

Deroubaix et al., 2017, ACP, Interactions of Atmospheric Gases and Aerosols with the Monsoon Dynamics over the Sudano-Guinean region during AMMA

General Description of manuscript:

The authors use observations from the West Africa AMMA aircraft campaign in 2006 and an atmospheric chemistry model to diagnose the transport patterns and contributing sources to enhancements in carbon monoxide and PM_{2.5} along a latitudinal transect from the Gulf of Guinea to the Sahel.

General Comments:

As presented currently the study appears anecdotal. It is not apparent that the features observed along a very limited longitudinal domain in West Africa apply to the rest of West Africa and to other years. Please clarify whether the findings in this study are generally applicable to the rest of West Africa and other years? If so, what do the outcomes from this study mean for past/present/future atmospheric composition or development of air quality and/or climate policy?

Why not also compare the model to other parameters measured during the AMMA campaign to assist in interpreting transport patterns and contributing sources and diagnosing what causes differences between modeled and observed PM_{2.5} and CO? These could include measure components of PM_{2.5} (sulfate, ammonium, organic aerosol, nitrate), and CO precursor VOCs, for example.

Specific Comments:

p. 2, Lines 17-18: The authors point to economic growth as a driver of emissions from industries, including gas flaring, but the reference they cite does not mention economic growth as a driver.

p. 2, Line 19: Do the authors mean “air quality standards” or air quality guidelines? If from WHO these should be guidelines.

p. 3, lines 9-12: Presumably DACCIWA will also contribute to understanding the change in atmospheric composition due to increases in emissions over a rapidly growing region?

p. 3, line 31: Is a 1 month spin-up sufficient for carbon monoxide output from a model, when CO has a lifetime of ~2 months?

p. 5, lines 22-23: Please point out the features that are similar to the Flaounas et al. (2010).

p. 6, line 14: Remove parentheses around the AERONET URL.

p. 6, line 15: Space between number and units (400 nm instead of “400nm”).

p. 6, line 15: Provide units for “440-870”.

p. 10, line 17: “analyzes” should be analysis.

p. 10, lines 26-27: Point out in Figure 5 the feature that indicates the arrival of the cold tongue.

p. 12, line 31: Fix units.

p. 14, line 11: “perturbated” should be perturbed.

p. 15, line 14: What does “Figure ??” refer to? Is this Figure 11? Indicate on the figure the convective cell.

p. 15, line 5 (bottom of page): Dust is repeated.

p. 16, lines 29-30: There is no context for why the results in this work will be compared to DACCIWA. What new insights will be gained from this comparison that justify mentioning it here?

Figures:

Figure 3:

- What are the statistics in the first and third panel? Does this compare the modeled component to total AOD from the measurements? What’s the value in showing this? Why not just compare total modeled and observed AOD?
- The label for the modeled AOD components is confusing. The label is “AOD Anthr.” and “AOD Fires”, but shouldn’t it rather be biomass burning and all other components for clarity? The figure caption suggests this is what is shown.