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Late Weichselian paleoenvironment in the area of the Vestfjorden paleo-ice stream, north Norway

J.S. Laberg, R. Eilertsen, G. Salomonsen, T.O. Vorren

Department of Geology, University of Tromsø, N-9037 Tromsø, Norway (jan.laberg@ig.uit.no / Fax: +47 776 45600)

Located in a fjord – shelf transitional setting Vestfjorden is an out-fjord widening basin bounded by the Lofoten Island chain and the mainland coastline. Over-deepening in the inner part and outside the mainland coastline is of a glacial origin. Using high-resolution seismic data, gravity cores and multi-beam bathymetry images the paleo-environment including the late Weichselian paleo-ice stream fluctuations and its chronology was studied. The fjord sediment distribution is characterised by: 1) An up to 300 m thick succession of acoustically laminated sediments within the innermost part of the fjord inferred to be of glacimarine and marine origin, 2) South-westward (out fjord) prograding acoustically transparent to chaotic sediments dominating in the central fjord basin, 3) South-eastward progradation of glacigenic(?) sediments from the Lofoten Island into the Vestfjorden basin that resulted in the formation of a shallow platform, 4) Truncated acoustically transparent units along the outer, western side of the fjord suggested to represent older, partly eroded till units. Across the fjord in this area is the Røst moraine, a morainal bank which morphology and composition indicates formation by an episode of ice push during the fjord deglaciation, and 5) An upper acoustically transparent units of glacimarine and marine sediments within the deepest part of the fjord basin. Topographically controlled ice drainage during the last glacial maximum routed fast flowing parts of the Fennoscandian ice sheet to advance from the north-east and east through Vestfjorden, one of the largest drainage routes for the Fennoscandian ice sheet. Sediments in the innermost part of the fjord and in tributary fjords were eroded and deposited further out as part of the progradational till unit. The pattern of ice drainage controlled the location of the erosional – depositional zone. The age of the sediment progradation outside the Lofoten Island

is not known, we speculate that it is of early deglacial age. In the outermost part of Vestfjorden the sediment thickness is reduced, possibly due to higher flow speed due to the ice supply from the east causing increased basal erosion. Ice withdrawal from the glacial maximum position at the shelf break occurred from about 15 ^{14}C ka BP. During the deglaciation of Vestfjorden, a major readvance caused the formation of the Røst morainal bank at or immediately after 13.7 ^{14}C ka BP followed by further ice recession and ocean current controlled glacimarine and marine sedimentation.