Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Diurnal cycle of coastal anthropogenic pollutant transport over southern West Africa during the DACCIWA campaign" *by* Adrien Deroubaix et al.

Anonymous Referee #2

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General Description

The authors used ground-based and aircraft measurements of meteorological and chemical (CO, NO, NO2) variables collected during DACCIWA campaign to understand the transport pathway of biomass burning and coastal urban emissions in SWA. To further investigate this, they designed and used two experiments using WRF-CHIMERE (in tracer mode). First, they thoroughly studied the model performance and its limitations in capturing the transport. Next, they used the tracer experiments to assess the contribution of urban and biomass burning pollutions in the region. The manuscript is well written, and I recommend it for ACP after fixing the typos and addressing some

issues listed below.

General Comments: - There are mistakes in the order of references and format of the references in the introduction. Please double check the references.

- UTC and local time description (morning/evening) were used interchangeably. Please provide information on the time zone and sunset/sunrise time.

- The section on population can be shortened as some parts in introduction and 2.1 overlaps.

- How does the result compare with the AMMA campaign?

- The order of the figures is not correct. Please use supplement material if necessary.

- In section 3.2.2. the discussion on model performance in capturing wind and RH is difficult to follow. Please either discuss layer-by-layer (starting from the lowest layer) or variable by variable.

- In section 3.2.2. How does the result compare with radiosondes results?

- Estimating PBL height from radiosonde measurements (separating day and night measurements) and comparing with model PBL height can be beneficial for the discussion in section 3.3

- I suggest adding more details on the PBL height and its influence on the concentration of different constituent, especially during nighttime.

Specific Comments:

P3-L1-5: I suggest adding more references on the source attribution to provide a bigger picture. What is the contribution of these sectors in other regions or bigger domains? For example, compare with Sobhani et al., 2018; Yang et al., 2017; Kulkarni et al., 2015

P3-L2: What year? 2006?

P3-L12: "Haslett et al., in preparation" I don't think this is an acceptable format and it

is not mentioned in the References section.

P3-L18: "1-7 July" Please add 2016.

P4-L9: the Lome population stated in the text does not match Table 1.

P4-L10 and the next paragraph: Information given on population of Cotonou is confusing. Is it necessary to state 1,086,00 inhabitant and then change it in the next paragraph?

P42-Table 2: Please provide coordinates of the ground sites.

P5-L9: What is the local time?

P5-section 2.3: Please add a figure of outer domain.

P6-L2: How many layers below 1 km?

P6-L5: Please reference GFS data.

P6-L5: Did you use GFS data only for nudging or for meteorological initial and boundary conditions as well? Please clarify in the text.

P6-L14: Did you use cumulus parametrization for both domains?

P6-L27: What time do you start releasing the tracers? Have you allowed for spin up in the model before releasing the tracers?

P6-L28: "grid cell of each city". One grid cell? Given the high resolution of your inner domain, did you release tracers from one grid cell or from a region (city)? Please clarify in the text.

P7-L1: How much tracer did you release? Please clarify how you "reproduce the BB layer observed with MODIS" considering that the tracers are gaseous.

P9-L16: "Section 3.2" Do you mean Section 3.2.1?

P9-L18: Please comment on RH in layer (ii) to be consistent.

P9-L24: "the first kilometer" is this the monsoon layer? Please be consistent.

P9-L27: "wind speed is wider than at lower altitudes". Remove "than".

P10-L18: Did you compare measured and modeled RH? This can help to better understand the model performance in capturing PBL height and (maybe) clouds.

P11-L1: What is "feature G"?

P11-L22: NO and NO2 have a short lifetime and are not trace gases.

P29-Figure 5: Do thick marks indicate 00Z?

P12-L14-15: Increase in evening NO2/NO can be due to lower PBL (higher NO2 concentration) and reduction in NO by reacting with O3.

P12-L20: On July 5th concentration of both CO and NOx (more) increased in the evening thus resulted in a decrease in CO/NOx ratio and increase in NO2/NO. Maybe a mixture of BB and URB was transported to Save?

P12-L23: no need to start a new paragraph. P12-28-29: Could the nighttime increase in CO (and NO2 in the next paragraph) concentrations be due to lower PBL height? Please comment in the text.

P12-L32: What about NO peak at 12UTC?

P12-L34: Again, lower nighttime PBL height can also justify the increase in CO and NO2 concentrations.

P14-L4: or shorter lifetime of NO2?

P13-L13: please reference the figure after "single figure"

P13-L16: "northwestward" you mean "southwestward"?

P13-L21: What time did you start releasing the tracers?

References: - Yang, Y., Wang, H., Smith, S. J., Ma, P.-L. and Rasch, P. J.: Source

attribution of black carbon and its direct radiative forcing in China, Atmos. Chem. Phys., 17(6), 4319–4336, doi:10.5194/acp-17-4319-2017, 2017.

-Kulkarni, S., et al. "Source sector and region contributions to BC and PM 2.5 in Central Asia." Atmospheric Chemistry and Physics 15.4 (2015): 1683-1705.

- Sobhani, N., Kulkarni, S. and Carmichael, G. R.: Source Sector and Region Contributions to Black Carbon and PM2.5 in the Arctic, Atmos. Chem. Phys. Discuss., 2018, 1–43, doi:10.5194/acp-2018-65, 2018.

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C5