Re-review of 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. The authors have for the most part addressed the comments from reviewers in the first round. There are some remaining concerns that are indicated below that the authors should address before publication in ACP.

Follow-up Comments:

Authors: "We decided to focus on these two important atmospheric components (Carbon monoxide, CO, and fine atmospheric particulate matter, PM2.5) because the data were available. Aerosol Mass Spectrometer data were not available. For CO, we assume that we modeled the two main sources (i.e. Anthropogenic and biomass burning). Given the amount of VOCs, i.e. > 15 ppb according to Ancellet et al. (2011), VOCs oxidation must be very low (a few ppb)"

Re-review: There was a Quadrupole Aerosol Mass Spectrometer (Q-AMS) onboard the BAe-146 aircraft (see for example Capes et al., 2009) that includes measurements of fine particulate matter components. These can provide a compelling evaluation of the model and additional information about the composition of aerosols in your study. The VOCs concentration of 15 ppb has the potential to influence CO concentrations in the region, if the number of carbons of each VOC, the reactivity, unmeasured VOCs, measured VOCs not listed in Ancellet et al. (2009) (e.g. methacrolein, methyl ethyl ketone, methyl vinyl ketone, reactive aromatics, and higher order alkanes and alkenes), and the contribution of the non-background sources (67%) are taken into consideration.

Authors: "The sentence has been changed: 'However, the economic growth over the region drives up anthropogenic emissions: the increase of industries including gas flaring (Asuoha and Osu, 2015), of local fuel-wood burning for stoves and of traffic (Liousse et al., 2010; Hadji et al., 2012; Liousse et al., 2014) with more two-wheel vehicles using very poor fuel quality used (Ndoke and Jimoh, 2005; Assamoi and Liousse, 2010), which are suspected to quickly worsen the air quality.'"

Re-review: Thank you for changing the sentence. Unfortunately now it makes no sense. Without the references it reads as follows: 'However, the economic growth over the region drives up anthropogenic emissions: the increase of industries including gas flaring, of local fuel-wood burning for stoves and of traffic with more two-wheel vehicles using very poor fuel quality used, which are suspected to quickly worsen the air quality. Consider breaking up the sentence or rearranging to make the intention clear.

Authors: "As for all chemical species, and the principle of an area limited domain model, the lifetime of the species is not a constraint. The 'aged' concentrations are already modeled with the global climatological model, providing hourly boundary conditions. These concentrations are injected into our regional model depending on the wind direction and speed. The 'fresh' concentrations are explicitly hourly emitted in the domain. The real constraint motivating the use of a spin-up time is the transport of the species into the domain: we want to ensure that for the first modeled hour, all possible species, due to a previous transport, are well present in the domain. There is no link to the lifetime, but depends on the transport and the domain size only."

Re-review: State briefly in the paper why the spin up is conducted so that readers appreciate that it isn't a chemical initialization.

New issue not addressed in the initial review:
Page 3, Lines 18-19: The authors refer to biomass burning as natural. Is it? If so, is there literature to support its categorization?

Reviewer References:

Ancellet et al., Atmos. Chem. Phys., 11, 6349–6366, doi:10.5194/acp-11-6349-2011, 2011.
Capes et al., Atmos. Chem. Phys., 9, 3841–3850, doi:10.5194/acp-9-3841-2009, 2009.