

# ***Interactive comment on “The Variability of Relationship between Black Carbon and Carbon Monoxide over the Eastern Coast of China: BC Aging during Transport” by Qingfeng Guo et al.***

**Anonymous Referee #1**

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This study investigates the transport and aging of black carbon (BC) through assessing the relationship between BC and carbon monoxide (CO) over the eastern coast of China. It is a new angle to characterize the complicated processes associated with BC and to help constrain such a poorly understood climate forcer in the atmosphere. The in situ measurements of BC and CO from a series of field campaigns are explored. It is good to see the authors can fully exploit those valuable data in this paper. The obtained BC/CO relationships shed new light on the pollutant transport and transformation near the source regions over East Asia. I only have some minor comments for authors to address.

1) Page 4, L20. The statement “the peak time in Yellow Sea is delayed almost one day

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than that at Changdao Island” is not obvious in Fig. 3. Some quantitative assessment is suggested such as lagged correlation analysis.

2) It is not clear where the diesel/gasoline consumption data come from in the study.

3) The authors attributed the outlier (Changdao Island) in Fig. 5b to the fact that it is located in the rural area. Why not exclude this data point in the plot and purely focus on the relationships in urban area? With that, we will obtain a more significant correlation.

4) In Fig. 4c, each dot of BC/CO ratio is an average over the whole sub-campaign period. However, to accurately study the BC aging during transport, it would be better to pair the fresh BC properties in the source region with the aged one in the outflow region with a proper time lag. The time lag can be decided by the transport efficiency. I am not sure if such a method can be applied in this study.

5) Fig. 2, for which days the wind fields are plotted in each panel?

6) Fig. 3, the color-coding is a little confusing. If I understand correctly, the black lines are for BC, and the other different color lines are for CO. However, the location names (CD, WL, ES, YS, etc.) are also labeled using the similar colors. Please find a better way to avoid such an ambiguity.

7) The motivation of BC study in China should be stated in a more thorough way. Recent studies about absorbing aerosol effects on extreme weather and regional climate should be discussed:

Wang, et al. “New Directions: Light Absorbing Aerosols and Their Atmospheric Impacts”, *Atmos. Environ.*, 81, 713-715 (2013)

Li, et al. “Aerosol and Monsoon Climate Interaction over Asia”, 54, *Rev. Geophys.* (2016)

Wang, et al. “Towards Reconciling the Influence of Atmospheric Aerosols and Greenhouse Gases on Light Precipitation Changes in Eastern China”, *J. Geophys. Res.*

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