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Multi-centennial warming contribution from permafrost feedbacks

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Long-term climate projections on centennial timescales are subject to large uncertainty in the view of so far un-quantified contributions of carbon-cycle climate feedbacks. In this study, we provide an estimation of the potential effect of permafrost feedback on future warming in a simplified framework. We base our simulations on prior distributions informed by the literature for the parameters of a new simplified permafrost module within the probabilistic carbon-cycle climate model MAGICC.

Our results underline the importance of discussing permafrost thaw as a long-term climate feedback. Given the slow timescales of permafrost degradation and carbon decomposition, the additional warming from permafrost soils does only marginally affect 21st century temperature evolution, even under the high emission scenario RCP85. On timescales beyond 2100, the released permafrost carbon dioxide and methane can further increase global temperatures by about an additional degree in 2200 (upper 68 percentile, RCP85).