



Mass movement deposits in Lake El'gygytgyn largely controlled by glacial-interglacial cycles

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Lake El'gygytgyn is a bowl-shaped lake of 12 km diameter and 170 m water depth located in Chukotka, NE Siberia (1). It was formed 3.6 million years ago by a meteorite impact (2). In 2000 and 2003, two pilot studies were carried out that included an extensive seismic survey. In 2009, the lake was drilled within the framework of the International Continental scientific Drilling Program (ICDP), and a 320 m long sedimentary sequence was recovered (1).

From the 3.5 kHz sediment echosounder pilot-study data it was known that the lake is prone to frequent mass movement events (3), and a detailed study of the sediment core revealed 5 different types of mass movement deposits (MMD): Turbidites, grain flow deposits, debrites, slumps, and slides (4). Some of these MMDs have co-genetic origin, e.g. a debris flow may trigger a turbidity current, resulting in a frequent succession of turbidites on top of debrites.

This current study focuses on the sediment echosounder data. All MMDs visible in the echosounder profiles were mapped and assigned to the corresponding marine isotope stage (MIS) using the age model of the deep drilling core (5) down to a maximum depth of 0.26 s two-way traveltime (corresponding to MIS12). Frequency and accumulated volumes of the individual MMDs within each MIS were calculated. Both frequency and volumes are strikingly elevated during interglacials compared to glacials. Approximately 3.5 times more material was mobilized as MMDs during interglacials. All in all, this points at a paleoclimate mechanism such as lake-level change with subsequent slope destabilization as the trigger mechanism for MMDs rather than e.g. seismic shaking.

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