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Reconstructing the last Newfoundland Ice Sheet, Canada.

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The Newfoundland Ice Sheet which formed part of the North American Ice Sheet Complex was situated on the margins of the northwest Atlantic Ocean during the Wisconsinan glaciation (~80ka BP to 10ka BP). This complex consisted of the Laurentide, the Cordilleran and Innuitian Ice Sheets, the Canadian Maritime Provinces Ice Cover and the Newfoundland Ice Sheet (NIS). Although all were confluent at the last glacial maximum, the NIS is known to have supported independent ice centres with advances from the Laurentide Ice Sheet being restricted to Newfoundland's northern and western margins. Given its distinctive position, it is likely the evolution of the NIS through the last glacial cycle was influenced by a number of external and internal drivers including configuration changes in the Laurentide Ice Sheet, ice stream initiation and shutdown, changes in oceanic circulation and fluctuating sea levels and climate signals from the wider Amphi-North Atlantic. As such Newfoundland is a key location for investigating ice sheet response to a number of internal and external forcing mechanisms during glacial cycles. An established technique for reconstructing former ice sheet behaviour is the mapping and spatial analysis of glacial landforms. This provides a valuable record of former ice sheet extent and behaviour through time as well as ice sheet retreat during deglaciation. Here we present new mapping based on our interpretation of SPOT satellite imagery and Digital Elevation Models of the entire Island of Newfoundland as well as swath bathymetric imagery from several locations offshore. Our new database consisting of ~150,000 individually mapped subglacial bedforms that includes drumlins, crag and tails, glacially moulded bedrock lineations and ribbed moraines significantly increases the known landform record in this region. The new database shows Newfoundland has a complex palimpsest landscape that records multiple ice sheet events across the island. Here we report our attempt at unravelling this new record using flowset analysis which separates discrete ice flow patterns into snapshots of ice sheet behaviour through time. Our initial flowset analysis shows the NIS was a dynamic ice sheet which was susceptible to configuration changes throughout the last glacial cycle including ice divide migration, regional configuration changes, ice stream activity and enhanced ice flow caused by marine drawdown.