

## ***Interactive comment on “Remote biomass burning dominates southern West African air pollution during the monsoon” by Sophie L. Haslett et al.***

**Anonymous Referee #2**

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General remarks.

The main objective of this paper is to present and discuss the airborne aerosol measurements carried out during the DACCIWA campaign in the monsoon layer (ML) of the Gulf of Guinea coast. The objective of the work is very well described and sound because there is still uncertainty about the role of biomass burning (BB) emission in southern and central Africa on the composition of low-level aerosols in the monsoon layer. In addition to the paper Mari et al. (2008), the authors could provide other AMMA publications that raised the issue of the distinction between BB and local pollution emissions by using trace gas or aerosol measurements near the Gulf of Guinea coast during the wet season. The analysis of data from three aircraft under three different chemical regimes (urban outflow, upwind marine and continental background) is

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very convincing to support the hypothesis that the background composition of aerosols at the regional level is of critical importance. The analysis of the AMS data indeed demonstrates that the role of BB emission is very likely, but I still believe that other emission sources such as Nigerian off-shore oil fields should also be discussed, given the relatively large amount of sulfate already present in the upwind marine class (>25%) and not in the BBA layer above the monsoon layer (<15%). Section 3.3 on the modelling study showing cloud droplet concentration as a function of aerosol composition is somewhat beyond the scope of this nice paper on airborne data analysis. If the authors want to maintain such a model study, either a thorough discussion on model capabilities to address this issue or at least a comparison between DACCIWA measurements of cloud and aerosol properties and model simulations are necessary.

Detailed remarks and questions:

p.3 line 70 How do the unusual dry conditions modify the paper conclusions about the aerosol composition during the wet season ?

p.5 line 91 Add also a discussion about the characteristics of the AMS instrument since it is a major contribution to the data analysis

p.5 line 97 Comment on the 40% discrepancy between the CPC observations. Typical ?

p. 5 line 107 “surface level aerosol” is misleading. Do you mean aircraft data near the surface or surface network observations ? If surface network observations are used they should be described.

p. 5 line 113 Why is the 1.9 km altitude selected for the ML ? A plot of monsoon layer height distribution as a function of latitude might be useful to justify the altitude level selected, i.e. from aircraft met data.

p. 6 line 128 Are the emissions from the off-shore oil extraction fields included in the EDGAR data ?

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p.9 line 197 What is the sulfate and organic aerosol fraction expected for gas flaring emission ? How do you explain the large sulfate contribution for the upwind marine ?

Caption of Fig. 4: Define BBA layer

p.10 Very interesting section on AMS data analysis to demonstrate the major role of BB emissions even within the ML. Are m/z 44 and 28 occurrence characteristic of aging regardless of the aerosol type or specific of the BB aging ?

Caption of Fig. 6 define the dashed line

Fig.6 Might be useful to add "Fresh BB" in the figure within the triangle area

p.13 line 285-290 Do satellite observations (MODIS, MISR, CALIOP) show the extent of the BB plume above the ocean during DACCIWA ?

p.14 line 322 How is the 10% fraction of the BB plume entrained in the ML obtained ?

p.15 I am not convinced that the work with COSMO-ART is a significant added value to this paper as the model performances are not provided to perform such a study on aerosol/cloud interaction in addition to the initial goal of the paper of the role of regional BB within the ML. My feeling is that this section is not necessary and would require a specific publication where the important question aerosol/interaction question is properly introduced with relevant literature and where the model is validated against the DACCIWA data set before being to discuss the low level cloud formation in the ML.

p. 17 line 388-420 This section of the conclusion which advocates for new campaigns could be significantly reduced.

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