Mino-Proposals of PBO: GPS Profiles across the Carrizo Section of the San Andreas

Zheng-Kang Shen and David Jackson, UCLA

Deformation around the Carrizo section of the San Andreas fault can be described by a simple wrench style dislocation (Lisowski et al., 1991). This pattern is demonstrated in the data of the SCEC Velocity Map 2.0 release (Figure 1 for the horizontal station velocities and Figure 2 for the velocity profile across the San Andreas). This deformation can be modeled by a thick skinned dislocation model of 34 mm/yr right slip beneath a 20 km locking depth (Ge, 1997). Based on the modeling of the data, one might think that deformation in the region had been clearly understood. However, the above conclusion is mainly derived from data collected west of the San Andreas fault. Although one could assume that deformation east of the fault is pretty much symmetric to the west, it has yet to be explored and verified. If the deformation east of the fault is not symmetric, we need to find out why: is it because of the material difference across the fault, tilt of the fault plane, fault zone offset at depth, influence of other faults in the region, and/or something else? We can also investigate whether there is a thrust component to the fault; e.g. how much the Collinga anticline and active thrust are extended to the south.

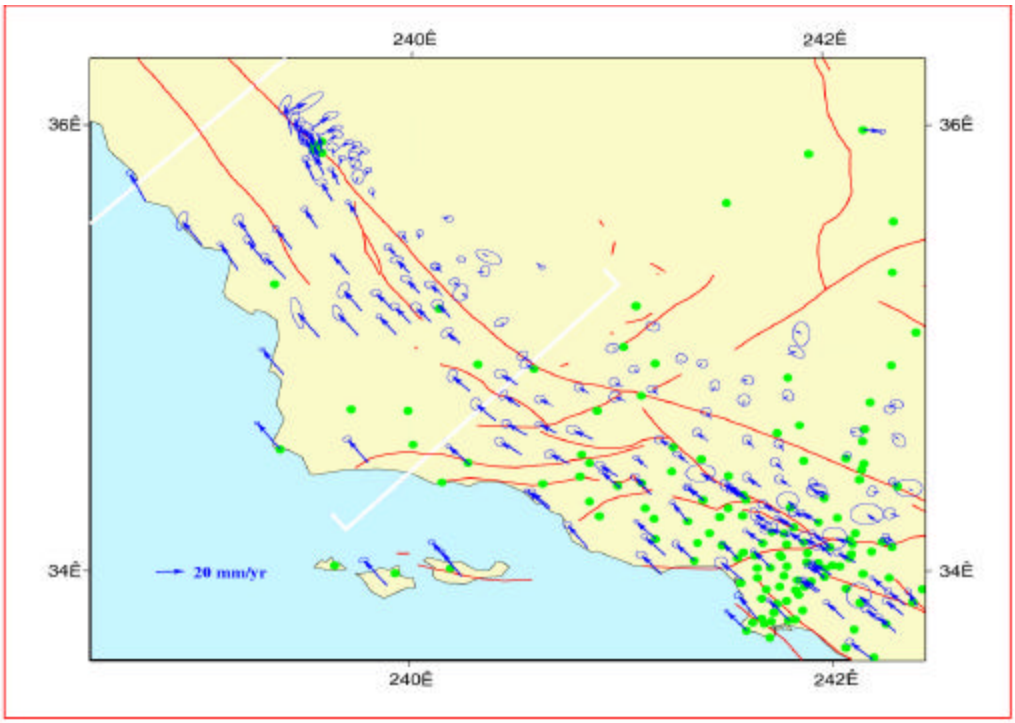

Fig. 1. Proposed area of study. Blue arrows are the horizontal velocities from the SCEC velocity map v2.0. Error ellipses are 95% confidence. White brackets delineate the sites whose velocities are shown in a profile across the San Andreas in Figure 2. The SCIGN stations are shown as green dots.

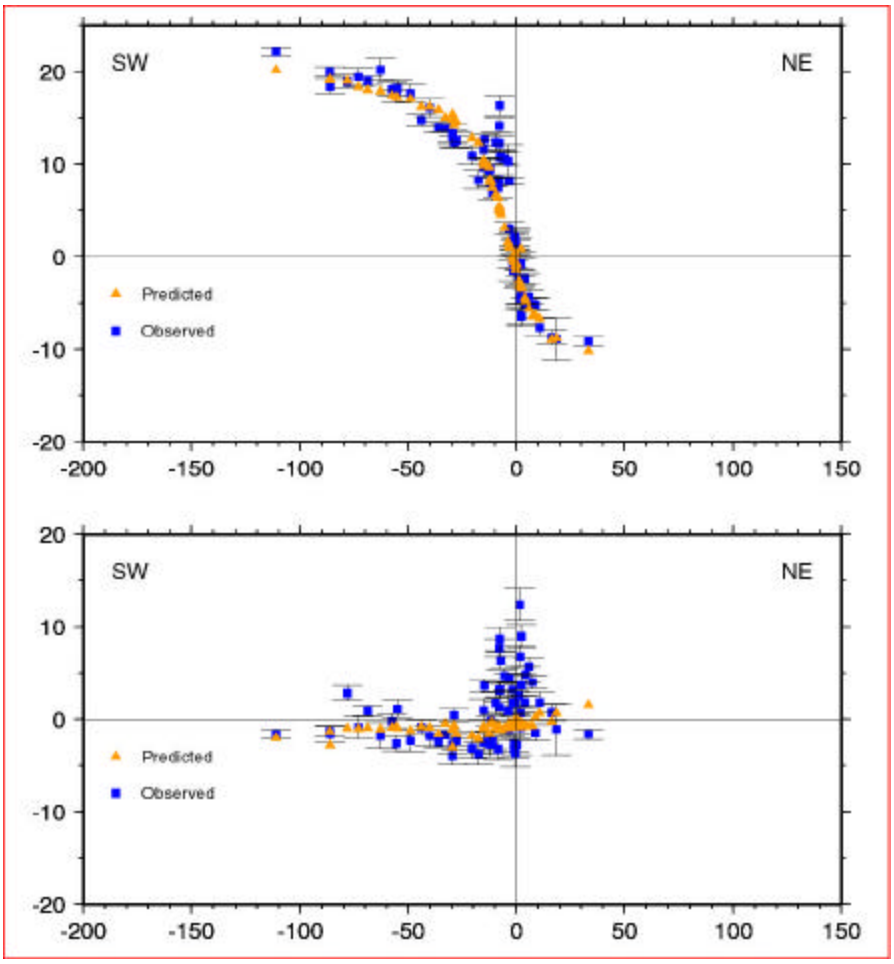

Fig. 2. Velocity profile across the Carrizo section of the San Andreas. Data are from the SCEC velocity map v2.0, for the stations located in the white brackets in Figure 1. Orange triangles are predictions from a block-fault model with 34 mm/yr slip beneath 20 km locking depth along the Carrizo section of the San Andreas (Shen and Jackson, 1999).

We propose establishment of two GPS profiles, each about 120 km long across the fault. One of the profiles crosses the McKittrick Summit at about 35.3ºN latitude and the other crosses the Bitterwater Road at about 35.6ºN latitude respectively. If survey mode GPS sites are considered, the station spacing along the two profiles should be about 3-5 km close to the fault, increased to about 10 km away from the faults. About 20 stations are needed for each of the profiles. On the other hand if continuous GPS sites are considered, the station spacing should be about doubled, and about 10 sites are needed for each of the profiles.

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