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Estimating carbon emissions from fires in Africa using remote sensing and modelling

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Africa is a continent dominated by fire. Biomass burned annually in African savannas is estimated to be about 2 Pg dry matter combusted on an area exceeding 400 million ha (Scholes & Andreae, 2000). African biomass burning emissions are thought to release $\sim$1.1 Pg C yr^{-1} to the atmosphere (Williams et al. 2007). This is a significant fraction of global wildfire emissions, which are estimated between 1.7 and 4.1 Pg C yr^{-1} (Andreae and Merlet, 2001). For comparison, carbon emissions from fossil fuel burning have been about 1.96 Pg C yr^{-1} (equal to 7.2 Pg CO_2 yr^{-1}) between 2000 and 2005 (IPCC 2007). Fire emissions, and the subsequent uptake of carbon by vegetation regrowth, contribute to the regional and interannual carbon cycle variability in Africa. Fires also have positive impacts: They promote growth of new plant biomass suitable for grazing, control woody biomass, maintain high biodiversity and the evolution of fire adaptation strategies. Fires have been used by people since the early Holocene (Bird & Cali, 1998), and are still a major land management tool in Africa. Frequency and magnitude of fire is one of the main determinants for the dynamics of savanna-forest boundaries.

To estimate the carbon emissions from fire and enable model simulations of future

changes in the fire regime, continental-scale dynamic vegetation model runs using the LPJ model including the SPITFIRE ("SPread and InTensity of FIRes and Emissions")

module are carried out, forcing the model with remotely sensed burned area data from the L3JRC dataset from 2001 to 2005. The LPJ-SPITFIRE model simulates carbon release based on modelled litter biomass and climate-driven combustion completeness. Preliminary results are presented.

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References:

Andreae MO & Merlet P (2001): Emission of trace gases and aerosols from biomass burning, Global Biogeochemical Cycles 15 (4): 955-966

Bird MI & Cali JA (1998): A million-year record of fire in sub-Saharan Africa ,Nature 394 (6695): 767-769

Scholes, M. & Andreae, M. O. (2000): Biogenic and Pyrogenic Emissions from Africa and their Impact on the Global Atmosphere. Ambio: A Journal of the Human Environment 29, 23-29

Thonicke K, Spessa A, Prentice IC, Harrison S, and Carmona-Moreno C. (submitted): The influence of vegetation, fire spread and fire behaviour on global biomass burning and trace gas emissions. Submitted to Global Change Biology.

Williams, CA, Hanan, NP, Neff, JC, Scholes, RJ, Berry, JA, Denning, AS and Baker, DF (2007): Africa and the global carbon cycle, Carbon Balance Management 2: 3, doi: 10.1186/1750-0680-2-3.