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Observed early-warning signals for a Greenland-ice-sheet tipping point

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Nonlinear feedbacks, such as the melt-elevation feedback, may produce a critical temperature threshold beyond which the current state of the Greenland Ice Sheet loses stability. Hence, the ice sheet may exhibit an abrupt transition under ongoing global warming, with substantial impacts on global sea level and the Atlantic Meridional Overturning Circulation. Melting rates across Greenland and solid ice discharge at the ice sheet's margins have recently accelerated. In this work, we analyze ice sheet runoff reconstructions and process-based simulations using new methods. We compare the acceleration in the runoff with the statistical properties of fluctuations around the system's equilibrium. The analysis uncovers significant early-warning signals for an ongoing destabilization and substantial further mass loss in the near future.