

EGU24-17399, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-17399>

EGU General Assembly 2024

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The Tipping Point Modelling Intercomparison Project (TIPMIP)

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While tipping points in the Earth system are recognized in the public and policy debate as one of the major risks of anthropogenic climate change, our current knowledge of their dynamics involves a broad range of uncertainties, and so far there is no systematic risk assessment quantifying the likelihood as well as the impacts of exceeding tipping points in the Earth system.

Here we introduce the Tipping Point Modelling Intercomparison Project (TIPMIP, www.tipmip.org), a major international initiative setting out to fill this gap in a multi-model approach: Based on ensembles of simulations with Earth system models as well as offline models combined with current observations, the experiments will serve to assess (1) the risk of crossing critical thresholds in the Greenland and Antarctic ice sheets, the Atlantic Meridional Overturning Circulation, tropical and boreal forests as well as high-latitude permafrost; (2) the short- and long-term (committed) impacts of crossing individual tipping points; (3) the (ir)reversibility of impacts on different timescales; and (4) the role of the forcing rate. TIPMIP also sheds light on potential model shortcomings when it comes to such highly-nonlinear dynamics in the Earth system which may significantly change projections for the 21st century and beyond.

The TIPMIP outcome will serve to generate a risk map, highlighting regions in the world which are most vulnerable to tipping transitions, which will be an important basis for forward-looking policy decisions.