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An observation-derived fire model for estimating past and future fire activity.

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Biomass burning is an important terrestrial process with a strong influence on vegetation and atmospheric composition. It generates carbon emissions estimated to reach on average half of the annual fossil fuel combustion, with significant inter-annual variability. Human activities and extreme climatic events have recently been responsible for an increased fire sensitivity of previously unaffected ecosystems such as tropical forests. Global fire models have been developed and included in Dynamic Global Vegetation Models to make projections of future fire patterns under climate change conditions. Their validation revealed that they need further improvements to satisfyingly represent the main observed patterns (see session BG4.1).

In parallel, we propose another strategy to look into possible climate change impact on fire activity, taking advantage of the increasing availability of satellite long term fire observations. We use the 10 years burned area estimates from the Global Fire Emission Database (GFED, [1]), over 1997-2006, along with a set of critical fire related independent variables, or predictors, to build a statistical model of the observed burned areas. The predictors include climatic, vegetation and human parameters.

To better understand how fires are driven, we validate and discuss the relationships the model suggests. It is then run with observations of the predictors over the last 40 years, for more robust validation and to study the role of fires in greenhouse gases growth rate variability. Finally, a run with projection data from a set of models provides a first

assessment of biomass burning under changing environmental conditions.