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## Overshooting the tipping point threshold for the Greenland ice-sheet using a complex ice-sheet model

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The rise of the global sea-level due to the melting of the Greenland ice-sheet poses one of the biggest threats to human society in the 21st century (IPCC, 2021). The Greenland ice sheet has been hypothesized to exhibit multiple stable states with tipping point behavior when crossing specific thresholds of the global mean temperature (Robinson et al., 2012). In regards to the desultory efforts to reduce the global emissions it becomes more and more unlikely to reach the 1.5°C goal by the end of the century and a crossing of the tipping threshold for the Greenland ice sheet becomes inevitable. First early-warning signals of a possible transition have already been found (Boers&Rypdal, 2021). However, it is known that a short-term overshooting of a critical threshold is possible without prompting a change of the system state (Ritchie et al., 2021). Using a complex ice sheet model, we investigate the effects of different carbon-capture scenarios after crossing the tipping threshold for the Greenland ice sheet. We are able to sketch a stability diagram for a number of emission scenarios and show that temporarily overshooting the temperature threshold for Greenland might be quasi-irreversible for some of the emission scenarios.

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