Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-1215-RC1, 2020

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contrasting impacts of two types of El Niño events on winter haze days in China's Jing-Jin-Ji region" *by* Xiaochao Yu et al.

Anonymous Referee #1

Received and published: 13 April 2020

The study by Yu et al. investigates the impact of central (CP) and eastern (EP) Pacific El Niño events on the occurrence of winter haze days (WHD) in the JJJ region in northern China. Based on a statistical analysis of observational data and reanalysis products they conclude that EP El Niños increase the number of WHDs while CP El Niño events decrease their number. Variations in atmospheric circulation patterns over northern China during CP and EP events are suggested to cause this effect.

The manuscript is well structured and presents a thorough analysis on an interesting topic. The presented numbers, however, do not support the claim of a strong effect of the different types of El Niño events on WHDs in the JJJ region (see detailed comments below). I believe that the study is interesting enough to be published but that the conclusions must be formulated much more carefully and worded more in terms of

tendencies. I summarise my concerns and list some specific comments below.

Major concerns:

1) All correlations between the ENSO indices and WHDs as well as changes (e.g. in circulation types) related to ENSO events are very low.

a) Fig. 1 displays pretty low correlations and I have a hard time to believe that they are actually statistically significant when averaged over the region (Tabe 2). How were the degrees of freedom determined for the student t-test? Even if statistically significant, such low correlation values don't argue for a strong impact of ENSO.

b) The response to CP El Niño events appears to be more consistent (judging from the composite change shown in Fig. 2) but the response to EP El Niño events looks rather variable from station to station (Fig. 1 and 2).

c) The box-and-whisker plot (Fig. 3a) indicates that there is quite some spread in the response between individual EP and CP events.

d) From the numbers on the change in circulation types (Table 3 and corresponding text), I would actually conclude that there is hardly any effect of El Niño but maybe I am missing something here?

2) It is stated that the number of haze days changes roughly by 2 during El Niño events (Fig. 2 and corresponding text). How does that compare to the average number of haze days?

3) Regarding the eight circulation types identified in section 3.3 I find it very hard to see the difference between some of them. What determines the number of these types? Since they are grouped together in the following anyway, is it necessary to distinguish between all of them?

Specific comments:

line 9: The first sentence of the abstract sounds strange to me. Maybe use "The El

Niño - Southern Oscillation" instead of just "El Niño".

line 53: What is meant by "Integral El Niño events"?

line 55 to 57: EP and CP El Niños are different flavours of the same climate mode

line 71 to 73: Does this classification differ from other commonly used ENSO classifications?

line 150 to 152: Obviously the averaged correlation values are higher if only values above a certain threshold are considered. I am not sure what to learn from that.

line 190: "worsening meteorological conditions": worse in what respect and compared to what?

line 312: "greatly worth concern" Please rephrase.

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