

Sedimentation patterns and sediment composition in a Norwegian glacial lake during a large magnitude flood

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Abstract In 1979 a large magnitude flood on the southeast side of the Jostedalsbreen ice-cap in western Norway created distinct sediment layers in glacial Lake Nigardsvatn. This paper examines sediment transport and deposition in a glacial meltwater river in 1979, 1993 and 2002, and the downstream variation in thickness of sediment deposits in Lake Nigardsvatn. The thickest deposit was observed next to the delta front and a more rapid downstream decrease occurred during the 1979 event. Particle-size analysis indicated that the 1979 and 2002 sediment layers contained more coarse fractions ($>31\ \mu\text{m}$) than the 1993 layer. During 1979, coarser sediment was deposited closest to the delta compared to the 1993 and 2002 events. The occurrence of rainfall induced floods during the summer of 2011 led to the highest water discharge and suspended sediment load on record. The observed conditions were comparable to that of higher magnitude floods.

Key words sedimentation; glacial lake; suspended sediment loads; varve thickness; large magnitude flood; grain size distribution