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Title: Vertical profiles of trace gas and aerosol properties over the Eastern North Atlantic: Variations with season and synoptic condition

The paper presents results of vertical profiles of gas and aerosol properties during ACE-ENA that were measured in summer 2017 and winter 2018. The combination of instruments onboard the aircraft (FIMS, AMS, SP2, thermal denuder, etc.) allowed for a thorough analysis of the impacts of seasonal differences, transport pathways, and synoptic situations on atmospheric composition (gas and aerosol) and aerosol microphysical and cloud-nucleating properties. It is well-written and an important contribution towards the understanding of factors controlling variability in aerosol properties, including CCN, in the eastern North Atlantic region. I only have a few very minor comments.

Response: We thank anonymous referee #1 for the positive feedback. We have revised the manuscript accordingly, and please find our point-to-point responses below.

Line 127: Should be a lower cut-off size of 10 nm.

Response: Thank you. This information has been corrected.

Figure 3 caption: Please describe what the 3 colors correspond to.

Response: The three colors (red, green, and blue) are used to represent the three different clusters of back trajectories. This information has been added to the caption of Fig. 3.

Line 157: Change to “North America”

Response: Thank you. The typo has been corrected.

Line 475: Should be 35 nm.

Response: The value has been corrected.

Lines 480 – 482: What does “mixing” refer to here?

Response: The sentence has been reworded as:

“The gradual change of CO mixing ratio and m_{BC} at altitudes above 1500 m also suggests the mixing between the layers of high Aitken-mode concentration due to NPF and long-range transported continental emissions.”

It would be helpful to provide a brief description of what is meant by a decoupled MBL since it is an important topic in the paper.

Response: Thank you. Additional discussion on the formation of the decoupled MBL is now added in Sect. 3.5.1:

“As the MBL deepens, the turbulence produced from surface-heating and cloud-top radiative cooling becomes insufficient to maintain a well-mixed layer. Consequently, the MBL begins to “decouple” into a surface mixed layer and an upper decoupled layer (Wood and Bretherton, 2004; Bretherton et al., 2010).”