

## ***Interactive comment on* “Emission of trace gases and aerosols from biomass burning – An updated assessment” by Meinrat O. Andreae**

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The article entitled “Emission of trace gases and aerosols from biomass burning – An updated assessment” by Meinrat O. Andreae, submitted for possible publication in ACP is quite timely and important, as it updates the biomass burning (BB) emission factor (EF) values from the famous Andreae and Merlet (2001) compilation (A&M2001) that has been widely used and referenced by the BB community. This article provides a much-needed and long-awaited update to that compilation, and includes new BB-emitted species that were not previously considered due to lack of measurements. Appropriately, high importance is accorded to data from field measurements, which are more representative of realistic open-air biomass-burning conditions, as opposed to laboratory experiments. Conversion factors have been applied to harmonize certain

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similar parameters and their units of measure to render them more compatible and comparable. The Extratropical BB emissions category, which was somewhat confusing in the previous (A&M2001) version has now been separated into Temperate and Boreal forest categories. Open garbage burning is now included, as these are quite significant in certain parts of the world. Original data and references upon which the present compilation is based are being made available in the supplement for the reader to customize the categorization of biomass burning and/or perform further calculations. Referenced literature increased from 130 papers to 350 papers relative to the previous (A&M2001) version. This article is very well written, comprehensive, and succinct, and represents a significant contribution to the biomass burning literature. Therefore, I recommend the publication of this article after the following specific concerns have been addressed.

Specific Concerns: Page 3, Line 15: I believe it is more conventional to refer to the FTIR technique as “spectroscopy” rather than “spectrometry”.

Page 6, Line 9: Change “depending of” to “depending on”.

Page 9, Lines 5-10: My main concern here is the use of Fire Radiative Power (FRP) as the sole basis to distinguish “top-down” satellite BB emissions methods from “bottom-up”. All satellite BB emissions methods described in the article utilize satellite observations (fire-pixel counts, burned area, or FRP) as a way of estimating the biomass burning activity. The use of one or another parameter (FRP or not) does not make a method “top-down” or “bottom-up”. Since the driving variable for estimating BB emissions are the factors that convert the activity to emissions (e.g. emission factors, as eloquently discussed in the article), it is the spatio-temporal distribution/configuration of the original input emissions, which went into deriving these EFs that determine whether a method is “top-down” or “bottom-up”. If those input emissions were observed at a few locations and limited time periods, and then scaled up globally, the method is “bottom-up”. But, if the input emissions were observed globally and regularly, and then scaled down to their sources, it is “top-down”, as in the use of satellite-derived aerosol opti-

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cal depths (AOD) of smoke-dominated aerosols to constrain the “emission coefficients” used to derive the emissions. Bearing this in mind, among the satellite methods described in this article, only QFED and FEER used globally-observed AOD to derive the coefficients that were then used to derive their final BB emission products, and thus may be categorized as “top-down”. The others (including GFAS, which is scaled to GFED emissions) used locally-observed BB-emitted constituents to derive emission factors that were then generalized for their global BB emission products, and thus may be categorized as “bottom-up”.

Page 9, Line 17: I am concerned about the use of FAO (2015) as the primary reference for a quantitative value, as I am not sure whether FAO (2015) was peer-reviewed. I believe it would be better to find and cite the original (peer-reviewed) source of the 53 Tg/yr estimate reported in FAO (2015).

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