109-14 - ATTEMPTING TO CLOSE THE SEISMIC GAP ALONG THE TETON FAULT THROUGH CHIRP MAPPING OF POTENTIAL SEISMITES IN JACKSON LAKE, WYOMING, USA

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605 (Colorado Convention Center)

Abstract

The Teton Range represents the uplifted footwall of the active Teton fault. Despite being an active and potentially dangerous fault, our understanding of the recent (<15 ka) fault slip history remains incomplete. Along the eastern front of the range, active Teton fault scarps offset late Pleistocene glacial moraines by ~12 m. However, recent trench studies across these scarps have only identified slip events accounting for ~6.7 m of the total vertical displacement, leaving a slip or seismic “gap” of 4-5 m unresolved in the field. This “gap” in the seismic record may indicate that the Teton fault is potentially overdue for a catastrophic earthquake. To augment this record, we are using Jackson Lake sediments, which provide a more sensitive and potentially more complete record of earthquake processes than those preserved onshore. To do this, we collected multiple grids of high-resolution CHIRP seismic reflection data across Jackson Lake, which is used to develop a stratigraphic framework within which several groups of mass transport complexes (MTCs) representing potential seismites can be identified. Within this framework, we have mapped out all MTCs, which are distinguished from rhythmic lake sediments by their lobate plan view geometry and chaotic or reflection-free internal character. This analysis identified two intervals that preserve multiple MTC events, which we have interpreted as likely seismites that could be related to the two main earthquake events recognized in onshore trenching studies. Additionally, 10 horizons containing at least one MTC were also identified and may also be related to Teton fault seismicity. Upcoming long coring efforts in Jackson Lake will focus on establishing a lake-wide absolute chronology in the upper 50 m of lake strata. These ages can be tied to the seismic interpretation and mapped MTCs, thus allowing us to precisely date the timing of these units and determine if they are seismogenic. If seismites or seismogenic turbidity flows are dated at times when previous Teton fault earthquakes have not been recognized, these lake sediment records could substantially augment the more recent history of Teton fault slip.

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