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The nature and origin of streaming behaviour in former ice sheets

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The surfaces once occupied by former ice sheets bear sedimentary and geomorphological evidence of the direction and "intensity" of ice flow, such as to permit identification of the locations of former ice streams. The locations and forms of streams that have developed in former mid-latitude ice sheets in Europe, Britain and North America have been reconstructed, and in some cases, the duration of streaming events has been deduced. A high resolution (5-20km grid size) ice sheet model has been used to explore the boundary conditions required to simulate streaming in the ice sheets. Many streams are relatively ephemeral and can be explained as a consequence of unforced instabilities, and may be associated with major oscillations of the ice sheet margin, but others require an easy-decollement basal boundary condition, and tend to be sustained for long periods. The precise locations of the latter can have a powerful impact on the form, extent and mass of the ice sheet. Conditions are also identified for both confluent streams, similar to those of modern-day Antarctica, and diffluent streams, which develop on low relief beds.