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Fire emissions simulated by prescribing burned area observations in a global vegetation model

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The emissions of trace gases and aerosols from large vegetation fires into the atmosphere have an important climate impact. In this study we integrate observed burned area into a global vegetation model to derive global fire emissions.
A global continuous burned area products provided by GFED (Global Fire Emissions Dataset) were obtained from MODIS (and pre-MODIS) satellites and are available for the time period 1997-2011. We integrate the global burned area product into the global vegetation model JSBACH, a land part of the Earth-System model developed at the Max Planck Institute for Meteorology. JSBACH simulates land biomass in terms of carbon, which can be combined with the satellite burned area information to derive fire carbon emissions. Some assumptions on fire fuel consumptions have to be made during the integration of satellite burned area into the JSBACH. This includes processes such as tree mortality and combustion completeness, i.e. how much of the vegetation biomass gets combusted during a fire. Partially, this information can be also obtained from measurements. In this study we follow closely the approach of GFED, incorporating also GFED supplemental information, to simulate fuel consumption in JSBACH. And we compare simulated by this approach fire carbon emissions with the fire emissions from GFED.
Global vegetation models often use prescribed land cover maps. The simulated in the JSBACH vegetation biomass and thus the simulated fire carbon emissions critically depend on the land cover distribution. In our study we derive fire carbon emissions using two different land cover parameterizations, based on two different satellite datasets. We will present the results obtained from simulations using the JSBACH standard MODIS based vegetation distribution and compare them to the results derived using the recently released ESA CCI land cover satellite product to demonstrate the sensitivity of simulated fire carbon emissions to the underlying land cover distribution.