

## ***Interactive comment on “Atmospheric teleconnection processes linking winter air stagnation and haze extremes in China with regional Arctic sea ice decline” by Yufei Zou et al.***

### **Anonymous Referee #2**

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#### GENERAL COMMENTS

This paper uses sensitivity experiments to increase our knowledge and understanding of the dynamics and teleconnections whereby Arctic sea ice decline could influence pollution and air quality in China. This is a timely study with some interesting diagnostics and analysis. The approach toward the sensitivity experiments, the diagnostics defined, and the quality and quantity of figures and tables is all good.

However, I have a couple of concerns as outlined below.

#### SPECIFIC COMMENTS

C1

I think lines 22 and 32 are not quite correct as they stand. I'd suggest changing "positive correlations with the regional Arctic sea ice decline" to "positive correlations with the regional Arctic sea ice concentrations", and "positive correlation with the declining sea ice" to "positive correlation with sea ice concentrations". My reading of Figure 1 is that the positive correlation between the EU index and sea ice concentrations in R2 (Figure 1b) suggests that the EU index will decrease as sea ice decreases in R2. Then, the positive PPI index in East Asia in the negative phase of the EU (Figure 1d) suggests that this decreasing EU index will lead to increased pollution in East Asia. Therefore, pollution gets worse in East Asia as sea ice declines in R2. Perhaps section 3.1 would be clearer if re-written slightly to emphasize this?

My major concern with this paper is with regards to how relevant this key conclusion is to the real world (which will experience SENSall). Figure 1b shows negative correlations in R1 and R3, so declining sea ice in these regions will improve pollution in East Asia, cancelling the impacts of sea ice decline in R2. Indeed, Tables S3 and S4 indicate no significant difference in PPI between the CTRL and SENSall experiments. This concern, that the substantial conclusions in this paper are all based on SENSr2 which may not be a realistic scenario, will need to be addressed.

Checking of the English grammar and language throughout the manuscript is required. To give a couple of examples: on page 2 line 4 "environmental stressors" should be "environmental stresses", and on page 7 line 21 "are the same with these" should be "are the same as those".

The description of some of the calculations and diagnostics used in the paper could be slightly clearer. For example, in section 2.3, which "statistical functions in Python" were used, and what is meant by "proper distributions"? Also, please expand on the definitions of WSI and ATGI to make clearer exactly how these are calculated.

#### MINOR COMMENTS AND TYPOGRAPHICAL ERRORS

Page 3, line 32: Person should be Pearson

C2

Page 5: Perhaps change "Fig. 1" to "Fig. 1a" on line 28, and then add reference to "Fig. 1b" on line 31.

Page 10, line 6: "( et al." should be "(et al."

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-1023>, 2019.