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Flow switching and large-scale deposition by ice streams draining former ice sheets

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Fast-flowing ice streams are responsible for the bulk of mass transfer through large ice sheets. We use extensive three-dimensional seismic data from the western Norwegian margin to explain how a several-hundred-kilometer-long ice stream has undergone major switching in flow direction from one glaciation to the next. The direction of ice flow is inferred from the pattern of buildup of thousands of cubic kilometers of glacier-derived debris and observations of large-scale streamlined landforms on former subglacial beds. We demonstrate that ice streams can undergo major changes in flow direction through modification of their large-scale topographic setting. Whereas ice-stream switching in modern ice sheets has been regarded mainly as a reflection of internal changes in ice-sheet dynamics, switching over successive 100 k.y. glacial cycles may in this case be a response to the effects of continuing sediment deposition and the large-scale development of ice-influenced continental margins.

Keywords: ice streams, Norwegian margin, three-dimensional seismic data, glacial lineations, glacial bedforms

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