

12-10 - PALEOENVIRONMENTAL DYNAMICS OF GRAND TETON NATIONAL PARK (WYOMING) DEDUCED FROM CHIRP SEISMIC REFLECTION AND SEDIMENT CORES FROM JACKSON LAKE



Sunday, 15 October 2023



10:40 AM - 10:55 AM



324 (3, David L Lawrence Convention Center)

Abstract

Jackson Lake is the largest of the piedmont lakes located in Grand Teton National Park (Wyoming), and its position adjacent to the Teton fault provides an unparalleled opportunity to investigate the tectonic and hydroclimatic history of the region. Here, we present a Holocene paleoenvironmental reconstruction and lake level curve for Jackson Lake using new shallow water sedimentary records from Moran Bay. High-resolution CHIRP seismic reflection profiles convey a complex depositional history and evidence of fault motion. Seismic images of stacked prograding clinoforms were interpreted as paleo-deltas, and used to create a new lake level curve by mapping the position of the topset-foreset rollover. A long (~13.8 m) piston core was retrieved from the low-amplitude basin fill of Moran Bay's depocenter, an unique acoustic facies that makes up the youngest depositional unit. Radiocarbon ages indicate that the core chronology spans ~10,400 cal yr BP to 2021 CE. Prior to ~10,280 cal yr BP, CHIRP seismic profiles indicate considerable disturbances to Moran Bay sediments, including faults, slumps, and asymmetric folds. Two mass transport deposits were identified in the core, and these appear to align temporally with major ruptures along the Teton Fault that have been identified in trench studies. Long-term trends in core physical properties and carbon geochemistry (wt. % TOC) correlate to major regional climatic changes. Early Holocene (~10,400 – ~6,600 cal yr BP) sediments are rich in clay, and show high variability in density, magnetic susceptibility and TOC. Transitioning to the mid-Holocene (6,600 – 2700 cal yr BP), core sediments are increasingly silty and sandy, with low variability in physical properties and TOC. The Late Holocene produced a sharp increase in accumulation rates, sand-sized detritus and TOC. Deposition in Moran Bay illustrates the interplay between climatic and tectonic processes and their influence of shallow lacustrine depositional patterns, and the lake level curve provides new evidence for Jackson Lake's water balance during the deglacial period.

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