

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2020-1305

Anonymous Referee #2

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Referee comment on "Is the Atlantic Ocean driving the recent variability in South Asian dust?" by Priyanka Banerjee et al., Atmos. Chem. Phys. Discuss.,  
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### Review Comments

On "Is the Atlantic Ocean driving the recent variability in South Asian dust?" by Priyanka Banerjee, Sreedharan Krishnakumari Satheesh, Krishnaswamy Krishna Moorthy.

Recommendation: major revision

General comments: The study of the impact of dust on the South Asian region Asian monsoon is important to the environmental improvement. The study conducted by Banerjee et al. indicated the impact of the interannual variability of dust aerosols over the South Asia has been experienced shift from Pacific Ocean SSTs to the North Atlantic SSTs in recent years. The authors further found that the NAO is the crucial factor to impact the North Atlantic tripole pattern, then leading to associated atmospheric large circulation change, therefore affecting the dust over the South Asia. However, the logical of the mechanisms is not clear, lots of parts confused me, so, I recommend it be accepted for publication after major revisions.

Specific comments:

- Write all the EL Niño/La Niña words correctly in this article, such as Line 38, 42, 53, etc.
- Line 118-119, "The SD is low indicating that high dust activities persist over these regions." In the Fig1a, this SD of this region is the biggest than other regions, the value

is between 4-8.

- Line 178, the reference of the data “monthly SST and sea ice from Hadley Centre (1870-1981)” is missed.
- Line 179-181. About the “NAtl” simulation, I don’t know the specific region of the North Atlantic Ocean, is the south two areas of the North Atlantic tripole SST?
- Line 197-198, why you divided two periods from 2010, what is the basis?
- Line 203, shifted north-eastwards, is that corrected? Not the westward?
- Line 223, the partial correlation method, you not mentioned in the methods, please introduce it.
- Since the NADI index from April to June is well correlated with the dust index, and the NADI index from April to June is also analyzed in the article, why is the annual SST field given here?
- Line 241-234. The signal of the Pacific SST is weak, only is a small region shown the 90% confidence level, how does it affect the dust? What is the physical process? Instead, the signals are stronger in the north Pacific and tropical Atlantic Ocean, did you analyze the process?
- Line 254-256. NAO is the seesaw pattern of the relationship between the Icelandic Low and the Azores High, which is the atmospheric circulation pattern, not the SST pattern. The Icelandic Low is located over the north of 60 degrees, and your two significant regions are both over the south of 50 degrees, which is not the NAO, but two south branches of the North Atlantic tripole.
- Line 301-303, What is the linkage with the NAO and the North Atlantic tripole? With all the wind fields, SST, pressure fields and precipitation fields introduced above, it is completely impossible to see the process how the Atlantic SST influences NADI?
- Line 311-313, the North Atlantic tripole pattern is also significant in Figure 5b. The relationship between NADI and the North Atlantic tripole SST in the early period is very significant, and the relationship between NADI and the North Atlantic tripole SST in the late period is only significant in the two southern regions. It cannot be seen that the influence from the Pacific Ocean in the early period is changed to the influence from the Atlantic Ocean in the late period.
- Line 316-318, in figure 5b, the south branch SST over the tropical Atlantic is also present the negative pattern, which is resembled as the 5f. It is consistent with the SST distribution in the late tropical Atlantic Ocean. Why the atmospheric pressure not perform the uniform anomalous high?
- Line 318-321, the relation with the North Atlantic SST leads to the convergence and precipitation, but how the North Atlantic SST result in? I am confused the process.
- Line 321-324, why the convergence over the Mediterranean region can induce the next area divergent?
- In figure 5, Why not directly correlate the dust index with each air and sea field and see how climate variables modulate the dust index? In addition, both the correlation between Atlantic NADI index and the Atlantic tripole SST field in the early and late periods is significant. How can we see the physical process of dust index changing from influenced by the Pacific Ocean to the Atlantic Ocean? You don’t give the Pacific SST’s relation pattern in the early periods.