

Interactive comment on “Radiative forcing of climate change from the Copernicus reanalysis of atmospheric composition” by Nicolas Bellouin et al.

Anonymous Referee #2

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This manuscript estimated radiative forcing of six essential agents, like CO₂, CH₄, tropospheric and stratospheric ozone, and aerosol-radiation and aerosol-cloud interaction, during pre-industry to the present period of 2003-2016 by using the Copernicus Atmosphere Monitoring Service reanalysis and gave detailed analysis of their uncertainties. The radiative forcing dataset including space distribution and time series generated by this work, is very useful to monitor climate change and will benefit to related researchers. The writing of this paper is in good form and easily understood by readers. I would suggest that ESSD publish this manuscript after some minor modifications.

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1. Line 27-28 It would be better to also give the increasing rate for the total anthropogenic radiative forcing in the abstract.
2. When calculating aerosol-radiation interaction, the authors used aerosol size as a proxy for aerosol origin, which will bring some errors for their results, could they give some sentence on this?
3. The scaling method was used by the authors to get daily PI mixing ratios of carbon dioxide etc., could they compare IPCC dataset or other dataset used by previous researchers to see how much differences.
4. Line 232-233 Have you estimated the effect of the spectral resolution of radiation model on radiative forcing due to aerosol-radiation interaction? Zhang et al. (2020) found that the spectral resolution only has little effect on R_{Fari}.
Hua Zhang, Sihong Zhu, Shuyun Zhao, Xiaodong Wei, Establishment of High-resolution Aerosol Parameterization and Its Influence on Radiation Calculations, J. Quant. Spectrosc. Radiat. Transfer, 243, 2020 106802.
5. In evaluating aerosol-cloud interaction, different cloud overlap treatment in the used radiation model may affect final RF estimation too, how the authors consider it? Additionally, the uncertainties in other input dataset of cloud parameters all will affect these results.
6. Figure 7. A legend for colored lines is needed.
7. Line 526 “with peaks in the Tropics,”, in the contour map of Figure 12. It is very difficult for readers to distinguish where the peak is. It would be better to widen the contour levels, especially the maximum level.

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