Mini-Proposals of PBO: GPS Network at Southern California Coast Ranges

Zheng-Kang Shen, David Jackson, UCLA; Ducan Agnew, SIO

The San Gregorio-Hosgri fault system runs offshore from Monterey Bay to Point Sal in California. Branches of the fault may cut through onshore, at Point Sur and San Simmon. It is important to map the deformation along the fault, not only for the regional seismic hazard assessment, but also for a complete accounting of the deformation field across the plate boundary in central California. Although geological studies once put the slip rate along the fault as high as ~8 mm/yr (Hall, 1981), results from space geodesy suggest that the slip rate is probably low. Argus and Gordon (unpublished manuscript) estimated ~5 mm/yr for the relative motion between the VLBI station velocities along the Coast Ranges and that at Hawaii. GPS results placed the rate at about a couple of mm/yr (SCEC Velocity Map release 2.0; Shen-tu et al., 1999; Figure 1). Shen and Jackson (1993) combined GPS data with historical triangulation in the Southern Coast Ranges region and estimated the slip along the fault as 1-4 mm/yr. More monitoring is needed in order to pin down the deformation rate more precisely.

We propose to set up GPS stations along the Southern Coast Ranges from Point Sur to Point Sal. If survey mode GPS is considered, we can establish 10 sites along the stretch, plus 2 small networks about 6 stations each, at the Point San Simmon and Point Sur. The small networks will be used to constrain the onshore deformation. If continuous GPS is considered the number of sites may be reduced to 6 for the stretch and 2 for each small network. Data from this coastal network will be combined with that from the IGS stations at Hawaii and other Pacific plate sites to pin down the deformation in between. Also, we may be able to pick up the wrench style elastic deformation onshore if the fault offshore is locked, subjected to the amplitude of the fault slip rate, distance between the fault and the network, and duration of the observations.

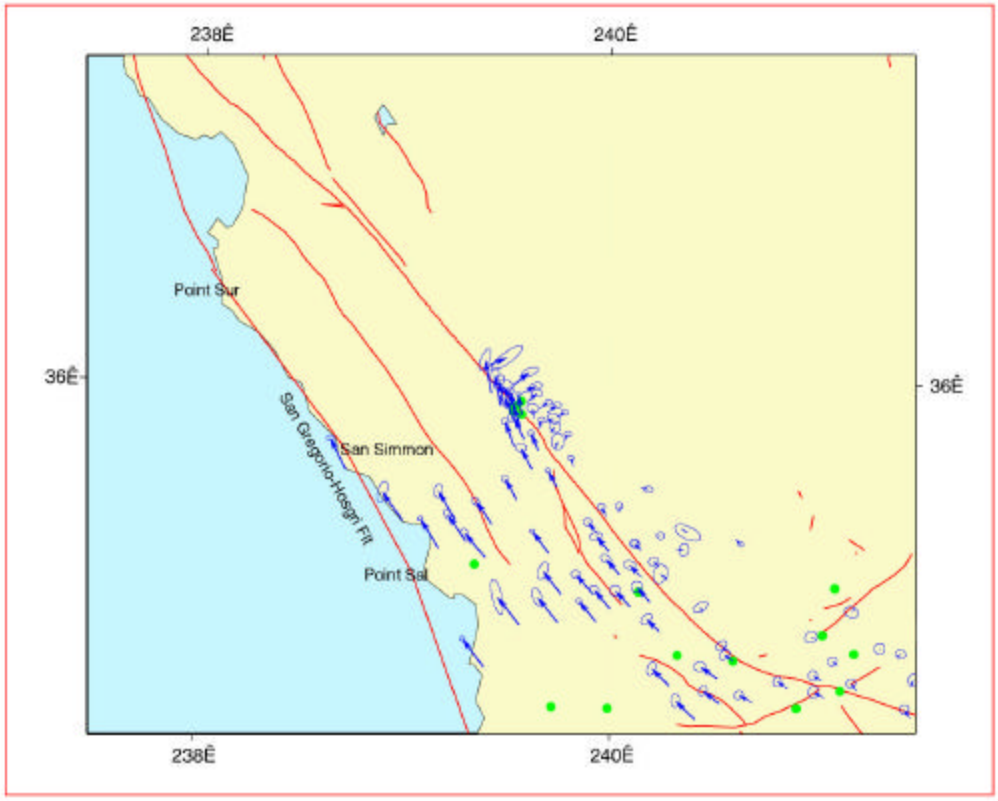

Fig. 1. Proposed area of study. Blue arrows are the horizontal velocities from the SCEC velocity map v2.0. Error ellipses are 95% confidence. The SCIGN stations are shown as green dots.

References

Feigl et al., J. Geophys. Res., 98, 21,677-21,712, 1993.
Hall, J. Geophys. Res., 86, 1015-1031, 1981.
Lisowski et al., J. Geophys. Res., 93, 8369-8389, 1991.
Shen et al., J. Geophys. Res., 101, 27,957-27,980, 1996.
Shen-tu et al., J. Geophys. Res., 104, 28,927-28,956, 1999.