

## **Sedimentary fill record and sequence stratigraphic architecture of Flathead Lake, Montana**

By

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The purpose of this study is to analyze the sequence stratigraphic architecture of Flathead Lake, a large (510 km<sup>2</sup>) open lake that occupies a major, actively-deforming half-graben in western Montana. During the most recent glaciation, Flathead Lake was located at the ice margin of the Cordilleran Ice-Sheet and its early fill record was profoundly affected by glacial processes. Following glacial retreat, Flathead Lake evolved into the open oligotrophic lake system present today. Because of this history, Flathead Lake is an ideal natural laboratory to investigate the control of glacial dynamics, lake level, sediment fluxes, and tectonics on basin fill history, using a sequence stratigraphic approach coupled with non-genetic sequence stratigraphic interpretation. This is important work because, in contrast to continental margin settings, controls on sequence stratigraphic architecture are not well understood for lake settings and are particularly poorly understood for glacial lakes.

Initial studies of unpublished 3.5 kHz reflection seismic data show widespread deposition of acoustically-stratified, mostly undisturbed Pleistocene glacial lake sediment. The largely undisturbed nature of this Pleistocene sediment suggests that glacial grounding did not occur across most of the lake basin during the last glacial maxima and that much of this sediment record was likely deposited by sub-glacial lacustrine processes. In contrast to the Pleistocene record, Holocene sediments record progradation of the Flathead River delta into the lake; Holocene architectures appear to be controlled mainly by changes in lake level that are broadly analogous to those that control "classic" marine sequence stratigraphic architectures.