

Interactive comment on “Six Global Biomass Burning Emission Datasets: Inter-comparison and Application in one Global Aerosol Model” by Xiaohua Pan et al.

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The manuscript presents a comparison of biomass burning emissions estimated using satellite observations of active fires including burnt area and fire radiative power. Evaluation of the different emissions datasets is performed by application in a global aerosol model and comparing the relative changes in the organic matter aerosol fields over MODIS satellite and AERONET ground-based observations of aerosol optical depth (AOD). The authors acknowledge the limitations of the nature of a model-specific study like this but the inter-comparison is very thorough and provides valuable, and timely, insights into variability of estimating biomass burning emissions for application in mod-

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els. The manuscript is well written and in the scope of Atmospheric Chemistry and Physics, and I recommend it for publication subject to the authors addressing the comments below.

General comments:

Discussion of uncertainties in emission factors – would the known underestimate of PM emission factors, especially for peat fires in South East Asia, impact on the model AOD? <https://www.mdpi.com/2072-4292/10/4/495/htm> or <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2017JD027827>

Specific comments/questions:

Page 4, line 107: specify the multi-model study (is it “The AeroCom multi-model study”?).

Page 9, lines 365-367: could it be the case that the two day persistence in FINN1.5 is more representative of peat fires which may be more prevalent in EQAS?

Page 9, section 3.1.2: it may be useful to describe briefly why 2008 was chosen to investigate the seasonal variation. Does each emissions dataset capture inter-annual variability in the same way?

Page 10, line 409: “with each BB emission dataset instead” is repeating the earlier part of the sentence.

Page 11, line 433: change “peaking” to “peak”.

Page 11, section 3.2.1: it may be useful to a reader to give the names of each region as well as the acronym.

Page 12, section 3.2.2: it may be useful to give the country of the named AERONET sites, which is more intuitive to understanding the geography than giving just the regions.

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Page 12, lines 487-488: “in each respective region”.

Page 12, line 488: change “At most other AERONET” to “At most of the other AERONET”.

Page 13, line 534: “resembled with” should be “resembled”.

Page 13, lines 537-538: “All of these evidences” should be “All of this evidence”.

Page 13, line 539: should “respond” be “correspond”.

Page 13, line 543 (and other locations): would using “active fire detections” rather than “fire hotspots” be a more scientific way of describing this?

Page 13, line 553: “over entire” should be “over the entire”.

Page 14, line 566: should “emitted from smoke aerosols” be “emitted as smoke aerosols”?

Page 14, line 567: change “These evidences” to “This”.

Page 14, line 574: change “On broader...” to “Over broader...”?

Page 14, line 577: “largest month” should be “largest monthly”.

Page 15, line 624: should GFAS1.2 also be included as an FRP-based estimation?

Page 16, line 662: change “on inclusion” to “in including”.

Page 16, line 675: change “exceeds” to “is greater”.

Page 16, line 677: change “emissions is 10%” to “emissions are 10%”.

Page 17, lines 713-715: please clarify this last sentence as it isn't clear what is meant “by active fire product”. I thought that FINN1.5 and GFED4s are based on the burnt area product available from MODIS.

Page 17, line 721: “scares” should be “scars”.

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Page 18, line 758: a citation for other model assumptions may be helpful to the reader.

Page 19, final paragraph: while the focus of the evaluation has been based on AOD observations from MODIS and AERONET, it would be useful if some comments could be made on the potential use of in situ, especially aircraft, observations could be used in this context – for example, measurements made during the WE-CAN or FIREX-AQ campaigns in recent years. Also some comment on potential improvements to fire emissions estimates based on FRP products from geostationary satellite observations, especially in combination with low Earth orbit observations such as MODIS (and VIIRS).

Page 30: specify “annual total organic carbon biomass burning emissions”? I also think that removing the sites from the maps could be useful as they aren't that clear to discriminate from the colours on the map, and is a bit distracting from the values in the data.

Page 35, line 1290-1291: clarify that the climatology of AERONET AOD is AERONET-clim in the legend.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-475>, 2019.

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