

Project Abstract

In an effort to measure the Holocene slip rate of the San Andreas fault, we have continued field mapping and have conducted trenching at an offset channel in the East Highlands Ranch area of Highland. An abandoned channel of Plunge Creek is preserved on the southwestern (downstream) side of the fault. It is a remnant from a time when the channel flowed parallel to the fault in order to connect two channel segments that had been offset by slip on the San Andreas fault. The fault-parallel channel segment was abandoned when the channel re-incised straight across the fault. Since that time, the newly incised channel wall has also been offset by the San Andreas fault. On the northeast (upstream) side of the fault there are two major gravel-fill terraces preserved within the canyon of Plunge Creek. The channel wall that truncates the fault-parallel segment of the abandoned channel most likely correlates with the riser between the high and low terraces northeast of the fault. A preliminary estimate of the right-lateral offset of this feature is about 307 meters.

Several trenches on the high and low terraces were excavated in November and December of 2004 for the purpose of collecting dateable material to constrain the age of the offset terrace riser. Fourteen charcoal samples have been submitted for radiocarbon dating and fifteen samples were collected for optically stimulated luminescence dating were collected. Samples for cosmogenic nuclide surface exposure dating were also collected from boulders on the high and low terraces. The pending dates and a more refined measurement of the offset will allow us to estimate the Holocene slip rate along this part of the San Andreas fault.

The San Andreas and San Jacinto faults are the dominant faults within the plate boundary fault system in southern California. Together they accommodate about 70% of the Pacific-North America plate motion. However, there has been considerable debate as to whether the San Andreas fault contributes substantially more to the plate boundary deformation in southern California than the San Jacinto fault, whether the two faults contribute approximately equally or even whether the San Jacinto fault contributes more. The Holocene slip rate of the San Andreas fault, in Cajon Pass is well-documented at 24.5 ± 3.5 mm/yr (Weldon and Sieh, 1985). However, some investigators suggest that the San Andreas fault slip rate decreases southeastward along the San Bernardino strand, as more and more slip is accommodated by the San Jacinto fault (Matti and others, 1992; Morton and Matti, 1993). Our work on measuring the Holocene slip rate of the San Andreas fault in Highland is aimed at testing this hypothesis.