

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2020-1305

Jerome Brioude (Referee)

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 of "Is the Atlantic Ocean driving the recent variability in South Asian dust? " by Banerjee et al.

General comment: the paper presents new results on large scale processes that control the interannual variability of the dust concentration above the South Asia. The authors used satellite measurements from 2001 to 2018 to analyse the frequency of days (over a month, called $DA_{\%}$) when the dust optical depth above South Asia is high. Using NCEP/NCAR reanalysis, they found that an increase in $DA_{\%}$ was associated to an increase in SST in the mid-latitude North Atlantic, and a cooling in the Subtropical North Atlantic between 2011 and 2018. The authors presented a detailed analysis, based on NCEP reanalysis and CEMS simulations, of anomalies in the wind fields and SST to explain the link between the SST variability in the Atlantic Ocean and the dust emission over South Asia. The correlation was linked to large scale transport pattern anomalies and a weakening of the South Asia monsoon.

The paper is well written and the results are of interest for the community. I will accept this paper for publication after addressing the following comments:

Specific comment:

1) Section 3.3 is a bit long and probably needs some reorganisation. Figures 6 and 7 discuss the capabilities of CESM to simulate dust and precipitation in South Asia, and not so much the mechanisms that link dust activity to North Atlantic SST. I'm wondering if figure 6 and 7 should go in section 2.2 instead, and leave figures 8 and 9 in section 3.3. That way you will only discuss anomalies in section 3.3, which will help to follow the arguments of section 3.2 .

2) introduction: you don't mention the impact of the indian ocean dipole (IOD) and its impact on the monsoon and potentially on the dust emission. Please add references and comments.

Technical comments:

figure 5 top: the coast lines need to be enhanced.

abstract: you should rephrase lines 22-23 to better explain what you mean by 10% (20%) and 30% (50%).