Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
https://doi.org/10.5194/acp-2021-1055-RC1, 2022


# Comment on acp-2021-1055

Anonymous Referee #1

Referee comment on "Causal influences of El Niño–Southern Oscillation on global dust activities" by Thanh Le and Deg-Hyo Bae, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1055-RC1, 2022

The manuscript by Thanh Le and Deg-Hyo Bae attempt to investigate the influences of El Niño–Southern Oscillation (ENSO) on global dust activities by using the historical simulations of Global Climate Models (GCMs) from CMIP6 and developing the multivariate predictive model. The authors find that the ENSO displays significant impacts on dust deposition and transportation, while exhibits almost no impact on the dust emission of major dust sources. These findings emphasize the important role of ENSO in global dust activities. Overall, this paper is well written, and their findings exhibit promising potential for the predictions of future dust events. I would like to recommend an acceptation after these comments as follows are addressed.

Major comments:

(1) To estimate the influences of ENSO on dust deposition, the authors selected the multivariate predictive model that has already considered the contribution of past dust deposition events and the confounding factors. In the multivariate predictive model, three factors, including Indian Ocean Dipole, Southern Annular Mode, and the North Atlantic Oscillation, have been considered as the major confounding factors that may display important roles in global dust deposition. However, the authors didn't elaborate on the reasons why they only selected the above three factors. I suggest the authors to provide sufficient justification for selecting the three factors to improve the reliability and robustness of the predictive model and their corresponding findings.

(2) In Tables S1, a total of 12 global climate models (GCMs) from the Coupled Model Intercomparison Project Phase 6 (CMIP6) are selected to estimate the influences of ENSO on dust deposition. However, I cannot find the criteria for selecting these GCMs which are

generally required for a scientifically sound paper. In addition, three models and one model in Table S2 cannot provide the od550dust and emidust, respectively. Why were these models kept instead of eliminating them?

(3) In the Discussion part, the authors listed the possible reasons for the influences of ENSO on the dust deposition. In my opinion, ENSO also plays significant role in modulating the atmospheric circulation patterns that could substantially affect the spatial pattern of dust deposition. I think that it will be very interesting if the authors could discuss some impacts of atmospheric circulation patterns induced by ENSO on the dust deposition and transportation.

(4) The two paragraphs in the section of Methods have only one sentence, I thus suggest the authors to combine them into one paragraph.

Specific comments:

L24: "feedback" can be revised to "feed back"

L32: Some important references can be cited here to strengthen the statement concerning the role of dust on environment, including https://doi.org/10.1029/97JD00260; https://doi.org/10.1016/j.atmosenv.2017.07.036; https://doi.org/10.1029/2019JD030758

L40: "earth" -> "Earth"

L46-47: what is the difference

L116: "original"-> "originated"

Lines 44-46 of the Supplement, this paragraph only has one sentence. I suggest the authors to combine Lines 44-51 into one paragraph.