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Interactive comment on "Asian Summer Monsoon Anticyclone: Trends and Variability" *by* Ghouse Basha et al.

Anonymous Referee #2

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This paper deals with the trends and variabilities of Asian Summer Monsoon anticyclone (ASMA) using observational and reanalysis datasets. It deals with the spatial and temporal variabilities of ASMA and its relationship with long term oscillations. The subject dealt with is a very active and relevant topic. However, as I have already pointed out in my initial review, the methodology used for the study and structure of the manuscript needs major revisions. Main concerns about the manuscript are as follows: (1) The authors must bring out the novelty of the study properly. Throughout the manuscript, the already known facts and the results of the present study are in a completely messed up state, for example in the abstract itself. The authors have stated the known facts of ASMA in the abstract. The abstract should focus on the major results of the present study. (2) In the trend analysis, the relevance of dividing the ASMA

region into four different sectors is not clear. (3) What is the sanctity in averaging the wind, when the wind magnitudes are highly inhomogeneous (calm wind near to the centre of ASMA and higher wind to the edges) in all these sectors? Spatial extent of ASMA is discussed in the manuscript. No mention about the altitude/vertical extent of ASMA. This needs to be discussed. (4) The study delineates that there is significant trend/difference in the ASMA during different decades during the period 1950-2016. The study period of ASMA variability shown in Figures 6, 7, and 8 are not clear (for active/break days, strong/weak monsoon years, and El Nino/La Nino years). Is it during the period 1948- 2016. The period of wind anomalies and temperature anomalies are not clear from the figure caption (from CHAMP and COSMIC). I think it is better to compare the variabilities for the same period. The ASMA variability for the same period as that of the COSMIC and CHAMP data can be looked into. If already, it is done so, fine. However, this is not clear from the description of the figure caption and in the text. (5) I understand that this manuscript is a part of a special issue 'Interactions between aerosols and the South West Asian monsoon'. However, this aspect is not much discussed in the manuscript. It would be nice if the authors can focus more on it.

Specific comments: Abstract: Page1 Line 9: 'These pollutants. . .'-restructure the sentence ——Line11-12: 'The pollutants are expected to make a large radiative forcing'— Name the pollutants (species) responsible for large magnitude of radiative forcing ——Line13: long term oscillations such as .... ——Line 19-20: 'Significant..........of the ASMA'. Significant decadal variability is observed with reference to 1951-1960 period. Restructure the sentence. ——Line 21: 'Drastic increase from westerly to easterly'- What does the sentence really mean? (later in Section 3 in Figure 5, it is seen that anomalies are obtained by removing the mean and strength is obtained by taking the difference of winds at difference latitudinal sectors. In that case is it possible to call the change of sign in anomalies as westerlies or easterlies?)

Introduction Page 2 line 39: "distant maxima characters" Is it a typo error. Did you mean "distinct maxima characteristics" ——line 41: 'The maximum occurs due to

strong winds? Rewrite this sentence. The wind in the core of the anticyclone are not strong. Distinct maxima in tracers discussed in next paragraph also. Hence, authors may combine the sentences in first and second paragraph of section 1. ——line 46: modify the word 'issue' find another suitable word ——line 50: 'confined tracers transported outside—'- What does this sentence mean? Page 3 line 53: delete 's' of Plateaus

Data and methodology Page 3 line 71: delete 's' of Centres Section 2.2: Line 89 & 93: Specify the real data period used. Whether it is 1901-2016 or 1948-2016?

Results and discussions Figure 3: caption is missing. What is the confidence level of the trend shown? Compared to the trends in the northern end, trend in the southern edge seems to be very feeble? Page 8 Line185: Is it the time series of area/spatial average of zonal wind anomalies? . . . . .Line 192: 'contaminated. . .' ? ———Line 193-194: 'One is located. . . . . .and the other in the . . . . .' Rewrite the sentence Figure 5e: Why sector $30°$-$40°$is used. This region doesn't really represent the anticyclone according to figure 4. Page 8, Figure 5: Throughout the trend analysis section, the 'shift towards westerlies'. Whether the wind is becoming westerly or becoming less easterly (ie, the strength of the easterly is reduced). Whether it is really describing the strength of the anticyclone. In Figure 5, anomalies are obtained by removing the mean and strength is obtained by taking the difference of winds at difference sectors. In that case is it possible to call the change of sign in anomalies as westerlies or easterlies ?) Page 9 Line 204: remove the bracket before 'during' Page 9 Line 221-222: whether easterly wind corresponds to cooler regions? Correct the sentence Page 10 Line 237: 'Further, ...'rewrite the sentence Page 10 Line 240: In figure 6 the blue doesn't seem to be weak. The red and blue, strength are same but opposite in direction? Page 10, Line 242: Check this sentence for the correctness of "right (left) side of the anticyclone Page 12 Lines 278-281: Check the figures and conclude the features seen in the figure only.

Please also note the supplement to this comment: https://www.atmos-chem-phys-discuss.net/acp-2019-668/acp-2019-668-RC1-supplement.pdf