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# Large-scale reorganisation of fast-flowing ice sheet outlets on the Canadian Prairies during the last glacial cycle

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Satellite remote sensing data from central and southern Saskatchewan on the Canadian Prairies reveal glacial geomorphological evidence for the former presence of fast-flowing ice sheet outlets which drained the Laurentide Ice Sheet during the last glacial cycle. These fast-flowing outlets are recorded by elongate subglacial bedforms (including mega-scale glacial lineations over 20 km in length). The largest of these fast-flowing outlets was a "pure" ice stream, about 700 km in length, which terminated in a series of well-defined arcuate end moraines in southern Saskatchewan and Alberta. Stratigraphical and sedimentological investigations of these moraines show that they are composed of a variety of stacked subglacial tills and glaciotectonised lake sediments. This ice stream was in operation during the early stages of deglaciation when the ice sheet was still close to its maximum extent, and streaming flow operated along the length of the flow path. The remote sensing data demonstrate that a major shift in flow direction of up to ninety degrees then occurred with topographically-controlled fast-flowing outlets up to 300 km in length draining eastwards from the Alberta border into Saskatchewan. Such a shift in flow direction reflects variations in the relative timing of ice stream retreat which allowed adjacent outlets to respond asynchronously; retreat of one outlet triggering destabilisation and rapid advance of others. Although flow switching of palaeo-ice streams between different glacial cycles has been reported previously from continental shelf records, those ice streams were marine-based and would thus have been inherently more susceptible to rapid dynamic change. Our data demonstrate that major reorganisation also characterises terrestrial fast-flowing outlets during a single glacial cycle.