We would like to thank the referee for the thoughtful and insightful comments. We have addressed all of the comments. Our responses are itemized below.

This is a nicely written manuscript. This study is useful to understand the linkage of climate circulation and Asia pollution. I only have a few minor comments:
1) The spatial resolution used in this study is relatively coarse, and some potential uncertainties related to it may be discussed.

Added discussions in Sect. 2.1 "We would like to point out that simulated BC concentrations are likely underestimated because of the …. and coarse resolution of the model used.".

2) How much confidence do the authors have in simulating surface BC using GEOSChem? How about vertical profiles? The authors intensively investigated the impactof monsoon on vertical changes of BCs, but the first question is whether GEOS-Chemis able to capture the vertical profile of BC? How many uncertainties can be inferred from the potential bias of GEOS-Chem?

Added discussions in Sect. 2.1 "We have systematically evaluated the BC simulations for 1980-2010 in China from the GEOS-Chem model (Li et al., 2016; Mao et al., 2016)." and in Sect. 3.4 "We would like to point out that few aircraft observations of BC vertical profile are available in China. Previous studies have evaluated the GEOS-Chem simulated vertical profiles of BC by using datasets from aircraft campaigns for the regions of the Northwest Pacific, North America, and the Arctic (Park et al., 2005; Drury et al., 2010; Wang et al., 2011).".

3) In the abstract, Lines 17-18, whether the differences between the weakest EASM and strongest EASM years are significant. In another word, by looking at the entire simulation period, the authors can get the mean and the standard deviation of BC. How does this change magnitude (i.e., 0.04-0.09,0.03-0.04) compare to the 20-year variance? If we look at the inter-season variability (either summer or winter), do the weaker EASM always corresponds to higher BC whereas stronger EASM corresponds to lower BC?

Thanks for the suggestions. Now mean and standard deviation of BC for 1986-2006 are included in Table 2 and the related discussions are in Sects. 3.3 and 4.3. "The difference in surface BC concentrations between the weakest and strongest summer monsoon years in each region is comparable or even larger than the corresponding standard deviation of JJA mean surface BC for 1986–2006 (Table 2).". "The difference in surface BC concentrations between the weakest and strongest winter monsoon years over each region is significant by comparing with the corresponding mean and standard deviation of DJF mean surface BC for 1986–2006 (Table 2)."

4) Page 13, Line 22: the authors mentioned the effect due to non-China emissions. Maybe I missed something, I am not sure how the authors claim this impact is from non-China emissions.

Added discussions in Sect. 2.1 "We also conduct simulation (VNOC) to quantify the contributions of the non-China emissions to BC. The configurations of the model simulation are the same as those in VMET, except that anthropogenic and biomass burning emissions in China are set to zero."

5) Did the authors consider biogenic emissions in this study? If so, please add it. If not, please add the possible uncertainty due to this missing source.

Added discussions in Sect. 2.1 "including both fossil fuel and biofuel emissions".

6) In the abstract (Line 14), the authors mentioned that the differences in BCs are mainly due to the circulation. I am wondering whether there are any way to quantify the effect from circulation change, wet deposition, etc.

Thanks for the suggestion. Now the effect from circulation change and wet deposition are included in Table 3 and the role of wet deposition is discussed in Sects. 3.3 and 4.3. "We also examine the impact of the changes in precipitation associated with the strength of the summer monsoon on BC concentrations, which is not as dominant as that of the winds. Compared to the strongest EASM years, increases in wet deposition of BC are found in the weakest monsoon years north of 28 °N in eastern China (Table 2), as a result of the high aerosol concentrations in the region and also the increased rainfall in the lower and middle reaches of the Yangtze River (around 30 °N). In the region south of 28 °N in eastern China, we find decreased wet deposition of BC in the weakest monsoon years because of the less rainfall and low BC concentrations in that region." "Compared to the strongest EAWM years, enhanced wet deposition of BC are found in the weakest monsoon years in both northern and southern China (Table 2), likely because of the increased BC concentrations and precipitation in the corresponding regions."

7) The layouts of section 3 and 4 are interesting. These two parallel sections went through similar figures twice (one for summer and one for winter). Not sure whether this is the best way to discuss, but I think the figures showing summer and winter together look good.

We would like to keep the Sect. 3 and 4 separately, which are likely readable and easy to follow.

8) Page 4, Line 17: L. Wang et al., 2014 Please remove "L."

Deleted.

9) Figure 3. Is the spatial correlation significant? One way is to use lines or markers to indicate statistical significance, or mask the areas insignificant.

Thanks for the suggestion. The dotted areas added in Figure 3 indicate statistical significance with 95% confidence from a two-tailed Student's t-test.