First steps towards the realisation of the Tipping Point Modelling Intercomparison Project (TIPMIP): Results from coupled Earth system models

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Climate change poses a considerable risk to the stability of the Earth system and the maintenance of a habitable planet. The consequences of crossing certain tipping points in relevant components of the climate system, i.e. critical thresholds at which a small-scale change in forcing induces widespread and potentially irreversible feedbacks, are among the most uncertain, though they are believed to be some of the most severe for human societies. The Tipping Point Modelling Intercomparison Project (TIPMIP, www.tipmip.org) seeks to systematically investigate tipping dynamics in various components of the Earth system in order to evaluate the risk of crossing specific tipping points. Currently in its first phase, TIPMIP focuses on six components of the Earth system believed to exhibit tipping behaviour: the AMOC, Greenland and Antarctic ice sheets, permafrost, and the boreal and Amazon forests. Experiments using fully-coupled Earth system models, as well as tipping-element specific “domain” models, have been developed in order to evaluate the risk of crossing certain tipping points given present and future global warming.