

# Comparison of GFED3, QFED2 and FEER1 Biomass Burning Emissions Datasets in a Global Model

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## 1. BACKGROUND AND MOTIVATION

Biomass burning contributes about 40% of the global loading of carbonaceous aerosols, significantly affecting air quality and the climate system by modulating solar radiation and cloud properties. However, fire emissions are poorly constrained in models on global and regional levels. In this study, we investigate 3 global biomass burning emission datasets in NASA GEOS5, namely: (1) GFEDv3.1 (Global Fire Emissions Database version 3.1); (2) QFEDv2.4 (Quick Fire Emissions Dataset version 2.4); (3) FEERv1 (Fire Energetics and Emissions Research version 1.0).

## 2. EXPERIMENTS CONFIGURATION

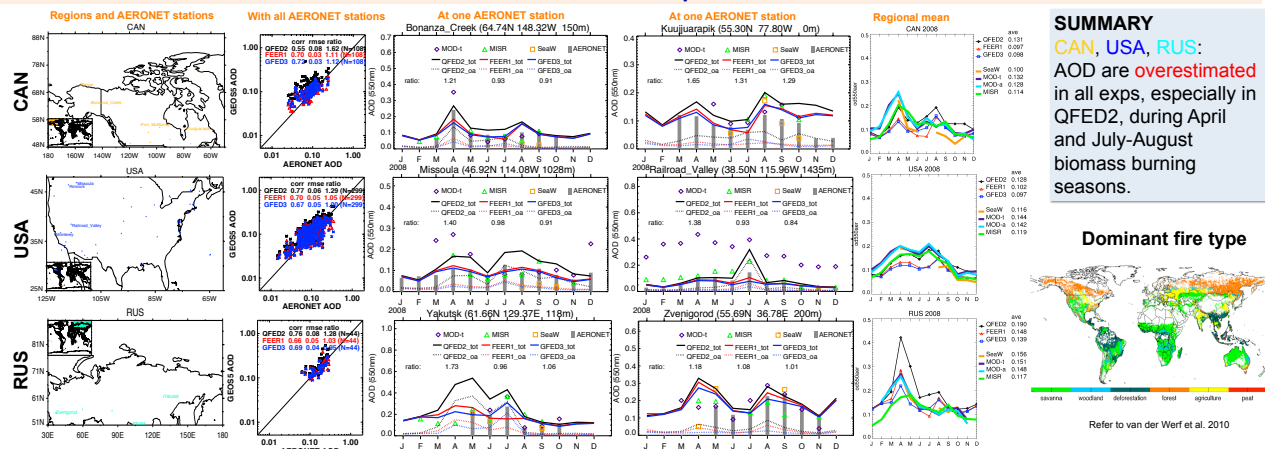
Exp.	Biomass Emission(BB)	BB grid (lon*lat)	BB Frequency	Time-frame	Reference
QFED2	QFEDv2.4	0.3125x	Daily	2000-present	Darnenov and da Silva (2015)
FEER1	FEERv1.0	0.5x0.5	Daily	2003-present	Ichoku and Ellison (2014)
GFED3	GFEDv3.1	0.5x0.5	Daily	1997-2011	Randerson et al (2013)

- NOTE:
1. Replay to Met. Filed. From MERRA
  2. Species: dust, sea salt, sulfate, black and organic carbon.
  3. Dust and sea salt emissions are calculated by the model.
  4. Model year: 2008
  5. Model grid: half degree

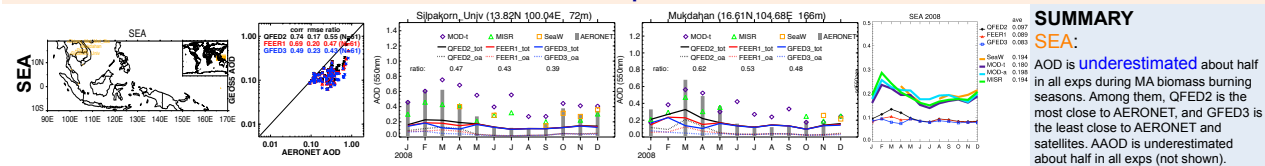


## 3. RESULTS: COMPARISONS OF AOD OVER REGIONS

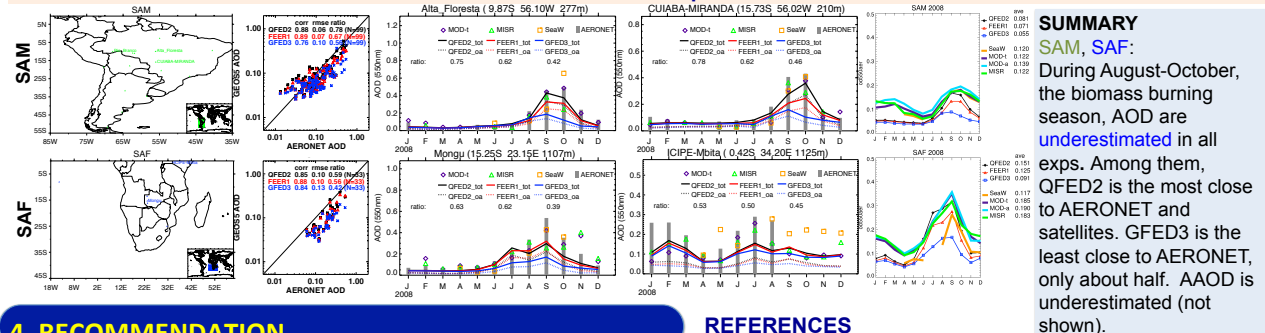
### Northern Hemisphere



### Tropics



### Southern Hemisphere



## 4. RECOMMENDATION

- ❑ Global simulation - use **FEER1**. It is not too high in NH, not too low in SH and Tropics
- ❑ Northern Hemisphere only simulation - use **FEER1**
- ❑ Tropics only simulation- use **QFED2**
- ❑ Southern Hemisphere only simulation – use **QFED2**

## REFERENCES

- ❑ Darnenov A and da Silva A. 2015. The quick fire emissions dataset (QFED)-documentation of versions 2.1, 2.2 and 2.4 NASA Technical Report on Global Modeling and Data Assimilation vol 32 NASA TM-2013-104606, 38.
- ❑ Ichoku, C. and Ellison, L. 2014: Global top-down smoke-aerosol emissions estimation using satellite fire radiative power measurements, Atmos. Chem. Phys., 14, 6643-6667.
- ❑ Randerson, J.T., G.R. van der Werf, L. Giglio, G.J. Collatz, and P.S. Kasibhatla. 2013. Global Fire Emissions Database, Version 3 (GFEDv3.1).
- ❑ van der Werf, GR et al., 2010: Global fire emissions and the contribution of deforestation, savanna, forest, agricultural, and peat fires (1997-2009), Atmos. Chem. Phys., 10, 11707-11735.