A Geophysical Investigation of the Offshore Portion of the Northern Segment of the San Andreas Fault on a “green research vessel”

Details

Meeting	2011 Fall Meeting
Section	Tectonophysics
Session	New Constraints on Active Fault Zones I Posters
Identifier	T31B-2346
Authors	Beeson, J W*, COAS, Oregon State University, Corvallis, OR, USA Goldfinger, C, COAS, Oregon State University, Corvallis, OR, USA Johnson, S Y, USGS, Santa Cruz, CA, USA Wakefield, W W, NOAA, Newport, OR, USA Clarke, M E, NOAA, Newport, OR, USA
Index Terms	Transform faults [7250] Continental tectonics: strike-slip and transform [8111] Plate motions: general [8155] Plate motions: present and recent [8158]

Abstract

Between Sept. and Oct., 2009 we collected 572 km2 of high resolution multibeam bathymetric data and ~592 km of single channel mini-sparker seismic reflection data aboard the R/V Derek M. Baylis. These surveys were conducted between Ft. Bragg, CA and Shelter Cove, CA in an effort to study the offshore section of the Northern San Andreas Fault (NSAF). We have combined multibeam data collected during this cruise with data collected by the California Seafloor Mapping Program to compile high resolution imagery of the entire offshore section of the NSAF. Seismic profiles were collected perpendicular to the fault at 1 km intervals. Two full length profiles were collected parallel to the NSAF. These data have allowed us to map, with high precision, the upper crustal features of the NSAF, and other features in the area. We have also used recently released industry collected multi-channel seismic reflection profiles, contributed by WesternGeco, available through the USGS. These profiles were collected at 10 km spacing and reach subsurface depths of ~5km, allowing for investigation of deep structural features. We observed, using bathymetric and seismic data, that the NSAF moves offshore at ~340° at Point Arena. At the head of Noyo Canyon, near Ft. Bragg, the NSAF takes a ~6° bend to the east, creating an extensional basin. The NSAF passes through Noyo Canyon which has been offset and captured by the main trace of the fault. As the NSAF bends at Noyo Canyon and moves

north it is observed bending back ~10° to the west near Tolo Bank. Tolo Bank is likely an uplifted block due to the left bend in the right lateral fault. North of Tolo Bank the NSAF comes ashore at Shelter Cove with no other major strike slip features observed to the west. Other interesting features observed are compressional folding and thrust faults striking northwest from, and terminating at, the NSAF. It appears that these are active structures but the amount of slip that is partitioned to these smaller faults is yet unclear. The principle stress axis of the folding/faulting west of the NSAF is consistent with deformation and uplift observed southwest of the Mendocino triple junction Geophysical data collection, 20 days of multibeam and seismic survey, were conducted using the R/V Baylis, a 65’ sailing research vessel owned by Sealife Conservation Society, Santa Cruz, CA. In addition, the R/V Pacific Storm, an 86’ converted fishing vessel, was used for Autonomous Underwater Vehicle (AUV) dives to gather video imagery of the NSAF. It was not only our goal to study the offshore portion of the NSAF but it was an opportunity to conduct research in an efficient manner. During the entire cruise, mobilization, data collection and demobilization, fuel consumption was recorded. The Baylis averaged 1.6 gallons of fuel per hour (g/hr) while the Pacific Storm consumed 12.9 g/hr. Total fuel consumption for the entire cruise was ~4900 gallons (Baylis, 681 gal, Pacific Storm, 3096 gal). For comparison, a similar cruise conducted on an intermediate class ship, i.e. OSU’s Wecoma, would consume 30,000-40,000 gallons of fuel.

Cite as: Author(s) (2011), Title, Abstract T31B-2346 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.

Powered by LODSPeaKr