The Late-Quaternary morphostratigraphic record of glaciation, paleoseismicity and postglacial environmental changes in fjord-lakes of Québec-Labrador

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Hydroacoustic surveys were conducted in eight fjord-lakes of Québec-Labrador in order to analyse their Late-Quaternary geomorphological and stratigraphic record of glaciation, paleoseismicity and postglacial environmental changes. This large morphostratigraphic dataset provided a unique opportunity to establish a conceptual model of the evolution for fjord-lakes in relation to deglaciation, glacio-isostatic rebound, sediment fluxes and paleoseismicity. The analysis of the morphology and distribution of many morainic deposits into the fjord-lakes (hummocky moraines, morainic sills and morainic complexes) allows relating their formation to the glacial erosion potential, as well as to climatic and topographic controls. During past glaciations, a topographic sill was left uneroded at the opening of valleys due to the decrease in the glacial erosion potential associated with the lateral extension of the glacier down-ice; this bedrock sill created in turn an anchoring point to the ice during deglaciation. Hummocky moraines were documented at the outlet of five fjord-lakes that are located within the deepest and narrowest valleys of the studied systems. Based on our analysis of these sublacustrine landform-sediment assemblages, fjord-lakes constitute distinct sedimentary systems that should be differentiated from typical fjord system (i.e., in marine waters). The large-scale landforms contained in the fjord-lakes of Québec-Labrador (i.e., esker, moraines, gullies, lateral banks, turbidity channels and circular cavities) are inherited from their past subglacial, glaciomarine and paraglacial conditions, while only small deltaic bedforms (i.e., sediment waves and crescent-shaped bedforms) were formed in postglacial times. The present-day hydrological regime of fjord-lakes of Québec-Labrador is considered river-driven, except for the lakes located near active seismic zones where widespread postglacial mass-movements are documented.