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A Late Weichselian and Holocene stratigraphy for Spitsbergen fjords

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High-resolution seismic data (Sparker, Boomer and 3.5 kHz penetration echo sounder) show characteristic reflection patterns in the fjords and bays of the Isfjorden area, the largest fjord system on Spitsbergen. They have, therefore, been used to establish a general stratigraphy for Late Weichselian and Holocene deposits in Spitsbergen fjords.
Seven seismostratigraphic units (S1 to S7) are distinguished. Subglacial deposits from the last glacial, but probably also deposits predating the last glacial, comprise unit S1. Unit S2 is composed of glacier-frontal deposits, reflecting halts and readvances during the deglaciation between c. 14,100 and 11,200 cal. years BP (calendar years before the present). Single and multiple sediment wedges comprising unit S3 reflect sediment reworking during the deglaciation. Unit S4 includes glacimarine sediments that reflect frequent changes in the physical environment (sub-unit S4a), as well as more stable physical environments with occasional ice rafting (sub-unit S4b) during the deglaciation. A period of enhanced ice rafting terminated the last glacial. Relatively homogenous sediments were deposited in a glacimarine environment with reduced ice rafting between c. 11,200 and c. 9000 cal. years BP (unit S5). More heterogeneous deposits comprising unit S6 are related to increased ice rafting during the last c. 9000 years. Unit S7 contains sediments and landforms that were deposited during and after glacier advances related to the Little Ice Age cooling and to surges.
Since the reflection patterns in the study area, as well as in other Spitsbergen fjords, are very similar, the proposed stratigraphy provides a useful tool to identify sedimentary environments, as well as to establish chronologies for single fjords from the last glacial until the present.