

Referee report

General comments:

This is a second review of 'Impact of Biomass Burning Aerosols (BBA) on the tropical African climate in an ocean-atmosphere-aerosols coupled climate model' after authors revised in response to the first round of referee comments, and comments largely focus on the new or altered content. The authors' additional comments and especially new simulations provided additional context to help disentangle effects of the dynamic SST and the aerosol radiative effects on cloud properties and ERFs, improving the quality of the analyses against the first version. I recommend acceptance after minor revisions.

Specific comments:

Minor:

The simulations to separate the impacts from BBA radiative dynamical effects vs. surface SST effects on cloud properties are very useful. As these are the dominant proposed mechanisms at play here, the differentiated models for BBA and SST effects should be mentioned in more places as appropriate through the work to justify claims of whether one effect or the other is dominant. For example:

- 346: Doesn't figure A6a) show that the BBA effect is strongly tied to the increased LCF over the Gabon/Angola coast? Is the increased moisture advection tied to BBA radiative impacts then?
- 475: The BBA effect being weaker isn't simply 'more likely', it is explicitly backed up by figure A6. I recommend mild reorganization to move the claim and the evidence (~line 487) closer together.

513: I read this sentence as claiming that the SST decrease is the dominant effect on changing cloud patterns, but figure A6 seems to show the opposite-- the BBA effect is at least as strong in JJA, if not stronger, over a wider ocean area and is the dominant influence near Gabon.

Technical corrections:

23: feedback should be 'effect' on precipitation

142: missing left parenthesis for Druge 2019

149: Biomass Burning shouldn't be capitalized

181: should read "the present configuration allows *us* to focus on solely the..." with no comma

206: favoring should be 'favor'

276: 'strongest' should probably be 'stronger'

304: define 'GG' and 'O-A' coupling

314: 'with an impact of up to 15W' as a phrase doesn't make sense. '...with an impact of up to [magnitude] at 15W', or perhaps 'with an impact out to 15W' as possible alterations.

Section 3.3: should read 'dynamics', not 'dynamic'

Figure A8 shouldn't have underscores in the title

400: Clarify the direction of the model bias with '...biased towards underestimating low-level cloud cover', as long as that is what's intended

420: figure reference should be A7

461: should read 'do not allow **us** to disentangle...'

474: Figure reference should probably be A9, not A8

487: remove 'the' before 'Figure A6'.

489: I believe the reference to figure A7 should probably be A6 for SON cloud anomalies

498: Clarify to say there are no major changes over **the African continent**. South America shows significant differences in precipitation.

559: either write 'using different GCMs' or, less favored because it's redundant with the acronym (global circulation model models), 'using different GCM models'

508: indicate should be 'indicates'

513: Suggest a rephrase to clarify and organize, the original sentence is confusing about what is cause and what is effect(s). One suggestion: This positive impact is found to be mainly due to the SST decrease, which is in response to the surface BBA radiative forcing (~ -5 to -15 W.m^{-2}) and the cloud changes associated with lower tropospheric heating. These both contribute to (i) increasing the LTS and (ii) to limiting the intrusion of dry air at the cloud top.