Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
https://doi.org/10.5194/acp-2021-249-RC1, 2021

Comment on acp-2021-249

Anonymous Referee #2

Referee comment on "Distinct evolutions of haze pollution from winter to the following spring over the North China Plain: role of the North Atlantic sea surface temperature anomalies" by Linye Song et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-249-RC1, 2021

Review of acp-2021-249

Haze pollution is a very serious environmental issue in China, especially in winter and spring. This manuscript discusses the possible connections of haze pollution in winter and spring. The authors show that conditions of the North Atlantic SST anomalies play a key role in determining seasonal evolutions of haze pollution over North China Plain. I find this study very interesting. The obtained results have important implications for the prediction of haze pollution. I suggest this manuscript to be accepted if satisfactorily addressing the following concerns.

General comments:

The authors define a DECC index by averaging the DECC anomalies over the 26 stations to describe variation of haze pollution over the NCPR. The authors need to prove that the DECC over NCPR varied similarly, i.e., the DEC of the 26 stations can be treated as a whole.

Lines 340-341 and Figure 5: I agree with the view that atmospheric circulation anomalies could exert impacts on haze pollution via modulating surface wind speed and humidity.

Whether change in the boundary layer height (BLH) also plays a role? Studies have demonstrated BLH is also a very important factor in modulating Haze pollution via change in the vertical diffusion of pollutant. For example, the anticyclonic anomaly and associated increase in sea level pressure over the North China plain may lead to decrease in the BLH, which would result in more serious haze pollution. The role of the BLH should be examined.

This study reported that North Atlantic SST anomalies play a key role in the formation of the atmospheric circulation anomalies via atmospheric teleconnection, which further determine evolutions of haze pollution over North China. From Fig. 6, it seems that geopotential height anomalies in the Arctic region also show large differences. Previous studies have shown that Arctic sea ice anomalies can significantly impact atmospheric circulation anomalies over East Asia and haze pollution over China. Hence, I suggest authors examine Arctic sea ice anomalies and discuss whether Arctic sea ice conditions also play a role in the different evolution of atmospheric circulation anomalies and haze pollution.

I suggest add associated wave activity flux into Figure 11 to more clearly illustrate propagation of the atmospheric wave train induced by the forcing over the North Atlantic.

The barotropic experiment simulations can well confirm the observed results. It is interesting. My question is: why the barotropic experiment simulation is only integrated for 40 days? In addition, why selected 31-40 days to analyze? Why not selected 25-35 days or other days to analyze?

Specific comments:

Line 53-54: the occurrences of haze pollution event -> the occurrence of haze pollution events

Please re-plot Fig 2(c), as there is a text spelling mistake (presist->persist).

Line 308: winds anomalies -> wind anomalies

Line 358: leads to -> and leads to

Line 410: also resembles -> and also resembles

Line 413: similar region-> same region?

Line 421: have -> has

Line 466: leads -> lead

Line 473: plays -> play

Line 488: closest -> the closest

Please check the references carefully, such as Wang et al. 2014 in line 64 is not found in the references. In addition, it is better to arrange the references in alphabetical order.