Supplemental figure DR1. Initial Geotherms. Both the oceanic and continent sides of the model use the Turcotte and Schubert (2002) geotherm formulation (their equation 4-125) with surface temperature 0°C and temperature 1300°C at depth. A) The allowed range of oceanic geotherms for 40 +/-10 m.y. crust. 40 m.y. is the approximate age of the large igneous province upon collision with the California margin (Liu et al., 2010; Saleeby, 2003, Nakanishi et al., 1999). B) The allowed range of continental geotherms. Just prior to the emplacement of the schist, the region was part of an active continental arc. Thermal models of pluton emplacement in the Sierra Nevada batholith suggest average temperatures < 750˚ C at 30 km depth (Hanson and Barton, 1989). The San Gabriel Mountains contain a smaller volume of Mesozoic intrusions than the Sierra Nevada (Jennings, 1977), suggesting lower temperatures in the San Gabriel Mountains than the Sierra Nevada. We allowed initial temperature at 30 km to range between 450 and 700 °C. The shape of the geotherm above and below 30 km in the model follows Turcotte and Schubert's (2002) oceanic crust geotherm calculations.
Supplemental figure DR2. Heat Production. The distribution of heat producing elements is assumed to follow a profile proportional to the profile of Brady et al. (2006). The Brady et al. (2006) profile is based on geochemical analyses and geobarometry in the Sierra Nevada batholith, California. A spatially and temporally constant profile is assumed throughout the model, i.e. the distribution of heat producing elements is not linked to model kinematics and is the same in both oceanic and arc portions.
Supplemental figure DR3.1. Initial thermal profile of the model depicted in Fig. 4. Black crosses indicate position of upper plate tracked particles. The dotted line separates an initial oceanic geothermal gradient calculated following Turcotte and Schubert (2002) for (in this model run) 32.2 m.y. crust. The initial conditions for the right side of the model also use the Turcotte and Schubert (2002) geotherm formulation, in this model constrained to have a temperature at 30 km depth of 627°C (Table 1). The difference between the two geotherms in this model happens to be quite small.
Supplemental figure DR3.2. Thermal profile at time = 1 m.y. Black crosses indicate positions of tracked particles. Temperature on the right side of the model has slightly increased due to shear heating on the thrust (compare Figure S2.1 and S2.2).
Supplemental figure DR3.3. Thermal profile at time of accretion of schist at 200 m (top of recorded inverted gradient). Black crosses indicate position of tracked particles.
Supplemental figure DR3.4. Thermal profile at time of accretion of schist at 700 m (bottom of recorded inverted gradient). Black dots indicate position of tracked particles.
Supplemental figure DR3.5. Thermal profile after ~4 km accretion. Black dots indicate position of tracked particles.
Supplemental Figure DR4.1. Scatter plots of Sierra Pelona Neighborhood Algorithm input parameters. Each dot corresponds to a forward model run, with color indicating the misfit $\psi$ between observations and predictions. Abbreviations: trnch, trench; dclmnt, decollement; cnvrgnc, convergence; acr, accretion; T, temperature; prod, production. Control parameters in the inversion are robust against local minima (ns = nr = 200; Sambridge, 1999).
Supplemental Figure DR4.2. Scatter plots of East Fork Neighborhood Algorithm input parameters. Each dot corresponds to a forward model run, with color indicating the misfit $\psi$ between observations and predictions. Abbreviations: trnch, trench; dclmnt, decollement; cnvrgnc, convergence; acr, accretion; T, temperature; prod, production. Control parameters in the inversion are robust against local minima ($ns = nr = 200$; Sambridge, 1999).