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Wetland distribution assumptions: consequences for Methane emissions

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Wetlands are the largest natural source of methane to the atmosphere. While process models of wetland methane emissions have advanced considerably in recent years, all of these models critically depend on estimates of the methane-emitting area. These estimates are highly uncertain, however. We investigate several approaches for estimating the wetland area and the consequences these assumptions have for the spatial and temporal distributions of wetland methane emissions.

For this investigation we use JSBACH, the land surface component of the Max Planck Institute Earth System Model MPI-ESM, extended with modules for the generation and soil transport of methane. We drive the model with an ensemble of simulations of climate over the historical period from the MPI-ESM CMIP5 archive, as well as observed climate from CRU-NCEP. We impose both static and dynamic wetland maps, as well as modelled wetland distributions, and determine the wetland methane emissions resulting from these estimates.

Results are compared to methane fluxes from atmospheric inversions to evaluate the consequences of the assumptions on wetland area.