SUPPLEMENTAL FILE. DATA ANALYSIS AND RESULTS

A map showing the locations and geometries of individual subregions sampled for kinematic inversion of focal mechanisms is presented in Figure A1. The results of the bootstrap analyses for each subregion are presented in Tables A1 and A2. Table A1 provides results of new data analysis for this study (i.e., the polygons in Fig. A1). Table A2 includes results of a reanalysis of selected subregions (in Unruh and Hauksson, 2009), the majority of which are located east of our main study area (Fig. 1; see Unruh and Hauksson, 2009, for locations of the sampling areas in Table A2). The motivation for reanalyzing the previous data is that we (i.e., Unruh and Hauksson, 2009) did not perform bootstrap analyses and determine confidence limits for most of the solutions due to computing limitations. The data from Unruh and Hauksson (2009) have been reanalyzed to confirm the previous results, quantify uncertainties in the solution parameters, and provide a common basis to combine them with the results of this study.

To develop the map of principal strain rate trajectories in Figure 2, the horizontal projections of d_1 (maximum extension) and d_3 (maximum shortening) obtained from each of the inversions were plotted on a base map as close as possible to the centroid of the respective subregion containing the earthquakes used in the analysis. Smooth trajectories mapping regional trends of d_1 and d_3 across the entire study were drawn by hand parallel to the local orientations in each subregion.

Ideally, there should be a sufficient number of earthquakes in a given subregion to provide a well-constrained solution, which we have found from prior experience to be a minimum of about 30 events (see Twiss and Unruh, 1998, for discussion). Preferably, the earthquakes should be uniformly distributed within the area sampled, the focal mechanisms should include a variety of nodal plane orientations, and the data should sample a homogeneous deformation. However, we encountered difficulties in attempting to satisfy these criteria in the western Sierra Nevada and San Joaquin Valley, where seismicity is relatively sparse and not distributed uniformly (see Figs. 2D, 2E, 2N, 2O). In such cases it is necessary to define relative large subregions to obtain enough data for a well-constrained solution; however, the larger the area, the less likely that deformation within the corresponding crustal volume is homogeneous. To assess deformation homogeneity in the western Sierra Nevada and San Joaquin Valley while satisfying the need to obtain a sufficient number of data to invert, we defined multiple and locally overlapping subregions with different geometries, as shown in Figure A1. Each subregion has a four-letter label or tag, which is placed as close as possible to the middle or centroid of the subregion in Figure A1 to distinguish overlapping polygons. The inversion result for each subregion was compared and contrasted with that of adjacent subregions, specifically to determine whether the solutions varied significantly with the inclusion or exclusion of events from adjacent and overlapping subregions. In general, we found that the inversion results from large areas of the western Sierra foothills and eastern San Joaquin Valley did not vary significantly among the different sizes and geometries of the polygonal subregions used to sample the seismicity data (Fig. A1, Table A1). We interpret these results as evidence that the deformation geometry is uniform across these larger areas, as depicted by the strain trajectories in Figure 2.