



Developing a Holocene storm record for lakes in the Southern Alps, New Zealand

Sean Fitzsimons (1) and Jamie Howarth (2)

(1) Department of Geography, University of Otago, P.O. Box 56, Dunedin, New Zealand, (2) GNS Science, P O Box 30368, Lower Hutt, New Zealand

Modelling the likely impacts of climate change on the hydrological cycle has led numerous researchers to suggest that change is likely to be characterised by significant modification of the magnitude and frequency of extreme events. However, understanding the characteristics of extreme hydrological events requires records of the magnitude and frequency of events on centennial and millennial timescales, which are not available from instrumental records of climate and river flow. Recent research has shown that abyssal lake sediments have the potential to yield continuous records of floods in the form of turbidites that record the delivery of coarse-grained sediments into lakes during energetic river flows. In this paper we describe the development of a flood stratigraphy for South Lake Mavora, a small (1.23 km²) moraine and outwash sediment-dammed lake in western Southland. The sediments of the lake were sampled using a Mackereth corer capable of retrieving continuous cores 50mm in diameter and up to 6m long. Two 6m-long cores were retrieved from the deepest part of basins and seven 1m-long cores adjacent to the longer cores and in a transect from the deepest part of the basin to a fan-delta on the western side of the lake. The age model for the sediments is based on 28 ¹⁴C dates from a single core. The lake sediments are predominantly planar-bedded hemipelagic fine and medium silts with individual layers between <1mm and 300mm thick. The hemipelagic sediments are interrupted by three types of rapidly-deposited layers (RDL's). Type 1 RDL's are beds of deformed lacustrine sediment which we interpret as the products of subaqueous mass movements. Type 2 RDL's are 2-200mm-thick beds of normally graded coarse to medium silt capped by thin fine silt layers. They overlie type 1 RDL's and are interpreted as turbidity currents generated by the underlying subaqueous mass movements. Type 3 RDL's consist 1mm to 30mm-thick beds of very fine sandy silt that grade into fine silt which are interpreted as turbidites that represent floods from the Mararoa catchment. The record of fluvially-derived turbidity currents provides a Holocene record of storminess in the southern South Island.