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Title:

Enhancements in Deriving Smoke Emission Coefficients from Fire Radiative Power Measurements

Abstract:

Smoke emissions have long been quantified after-the-fact by simple multiplication of burned area, biomass density, fraction of above-ground biomass, and burn efficiency. A new algorithm has been suggested, as described in Ichoku & Kaufman (2005), for use in calculating smoke emissions directly from fire radiative power (FRP) measurements such that the latency and uncertainty associated with the previously listed variables are avoided. Application of this new, simpler and more direct algorithm is automatic, based only on a fire's FRP measurement and a predetermined coefficient of smoke emission for a given location. Attaining accurate coefficients of smoke emission is therefore critical to the success of this algorithm. In the aforementioned paper, an initial effort was made to derive coefficients of smoke emission for different large regions of interest using calculations of smoke emission rates from MODIS FRP and aerosol optical depth (AOD) measurements. Further work had resulted in a first draft of a 1×1° resolution map of these coefficients. This poster will present the work done to refine this algorithm toward the first production of global smoke emission coefficients. Main updates in the algorithm include: 1) inclusion of wind vectors to help refine several parameters, 2) defining new methods for calculating the fire-emitted AOD fractions, and 3) calculating smoke emission rates on a per-pixel basis and aggregating to grid cells instead of doing so later on in the process. In addition to a presentation of the methodology used to derive this product, maps displaying preliminary results as well as an outline of the future application of such a product into specific research opportunities will be shown.

(Ichoku, C. and Y. J. Kaufman, A method to derive smoke emission rates from MODIS fire radiative energy measurements, *IEEE Trans. Geosci. Rem. Sensing*, **43**(11), 2636-2649, 2005.)