

Near-Surface Geophysical Imaging Using Seismic and Radar Methods

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Abstract

Seismic refraction and ground-penetrating radar (GPR) methods were used to study active faults in the San Francisco Bay area and a relict shoreline deposit in Death Valley. The Bay Area sites are located along the Hayward and Green Valley faults. The Hayward fault site is located at Tyson's Lagoon, a sag pond between two strands of the fault. Both seismic and GPR data indicate a near-horizontal interface 7-9 m deep that apparently coincides with the Holocene-Pleistocene boundary. Seismic velocity increases from 300-1000 m/s in the overlying material to 1700-1800 m/s beneath. At the Green Valley site, the fault location is constrained on the basis of seismic velocities, and channel features 5-10 m wide are imaged using GPR.

The Beatty Junction Shoreline Deposit in Death Valley National Park is a beach barrier bar approximately 500 m long, 50 m wide, and 5 m high, that corresponds to a relict shoreline of the former Lake Manly. A seismic refraction line was recorded along the crest of the bar, and used to map the interface between the base of the bar sediments and the underlying fan deposits. GPR profiles image the internal structure of the barrier bar, showing that the crest of the bar migrated in a shoreward direction as the upper portion of the bar was deposited during a transgression.

Biography

Mitchell Craig is Assistant Professor in the Department of Geological Sciences at California State University, East Bay (formerly Hayward), where he has been since 2002. He received a Ph. D. in Geophysics from Georgia Institute of Technology in 1990, worked for Chevron for 9 years as a geophysicist and computer system analyst, and was Senior Lecturer in the Department of Geological Sciences at the University of Papua New Guinea for 3 years.