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Glacial sedimentary processes and depositional environments in fjord systems – evidence from Nordfjord, western Norway

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Fjords situated in past, or present, glacial regimes represent important repositories between land masses (source systems) and the open oceans (sink systems). Newly collected TOPAS high-resolution seismic profiles from the previously glaciated Nordfjord system, on the west coast of Norway, now reveal sedimentary processes and depositional environments within fjords in more detail than before. The seismic data show that the sediment basins within Nordfjord are characterised by a well-laminated lower unit that is overlain by acoustic transparent lensoidal bodies. We infer the lower unit, which is up to 350 m thick and locally contain small-offset faults, to be composed of glacimarine/plumite-like sediments. The transparent bodies represent slide debrites, having volumes between 0.010 km^3 and 0.25 km^3. We note that the slide debrites constitute as much as 10% of the total sediment volume within the fjord. The Nordfjord basin sediments were deposited as the ice retreated from the coast at c. 12.7 ^{14}C ka BP during the last deglaciation of Norwegian margin. The Nordfjord system was then ice free for a short time period, before the Younger Dryas readvance at 11-10 ^{14}C ka BP occupied the inner part of the fjord. The identified slide bodies are suggested to be related to failure episodes associated with rapid isostatic adjustments accompanying the withdrawal of the Younger Dryas ice sheet. This implies that the lower glacimarine/plumite-like unit within Nordfjord has been deposited in only 1500-2000 years. Thus, the filling of the fjord basin was rapid, and sediment rates as high as 25 cm/yr might have existed. The following isostatic rebound promoted con-

ditions for failures, allowing slide debrites to cap the well-laminated lower unit within the entire fjord system.