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Implementing microscopic charcoal in a global climate-aerosol model

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Information about past fire activity is crucial to validate fire models and to better understand their deficiencies. Several paleofire records exist, among them ice cores and sediments, which preserve fire tracers like levoglucosan, vanillic acid, or charcoal particles. In this work, we implement microscopic charcoal particles (maximum dimension 10-100 μm) into the global climate-aerosol model ECHAM6.3HAM2.3. Since we are not aware of any reliable estimates of microscopic charcoal emissions, we scaled black carbon emissions from GFAS to capture the charcoal fluxes from a calibration dataset. After that, model results were compared with a validation dataset.
The coarse model resolution (T63L31; $\sim$1.9°x1.9°) impedes the model to capture local variability of charcoal fluxes. However, variability on the global scale is pronounced due to highly-variable fire emissions.
In future, we plan to model charcoal fluxes in the past 1-2 centuries using fire emissions provided from fire models. Furthermore, we intend to compare modelled charcoal fluxes from prescribed fire emissions with those calculated by an interactive fire model.