



## Comparing modelled fire dynamics with charcoal records for the Holocene

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An Earth System model of intermediate complexity, CLIMBER-2, and land surface model JSBACH that includes dynamic vegetation, carbon cycle, and fire regime are used for simulation of natural fire dynamics through the last 8,000 years. To compare the fire model results with the charcoal reconstructions, several output variables of the fire model (burned area, carbon emissions) and several approaches of model output processing are tested. The z-scores out of charcoal dataset have been calculated for the period 8,000 to 200 BP to exclude a period of strong anthropogenic forcing during the last two centuries.

The model analysis points mainly to an increasing fire activity during the Holocene for most of the investigated areas, which is in good correspondence to reconstructed fire trends out of charcoal data for most of the tested regions, while for few regions such as Europe the simulated trend and the reconstructed trends are different. The difference between the modeled and reconstructed fire activity could be due to absence of the anthropogenic forcing in the model simulations, but also due to limitations of model assumptions for modeling fire dynamics. For the model trends, the usage of averaging or z-score processing of model output resulted in similar directions of trend. Therefore, the approach of fire model output processing does not effect results of the model-data comparison.

Global fire modeling is still in its infancy; improving our representations of fire through validation exercises such as what we present here is thus essential before testing hypotheses about the effects of extreme climate changes on fire behavior and potential feedbacks that result from those changes.

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