



## **Ice stream dynamics with stochastic climate forcing**

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Ice sheets are tightly coupled to the climate system, whether at the ice/atmosphere or at the ice/ocean boundaries. In this study we focus on the ice/atmosphere boundary by exploring the links between streaming behaviour observed in large ice sheets and climate forcing; in particular, we address the role of stochasticity in climate fluctuations. We use a stochastic model informed by the statistical properties of climate proxies from ice core data to simulate the natural variability of snow accumulation and atmospheric temperature throughout the Holocene. The simulated time series are then used to drive a simple differential model of ice stream dynamics. Our analysis shows that stochasticity in the climate forcing induces the co-existence of dynamic behaviours that would be incompatible in a purely deterministic ice stream model. Moreover we find that climate fluctuations can drive the stream away from the flow regime expected in a steady climate even in the absence of a shift in the mean climate properties. Lastly, we discuss the implication of these results with respect to observations and records of past ice stream dynamics.