



Supplement of

Cloud adjustments dominate the overall negative aerosol radiative effects of biomass burning aerosols in UKESM1 climate model simulations over the south-eastern Atlantic

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Figure S1. UKESM1-simulated mean organic carbon (OC) during July and August 2016-2017 as (a) the vertically integrated

5 burden and (b) profile along the latitude of Ascension Island, 8.1° S (the white line in Fig. S1a). The domain in Fig. S1a, ranging from 30° S to 10° N and from 40° W to 30° E. The grey box in the map (cloud box) represents the cloud areas where the averaged low cloud fraction is above 0.58. The TM is the total mean of the domain and the CBM is the mean of the cloud box. The contours in Fig. S1b is the cloud-specific water content in the baseline simulation.



Figure S2. Mean (a) MODIS and (b) UKESM1-simulated AOD during July and August 2016-2017, and the (c) differences between MODIS and the model.



BBA associated CCN fraction at 0.2% supersaturation

Figure S3. UKESM1-simulated mean fraction of CCN from BBA at 0.2% supersaturation under standard conditions for temperature and pressure (STP) during July and August 2016-2017 as (a) the fraction of vertically integrated burden and (b) fraction of profile along the latitude of Ascension Island, 8.1° S (the white line in Fig. S3a). The domain in Fig. S3a, ranging

5 from 30° S to 10° N and from 40° W to 30° E. The grey box in the map (cloud box) represents the cloudy areas where the averaged low cloud fraction is above 0.58. The TM is the total mean of the domain, and the CBM is the mean of the cloud box. The contours in Fig. S3b is the cloud-specific water content in the baseline simulation.

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Figure S4. UKESM1-simulated mean variation of boundary layer height (BLH) due to BBA during July and August 2016-2017 along the latitude of Ascension Island. The green, orange, and blue colours represents the variation of BLH due to BBA microphysics, scattering, and absorption effects.

Temperature along 8.1 ° S [K]



Figure S5. UKESM1-simulated mean vertical profiles of BBA effects on temperature along the latitude of Ascension Island during July and August, 2016-2017: (a) absorption, (b) scattering, (c) microphysical, and (d) total. The contour lines are the baseline cloud-specific water content. The same colour map scale is used in each plot to facilitate comparison, but the colour map ranges differ in each plot, corresponding to the maximum and minimum of temperature in each.