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## Tipping risks due to temperature overshoots within the Paris range

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Climate tipping elements potentially lead to accelerated and irreversible climate change once their critical temperature threshold is passed. Some of their critical thresholds (tipping points) are at risk to be transgressed already within the temperature guardrails of 1.5-2.0°C above pre-industrial levels. However, it has been suggested at the same time that global mean temperature levels are likely to temporarily overshoot these boundaries.

Therefore, we investigate the tipping risk for a set of four interacting climate tipping elements using a conceptual model. To this end, we study the impact of different peak and long-term saturation temperatures on the Greenland Ice Sheet, the West Antarctic Ice Sheet, the Atlantic Meridional Overturning Circulation (AMOC) and the Amazon rainforest.

We find that overshoot peak temperatures between 2.5-4.0°C increase the risk by 10-55% even if long-term global mean temperature levels are stabilized between 1.5-2.0°C. Furthermore, the interactions between the tipping elements increase tipping risks significantly already at modest to intermediate levels of interaction. Therefore our conceptual study suggests that safe overshoots are only possible for low peak temperatures of the overshoot as well as final saturation temperatures at or below today's global warming levels.