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# Global modelling of microscopic charcoal particles

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Fires affect vegetation, emit greenhouse gases and aerosol particles, and are a danger for people and infrastructure. Fire models are used to project future fire activity, which might change due to global warming. Information about past fire activity is crucial to validate these fire models and thus might help to better understand processes driving fire activity. Several paleofire records exist, among them ice cores and lake sediments, which preserve fire tracers such as charcoal or black carbon particles. In this work, we implement microscopic charcoal particles (maximum dimension 10-100 $\mu$m) into the global aerosol-climate model ECHAM6-HAM2. To estimate microscopic charcoal emission fluxes, we scaled black carbon emissions from GFAS. The scaling factor was chosen such that observed and simulated charcoal deposition fluxes were in best agreement. For this calibration, the observed charcoal deposition fluxes originate from recent measurements from European sediments. After that, model results were compared with an independent dataset including also observations from different parts of the world and from peats and ice cores.

Due to the coarse model resolution ($\sim$1.9°x1.9°), the model does not capture local variability of charcoal deposition fluxes. However, the model represents the variability on the global scale reasonably well.

In future, we plan to simulate charcoal deposition fluxes for the past 150 years as well as for periods further back in time (e.g. AD 1). In the latter case, a fire model will be used to calculate the aerosol emission fluxes.