SHALLOW SEISMIC REFLECTION ANALYSIS OF THE SOUTHERN DEATH VALLEY FAULT ZONE, SOUTHERN CALIFORNIA

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ABSTRACT

Positive flower structures are potential hydrocarbon traps associated with strike-slip tectonic environments, but there is still much that is unknown about how they form, particularly with regard to the fault and fold kinematics. This project focuses on a small, active positive flower structure forming in the Southern Death Valley Fault Zone (SDVFZ) that comprises the Noble Hills in Southern California. Preliminary mapping from high-resolution images will be confirmed by geologic and geomorphic mapping in the field. Fieldwork consists of surveying faulted landforms and measuring structural attitude data, such as the orientation of folded sedimentary beds and faulted landforms. Additionally, samples are collected for terrestrial cosmogenic nuclide geochronology to determine fault slip rates. A significant component of the fieldwork was the acquisition of a 1,100-meter shallow seismic reflection profile. The seismic profile cuts across the Noble Hills, showing the subsurface orientation of the faults that form the positive flower structure. The seismic profile and the observed surface features will be combined to create a 3-D structural model that links major faults within the flower structure. The goal of this project is to gain a better understanding of the tectonic history of the SDVFZ by combining traditional field mapping techniques with a shallow seismic reflection profile. This analysis will provide useful information about the kinematics and evolution of this flower structure that can be applied to larger flower structures to help determine their petroleum potential.

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