

JACKSON LAKE GEOPHYSICAL SURVEY AND EARTHQUAKE MONITORING PROGRESS REPORT

Robert B. Smith
Department of Geology and Geophysics
University of Utah
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Introduction

An integrated geophysical investigation of Jackson Lake was conducted during the summer of 1974 by the University of Utah and the University of Wisconsin-Milwaukee as part of the NSF's sponsored Intermountain Lakes Project. The primary research tool was a 24-foot research vessel specially designed for inland lakes geophysical surveys.

Seismic Reflection

During a period of five days in late June 1974, 120 km of air-gun and high-resolution reflection data were obtained on Jackson Lake. Maximum penetration achieved with a one-cubic-inch air gun was approximately 800m; maximum penetration of the 6.4 khz high resolution system was approximately 30m. Preliminary interpretation of the reflection data indicates that the main lake basin is characterized by flat sediments which conform to an 800m pre-lake sedimentary fill. No evidence of faulting could be detected along the Teton fault and suggests that it is presently inactive. Basement structure appears to underlay the sediments unconformably and shows a westward dip.

Seismic Refraction

Three seismic refraction profiles on Jackson Lake were obtained in July 1974, using a 40-cubic-inch air gun and sono buoys. The profiles range in length from 3, 7, and 9km and represent a coarse sampling of the lake's subsurface velocity structure. Preliminary interpretation shows the presence of a basement refracting horizon in addition to the lake bottom. These data will be used to obtain gross structure of the basement Paleozoic and volcanic rocks.

Total Field Magnetism

A digitally recording total field magnetometer was operated during reflection profiling, providing 60km of densely recorded magnetic profiles. These profiles are being analyzed at the University of Wisconsin-Milwaukee.

Piston Coring

Twenty piston cores, ranging in length from 2 to 5m, were obtained in late

June 1974. The cores are under examination at the University of Utah for lithology and geochemistry. In addition, paleomagnetic logs of inclination, intensity, and declination will be determined from selected cores. It is expected that these logs will provide accurate sedimentation rates and longevity of Jackson Lake as a sedimentary basin.

Microearthquake Data

Two reconnaissance microearthquake surveys were conducted in the Jackson Hole-Gros Ventre area during the summer and fall of 1974. The first array was located to permit sensitive seismic monitoring of the Teton fault and operated for 25 consecutive days. This four-station array centered on Jackson Lake. The southeast station was placed near the Gros Ventre slide to investigate local seismicity indicated by historical reports. Thirteen well-located events were recorded. Only two were located near the Teton fault and corroborate the inactive state of this major fault. Other epicenters were located in the Mt. Leidy Highlands approximately 30km east of the Teton range and just north of Gros Ventre slide area.

A second four-station array was established in the fall of 1974 to further investigate the seismicity of the Mt. Leidy Highlands. Over a recording period of seven usable days, 22 events were located on a north-south trend near the Teton-Fremont county line, approximately 40km east of the Teton fault. It is felt that these preliminary surveys point to an easterly migration of seismic activity away from the Teton fault at the northern end of Teton County. An apparent correlation between seismicity and hazards of the Gros Ventre slide area warrants additional detailed work. Seismicity in the central and southern portion of the Teton fault zone was not monitored.