Geophysical Research Abstracts
Vol. 13, EGU2011-1097, 2011
EGU General Assembly 2011

Estimation of the Injection Height of Biomass Burning Emission

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The focus of this study is laid on the relation between emitted fire radiative power (FRP) and smoke plume height. Once validated for different weather conditions and different fire characteristics, such a relation could be used to set up a parameterization of fire injection in global atmospheric chemical transport model (CTM). The study is based on both numerical simulation and observations. The numerical approach follows a two successive simulations strategy that first focuses on the study of FRP. Based on the capability of the WFDS model in fire simulation (and validation on prescribed fires), the effects of several parameters such as wind, fuel mass, or fire extension on FRP magnitude are investigated. The partitioning of the emitted energy between different processes such as radiation and convection is also studied. The second step simulation is based on the plume model developed by Freitas et al. (2007). This plume model is already used in different host models (e.g. WRF, BRAMS). In its current version, the fire is modelled by: a convective heat flux (pre-defined by the land cover and evaluated as a fixed part of the total heat released); and a plume radius which defines the fire extension where the FRP is homogeneously distributed. Here in our approach the Freitas model is modified to use results based on WFDS simulation and observations, to directly force the convective heat flux from FRP data. Validation of this new initialization method is shown by comparing Freitas 1D plume model with MISR data for several test case fires.