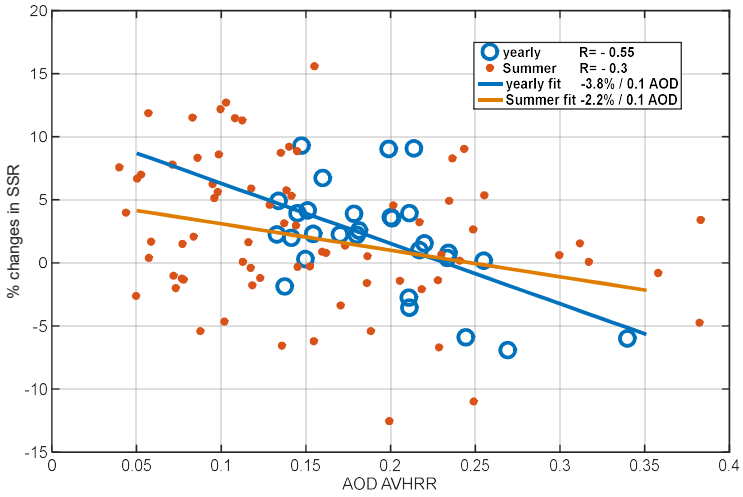
We would like to thank Dr. Tanaka for his fruitful comments.

ALL sky vs AOD

All sky SSR measurements and AOD from AVHRR have been used in order to find the AOD effect in all sky data. For yearly AOD and SSR averages from 1981 to 2009 a correlation coefficient of -0.55 was calculated with a rate of SSR reduction per 0.1 units of AOD equal with -3.8%.For monthly based comparisons, all months revealed a correlation coefficient of -0.2 with a rate of -1.5% /0.1 AOD with better results for summer and autumn months (-0.30, -2.2%/0.1 AOD and -0.30, -1.5%/0.1 AOD)



- The abstract states that a decrease of 2.9%/decade in SSR from 1910 to 1940. I wonder why the trend from this particular period is selectively highlighted within the extrapolated period of 1900-1952. Table 2 indicates a small increase of 0.04%/decade from 1900 to 1952, which is clearly different from above.

We have altered the abstract including:
Very small (0.02%) changes in SSR from 1900 to 1952, including a maximum decrease of 2.9% per decade in SSR from when taking in to account the 1910 to 1940 period, assuming a linear change in SSR.

- Also in the abstract, I could not find where the difference of 4.5% comes from. Table 2 indicated approximately 3.1% but for a slightly different period. The winter period shows the largest change, unlike what is stated in the abstract.

The 4.5% comes from figure 6 as an average of the difference of the 12 months.
Adding the trends of 1953-82 and 1983-2012 gives a slightly different result because mathematically these two individual percentages are calculated using de-seasonalized data using different (for the two periods) mean month values.

- Page 2, Line 21: Regarding the discussion on SSR changes in polluted and pristine areas, I believe that this is still an issue of controversy but two recent studies (Imamovic et al. 2016; Tanaka et al. 2016) showed otherwise, which can be reflected to this statement.

Reference to these studies and corresponding discussion has been added.

– Page 3, Line 2: Fix the citation style.

Style has been fixed

- Page 3, Line 6: Remove "explain".

Extra word has been removed.

- Page 3, Line 22: Figure 1 of (Ohmura 2009) also makes a clear case for this statement.

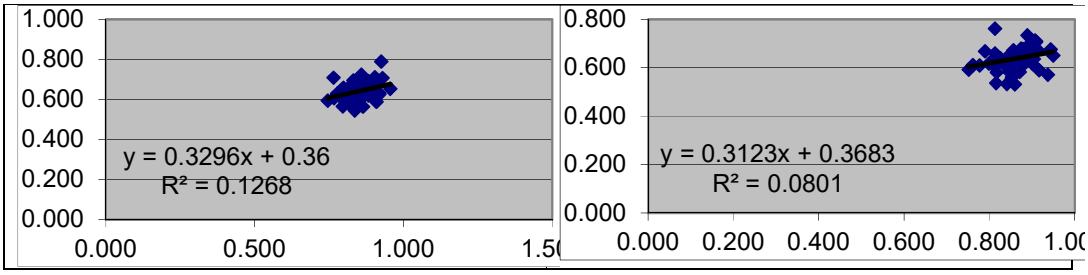
Reference to this work has been added.

- Page 4: Somewhere in the text (not necessarily in this page), the discussion could touch on aerosol-clouds interactions to acknowledge that the two factors (aerosols and clouds) are not completely mutually exclusive in explaining SSR trends.

Added sentence in page 2:"However, due to the aerosol-cloud interactions and the aerosol indirect effect on SSR (e.g., Rosenfeld et al., 2014), the two factors (clouds and aerosols) are not completely mutually exclusive in explaining SSR changes."

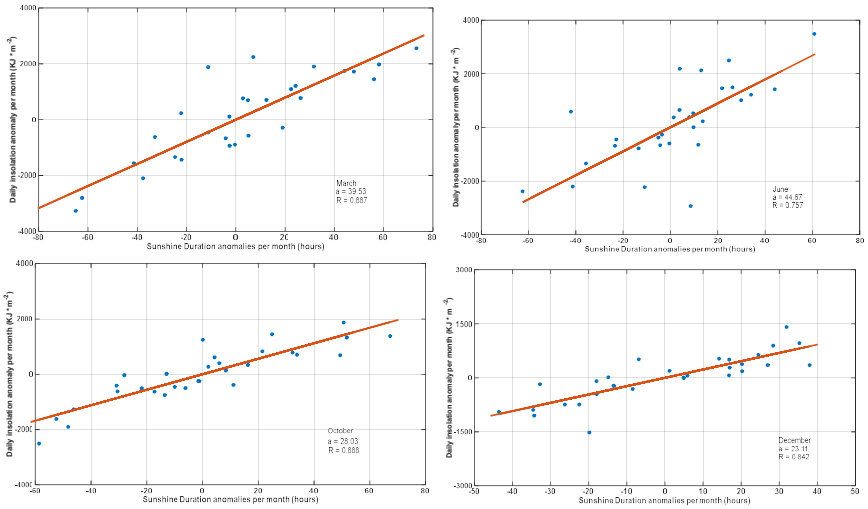
- Page 11, Line 14: I am trying to speculate what causes the weak correlation in summer. The paper cites small ranges of variables in summer as a reason for weak correlation, but how exactly do the range affect R2 values? Later in the paper (Figure 12), the number of cloudless days in summer is generally large, compared in other seasons. Could the number of cloudless days influence the correlation level?

The weak correlation is probably caused by the very low variability of the SDu/SDmax and the SSR/SSRmax ratios. Below an example for July and August correlations where in XX' axis is the SDu/SDmax and in the YY' axis is the SSR/SSRmax. Large number of cloudless days in the summer is exactly the reason for this low variability. So the calculated Ångström factors for monthly based analysis, based on this example can not be used as only a 12.6% and 8% of the variability of the reconstructed (1900-1953) Julys and Augusts could be explained using these method.



In the initial submission we have used the Ångström related formula in order to calculate SSR and SD related functions. This method includes the theoretical SSR and SD maximum values that insert an uncertainty for such calculations. After the reviewer's comment we decided to replace this method with the one used by Sanchez-Lorenzo and Wild (2012). One additional reason to test this method (as mentioned also in the paper) was the fact that monthly based calculated SD to SSR conversion functions had high uncertainty, linked with the very small SD/SDmax absolute variability especially for summer months.

In this new approach (Sanchez-Lorenzo and Wild, 2012) we did not use SSR and SD theoretical maxima in order to normalize the two factors, but monthly anomalies of SSR and SD have been used for a common measuring period and then the monthly coefficients of the regression of SSR and SD anomalies were used in order to reconstruct the 1900-1953 time series. The regression statistics of these monthly based SSR and SD anomalies analysis showed much better results from the Ångström method. As an example (and included in the new manuscript) statistics and graphs are shown below.



month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	22.47	34.99	39.53	46.65	57.88	44.67	51.87	46.23	34.28	28.02	27.32	23.10
R	0.842	0.895	0.887	0.840	0.799	0.757	0.773	0.572	0.812	0.888	0.916	0.842

The correlation coefficients show that SDU can explain from 65% to 82% of the variability of the SSR monthly anomalies. This additional verification analysis shows that the method used in this work is in accordance with important already published results. (e.g. Sanchez-Lorenzo and Wild, 2012) that have been analysed 17 stations with very long term SDU series.

After having calculated the reconstructed series with this method we have compared the yearly and monthly SSR deviations with the ones calculated with the Angstrom method using the yearly functions (initial submission). The results in yearly basis for all 1900-1953 period differ at a maximum by 1%.

The agreement of these two results shows that in the case that SD measurements in the past have no particular quality issues, then SSR can be reconstructed with the 65-82% explained variability already mentioned.

Finally we have decided to keep the new method on the revised document and include the (yearly based) Ångström results as a verification. The inclusion of this method had a direct impact on all related figures 2, 3, 4, 5, 8 and tables describing trends that include the 1900-1953 period. As already reported the differences were small but still all the plots and tables have been replaced with the new ones calculated based on the Sanchez-Lorenzo and Wild (2012) method.

- Page 12, Line 10: "light grey" should be "light blue" from what I can see from the figure.

The colour has been described properly.

- Page 13, Line 1: Separate "late1930's" into two words.

Suggested change has been edited.

- Page 13, Line 7: It may be useful to break up the 1900-1952 period into two because the text discusses the trend till late 1930s and the trend that follows separately.

We think that the current period break up into 1900-1952-1983-2012 periods is already a bit of a mix up for the reader. The basic idea behind this was that the 1900-1952 period is simulated SSR and the 1983-2012 two times 30 year measurement periods that could be also compared with each other. Figures like 5 and 7 could be used to retrieve any SSR % change for any time window and there can be readers that could be interested in a very specific period during these 112 years of reconstructed & measured SSRs.

- Page 13, Line 11: Remove comma after 2012.

Comma has been removed.

- Page 14, Lines 10-13: It needs to be specific which region it refers to. The trend of global anthropogenic BC emissions during 1910-1950 does not decline but rather levels off (Lamarque et al. 2010)

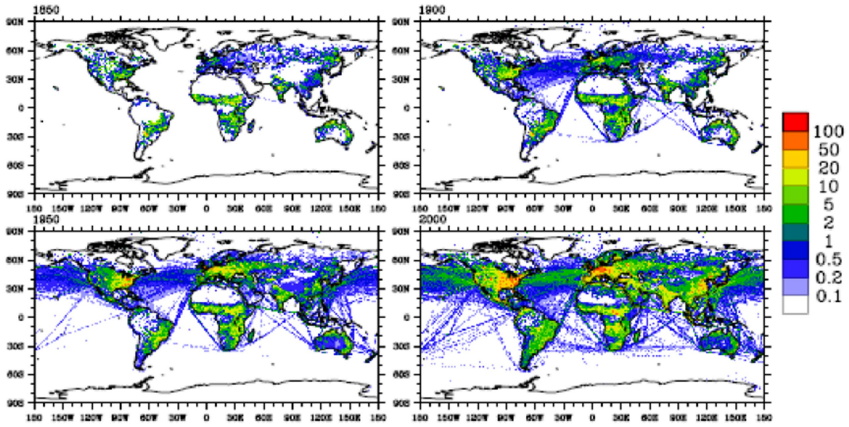


Fig. 4. Total annual emissions (anthropogenic, shipping and biomass burning) of NO_x (Tg(N)/year) for 1850 (top left), 1900 (top r 1950 (bottom left) and 2000 (bottom right).

The sentence has been changed to:
"Nevertheless, early dimming and brightening periods have been reported in Stanhill and Achiman (2016). The results can be partly supported by trends in anthropogenic black carbon (McConnell et al., 2007; Lamarque et al., 2010) and biomass-burning (Lamarque et al., 2010) emissions in Europe."

- Page 15, Line 7: Remove comma after Figure

Comma has been removed.

6. - Page 16, Line 3: Is the left panel of Figure 7 essentially same with Figure 5? If so, the left panel does not have to be shown as it is redundant.

The left panel in figure 7 is linked with figure 5 as it represents a sub period. Mathematically it is not the same as part of figure 5 as de-seasonalized monthly and yearly SSRs have been calculated only for the provided (fig. 7) and not total (fig. 5) period. But we agree with the reviewer that essentially they are the same so we deleted figure 7a but included the discussion on this figure on the existing paragraph.

- Page 18, Line 9: "non significant" needs to be connected by hyphen

Hyphen has been added.

- Page 20, Line 11: the SSR line should be "black" rather than "blue".

The colour has been described properly.

- Page 22, Line 7: Would there be any possible explanation why only the clear-sky SSR trend in winter is negative? A similar result was obtained for the all-sky SSR (Table 2).

There is no straight forward explanation for this negative winter trend. There are various aspects related with the seasonal trend calculation for wintertime such as:

- Wintertime clear sky statistics include more uncertainty due to the more frequent presence of clouds and the fewer clear sky points available.
- Clear sky changes and trends are linked with aerosol changes. For Athens area absolute AOD values for winter are minimum compared with other seasons.

- Page 22, Line 25: The discussion on visibility can be part of the discussion, not the conclusion. Visibility has not been brought up since the introduction.

The section has been transferred to the discussion section and only the conclusions of visibility related discussion has been left to the conclusion section.

- Page 23, Line 3: "drown" should be "drawn".

Typo has been corrected

References

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