The Fire Energetics and Emissions Research (FEER) group’s new coefficient of emission global gridded product at 1×1 resolution that directly relates fire radiant energy (FRE) to smoke aerosol release, FEERv1.0 Ce, made its public debut in August 2013. Since then, steps have been taken to generate corresponding maps and totals of total particulate matter (PM) emissions using different sources of FRE, and subsequently to simulate the resulting PM$_{2.5}$ in the WRF-Chem3.5 model using emission rates from FEERv1.0 as well as other standard biomass burning emission inventories. An flowchart of the FEER algorithm to calculate Ce is outlined here along with a display of the resulting emissions of total PM globally and also regionally. The modeling results from the WRF-Chem3.5 simulations are also shown.

### FEERv1.0 Ce Algorithm

#### Total PM Emissions

Comparisons among FEERv1.0, GFEDv3.1, QFEDv2.4 and GFASv1.0 of total particulate matter (PM) emissions from biomass burning in different regions, delineated according to the GFAs definitions. Note that the FEER emissions were generated using GFAS FRE data. Also notice that the QFED line is of PM$_{2.5}$ not total PM which was not available for version 2.4. PM$_{2.5}$ ranges between 65-100% of TPM according to Andreade and Merlet (2001), depending on ecosystem type. There is a noticeable separation between the bottom-up approaches (GFED and GFAS) and the top-down approaches (FEER and QFED).

### References

### Variables List

- **WS**: Wind speed (m/s)
- **θ**: Wind azimuth (deg)
- **L**: Plume length to pixel edge (km)
- **T**: Plume time to pixel edge (s)
- **A_t**: AOT of downwind pixels
- **A_b**: AOT of background pixels
- **ρ_a**: Mass extinction efficiency
- **M_d**: Smoke aerosol column mass density (g/m²)
- **M_a**: Total area of the downwind pixels
- **R_a**: Rate of smoke aerosol emission (kg)
- **R_f**: Rate of radiative energy release (MW)

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