



*Supplement of*

**Direct and semi-direct radiative forcing of biomass-burning aerosols over the southeast Atlantic (SEA) and its sensitivity to absorbing properties: a regional climate modeling study**

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Supplement

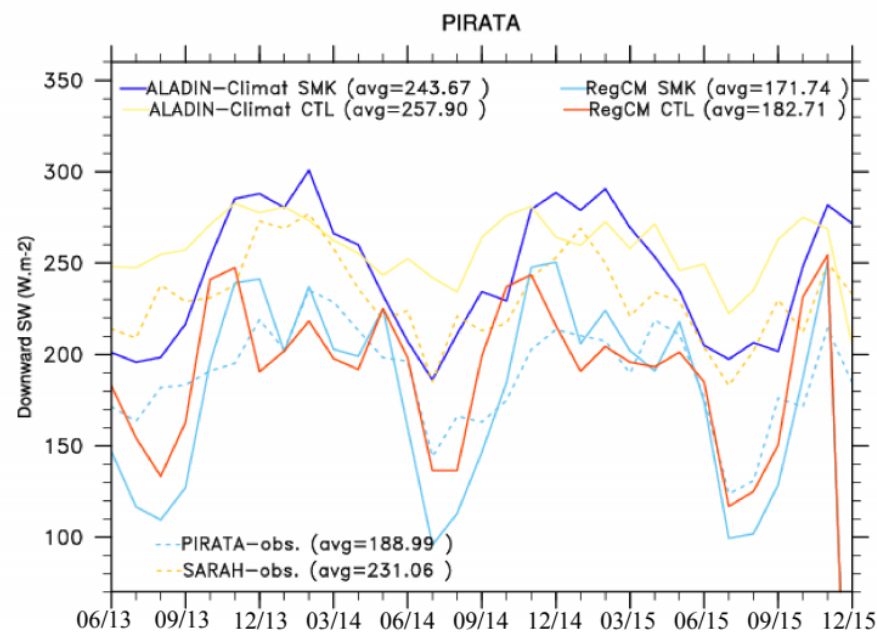
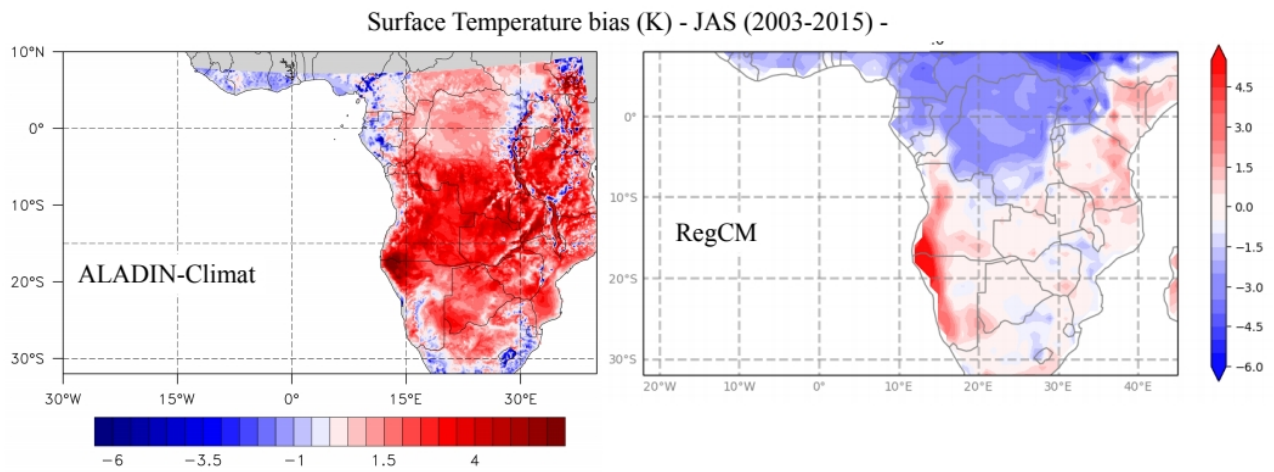
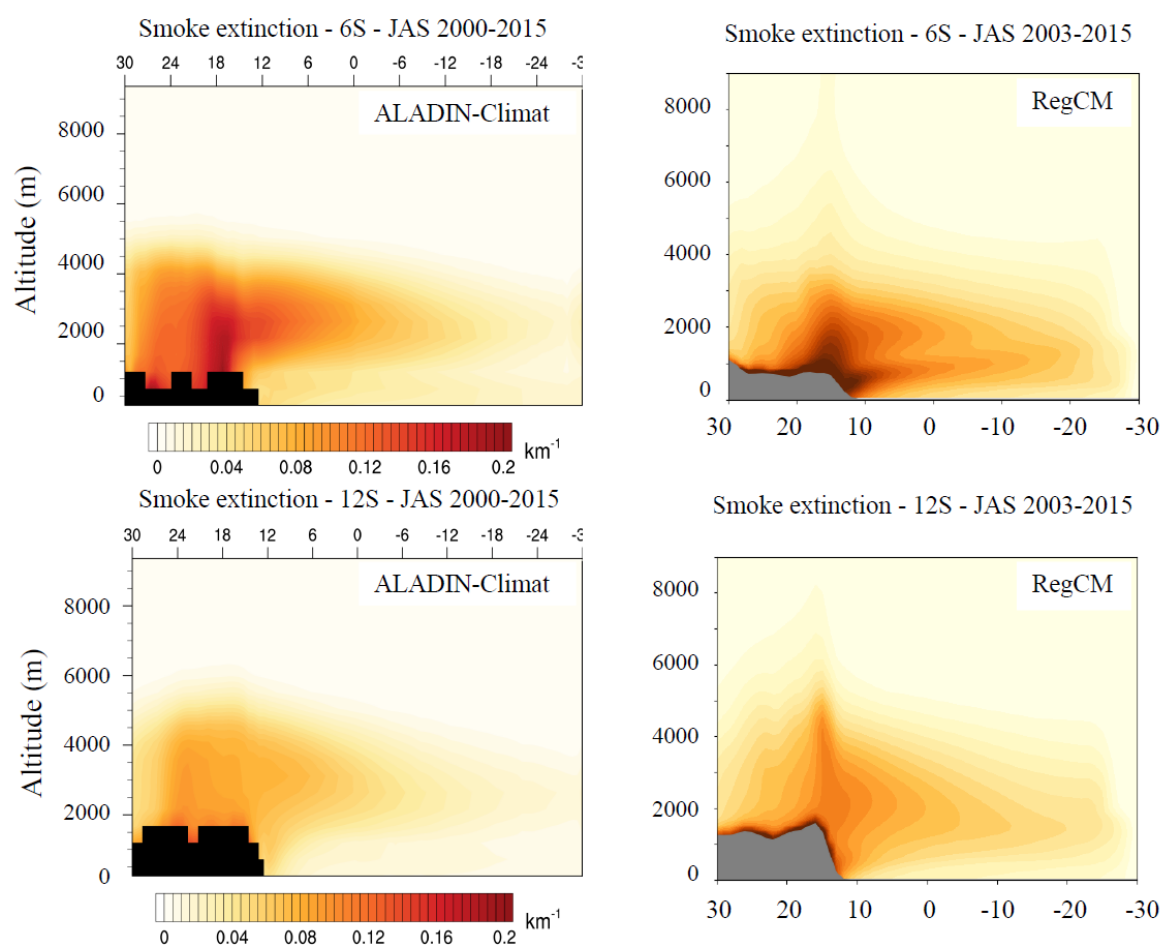


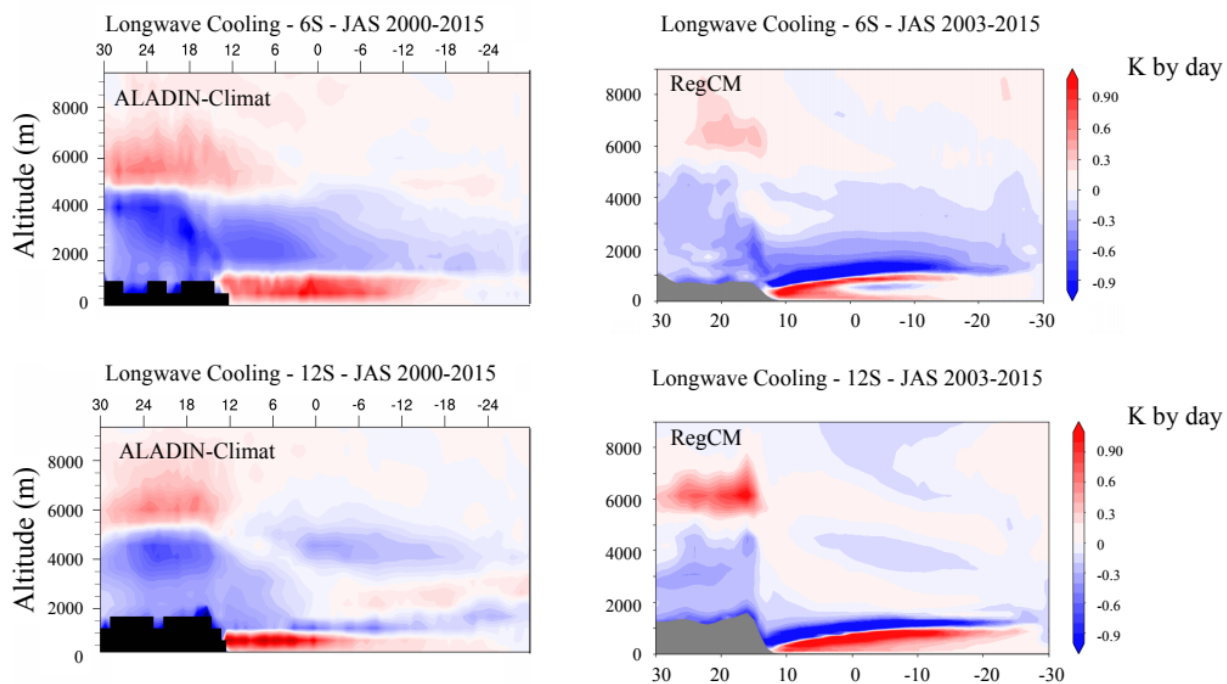
Figure S1. Monthly-mean surface shortwave radiations at the PIRATA station (8°E/6°S) from June 2013 to december 2015. SARAH-2, ALADIN (CTL and SMK) and RegCM (CTL and SMK) data are also reported together with in-situ buoy PIRATA observations.



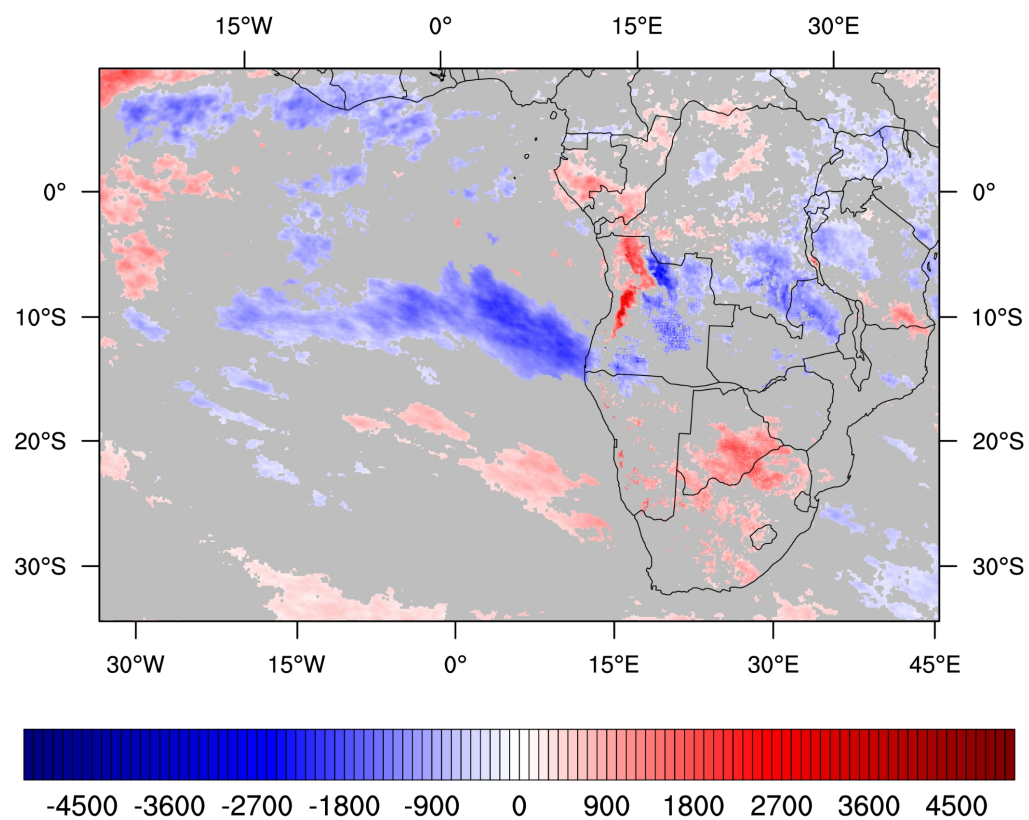
**Figure S2.** Difference in the surface (2m) temperature between ALADIN (left), RegCM (right) and CRU for the July-August-September (2003-2015) period.



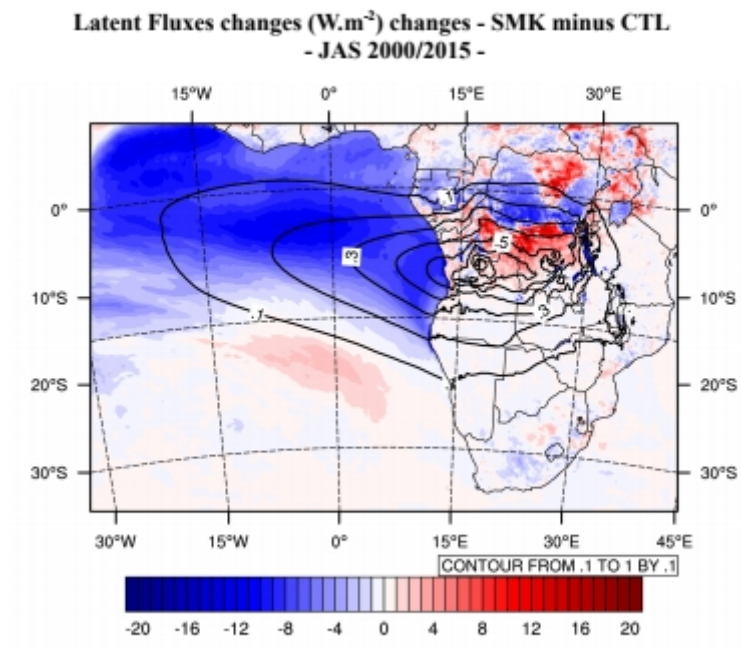
**Figure S3. Seasonal-mean (JAS) in the vertical profiles of BBA extinction (at 550 nm) at two latitudes (6 and 12°S), for the ALADIN (left, period 2000-2015) and RegCM (right, period 2003-2015) models.**



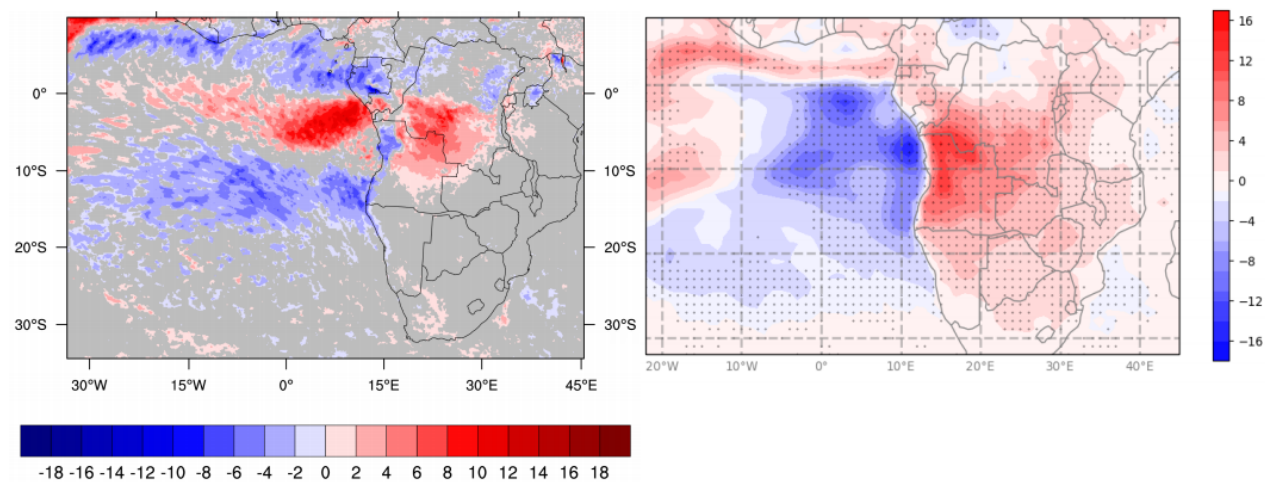
**Figure S4.** Seasonal-mean (JAS) changes (SMK minus CTL simulations) in the vertical profiles of LW cooling rate (K by day) due to BBA at two latitudes (6 and 12°S), for the ALADIN (left, period 2000-2015) and RegCM (right, period 2003-2015) models.



**Figure S5. Averaged-seasonal (JAS, 2000-2015) changes (SMK minus CTL simulations) of the cloud top height (in Pascal) for the ALADIN model.**

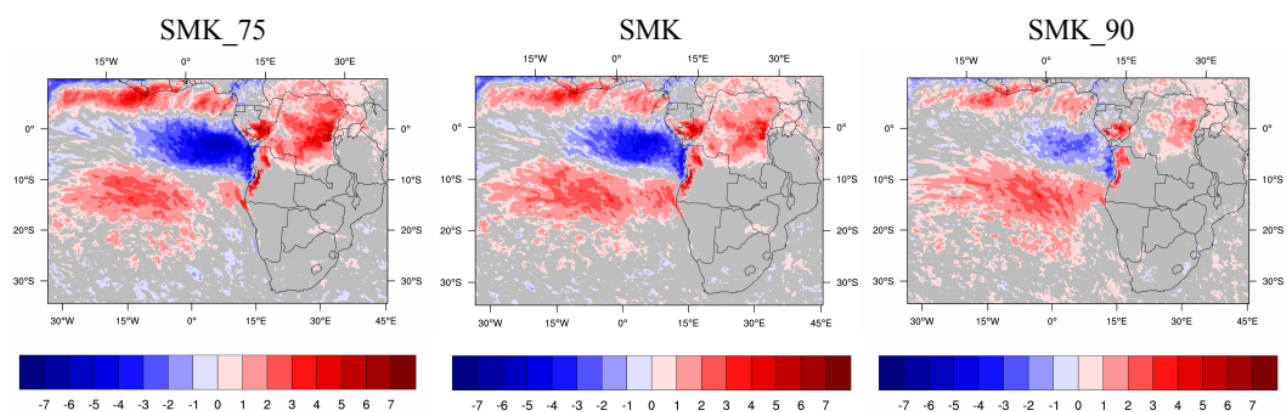


**Figure S6. Averaged-seasonnal (JAS) changes (SMK minus CTL simulations) of the latent heat fluxes for the ALADIN model.**

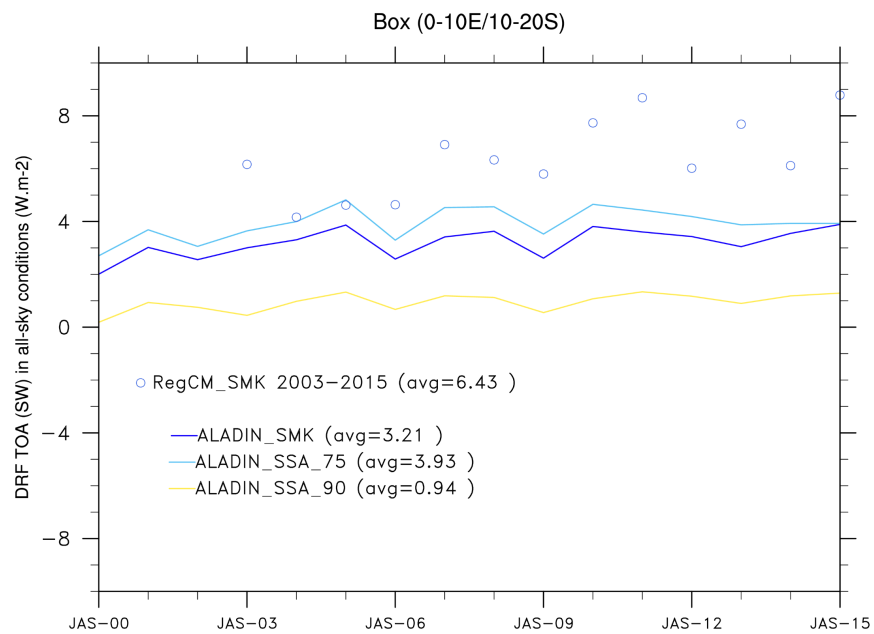


**Figure S7. Averaged-seasonal (JAS, 2000-2015) semi-direct effect (SW and LW) of BBA at TOA for the ALADIN (left) and RegCM (right) model.**





**Figure S8. Averaged-seasonal (JAS) changes (SMK minus CTL simulations) in the LCF for the three different ALADIN simulations (SMK\_75, left ; SMK, middle and SMK\_90, right).**



**Figure S9. Seasonal-mean (JAS) DRE of smoke aerosols exerted at TOA in the shortwave (all-sky conditions) averaged over the 0-10°E and 10-20°S box (box\_O) for the three ALADIN simulations (period 2000-2015) and RegCM (period 2003-2015).**