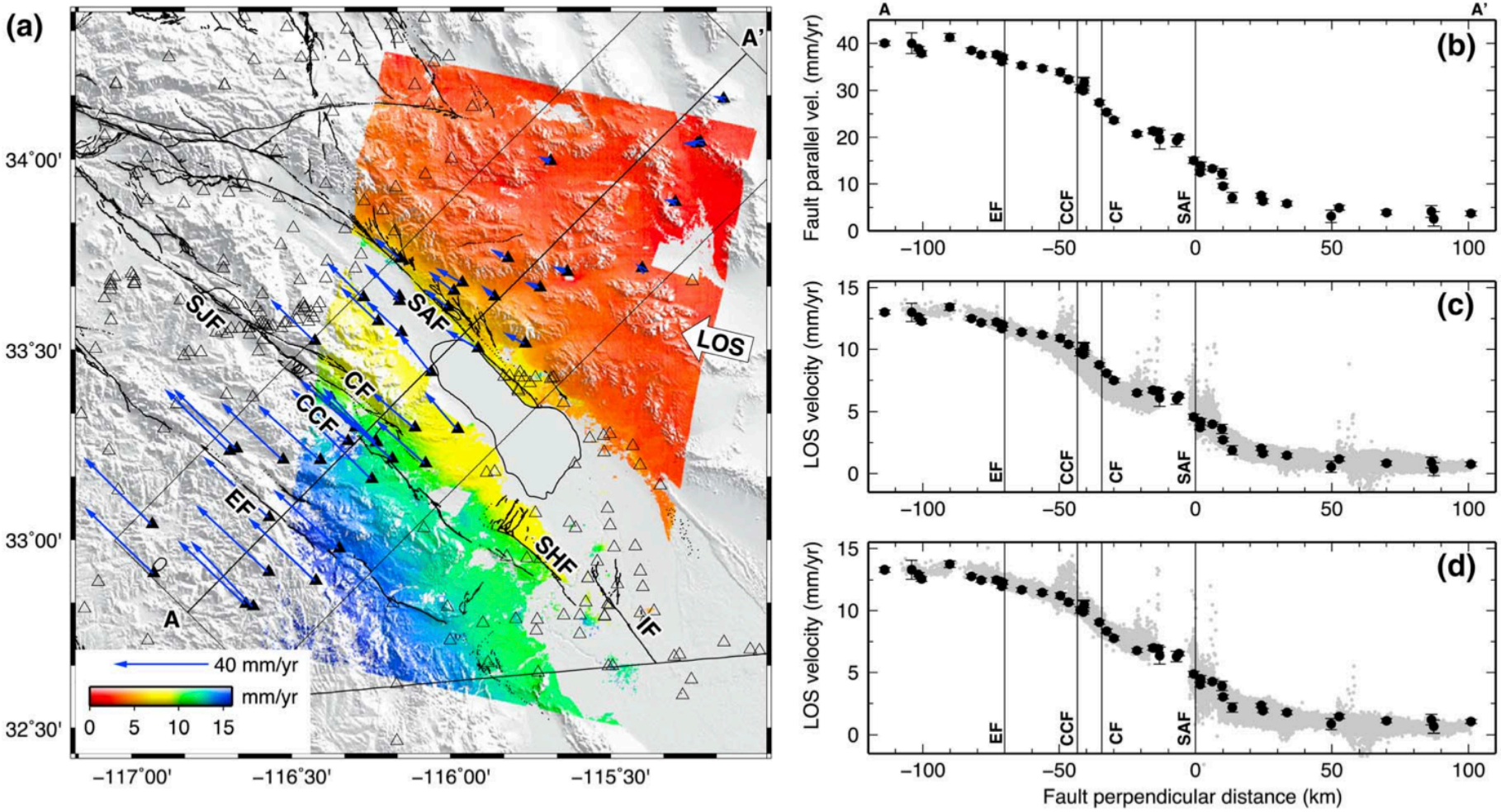
Interseismic velocities: InSAR/GPS integration

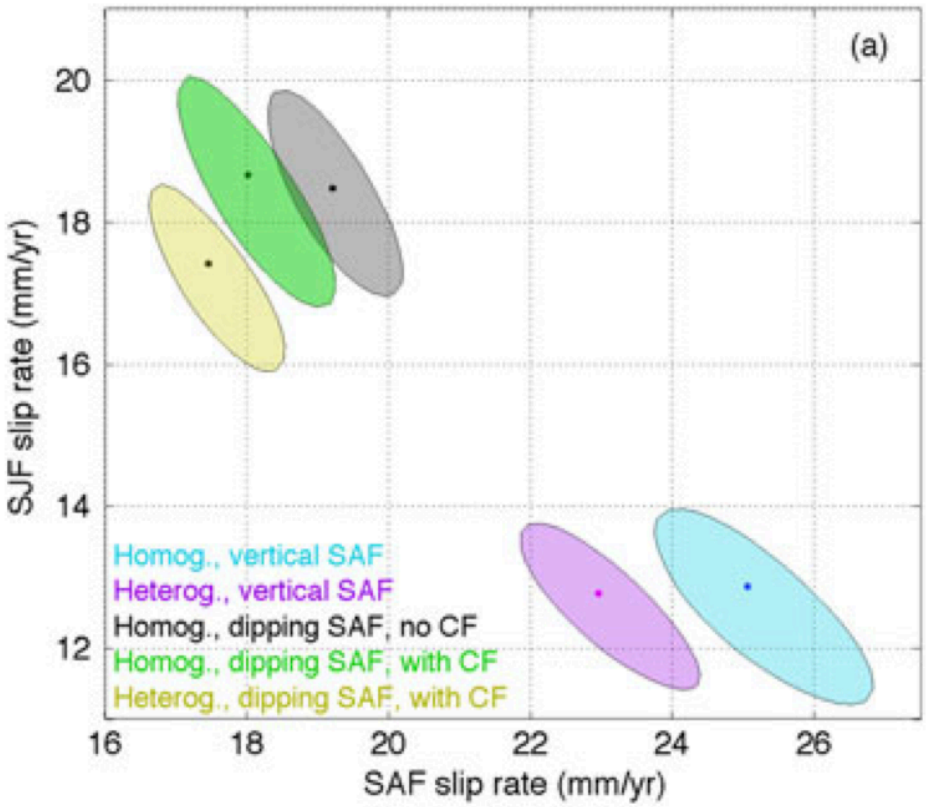


GPS: CMM4

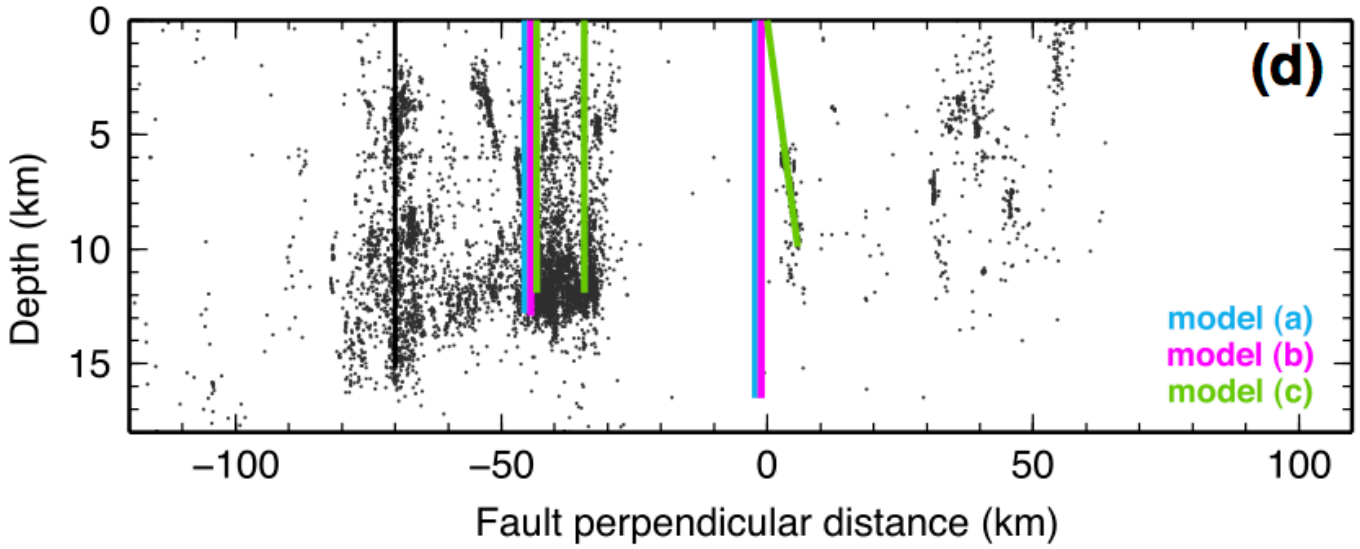
InSAR: Manzo et al., 2012

Lindsey and Fialko, 2013

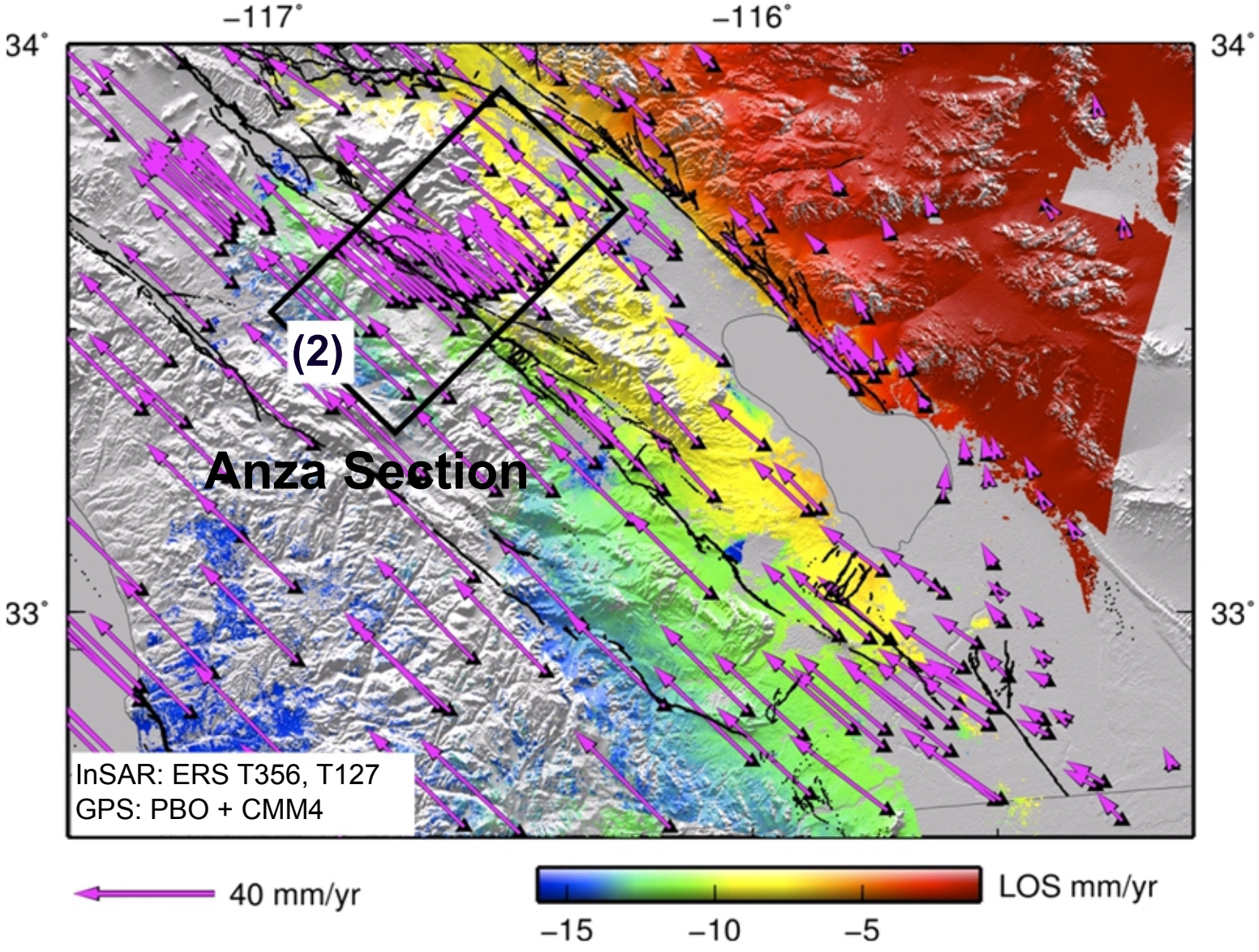
Effects of fault geometry on inferred slip rates

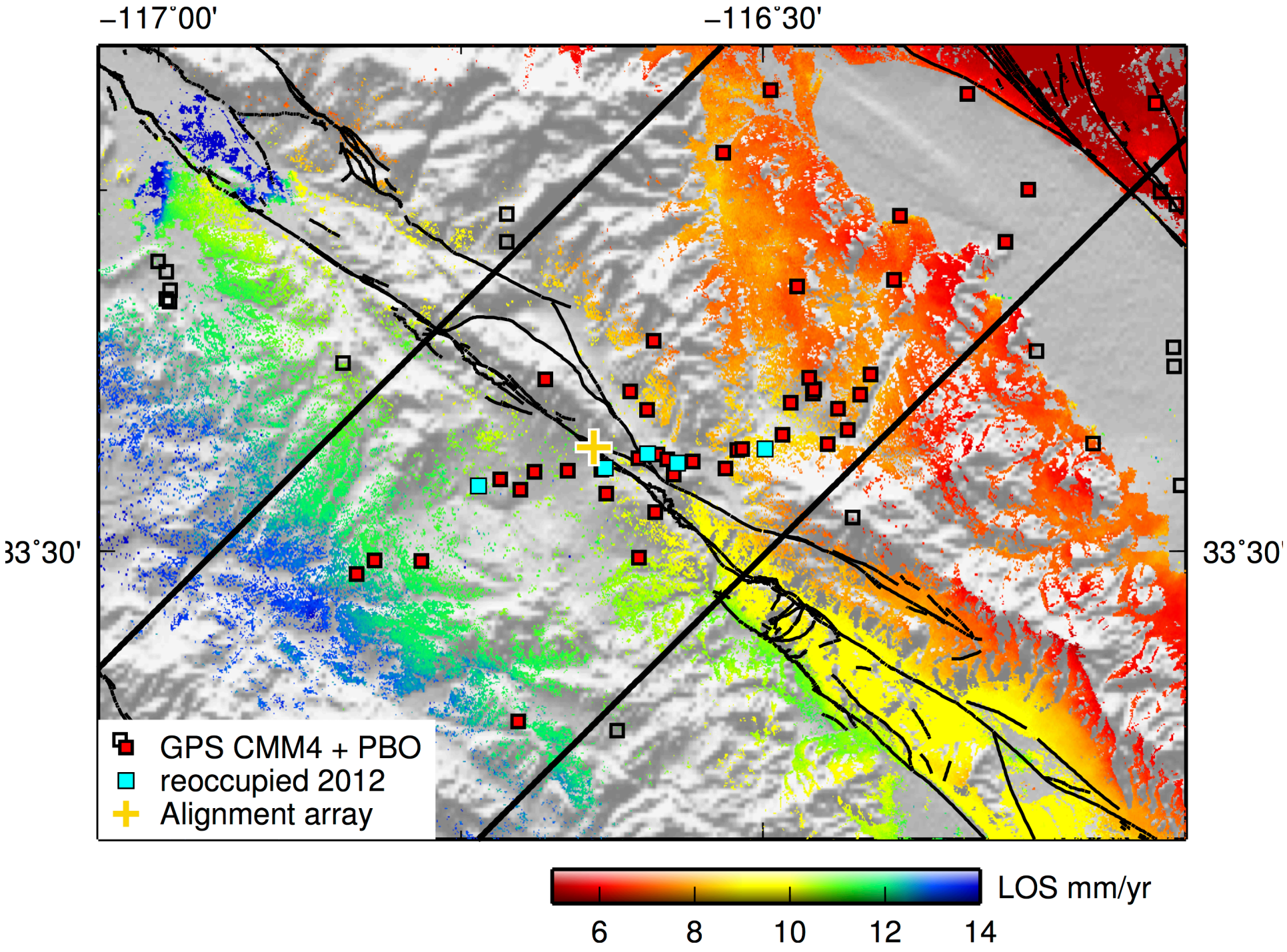


Lindsey and Fialko, 2013

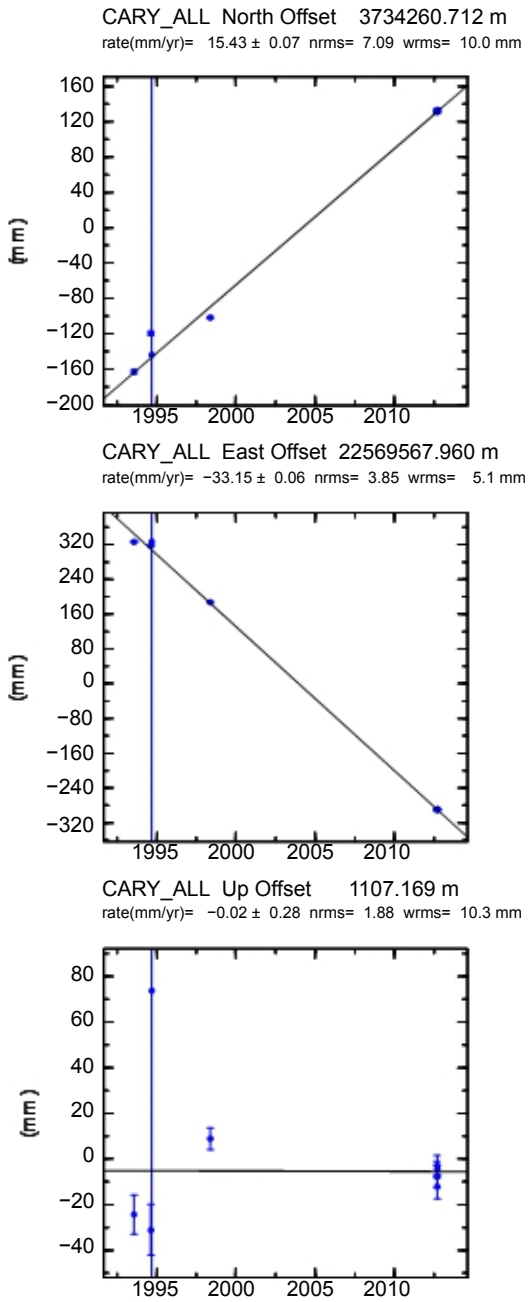


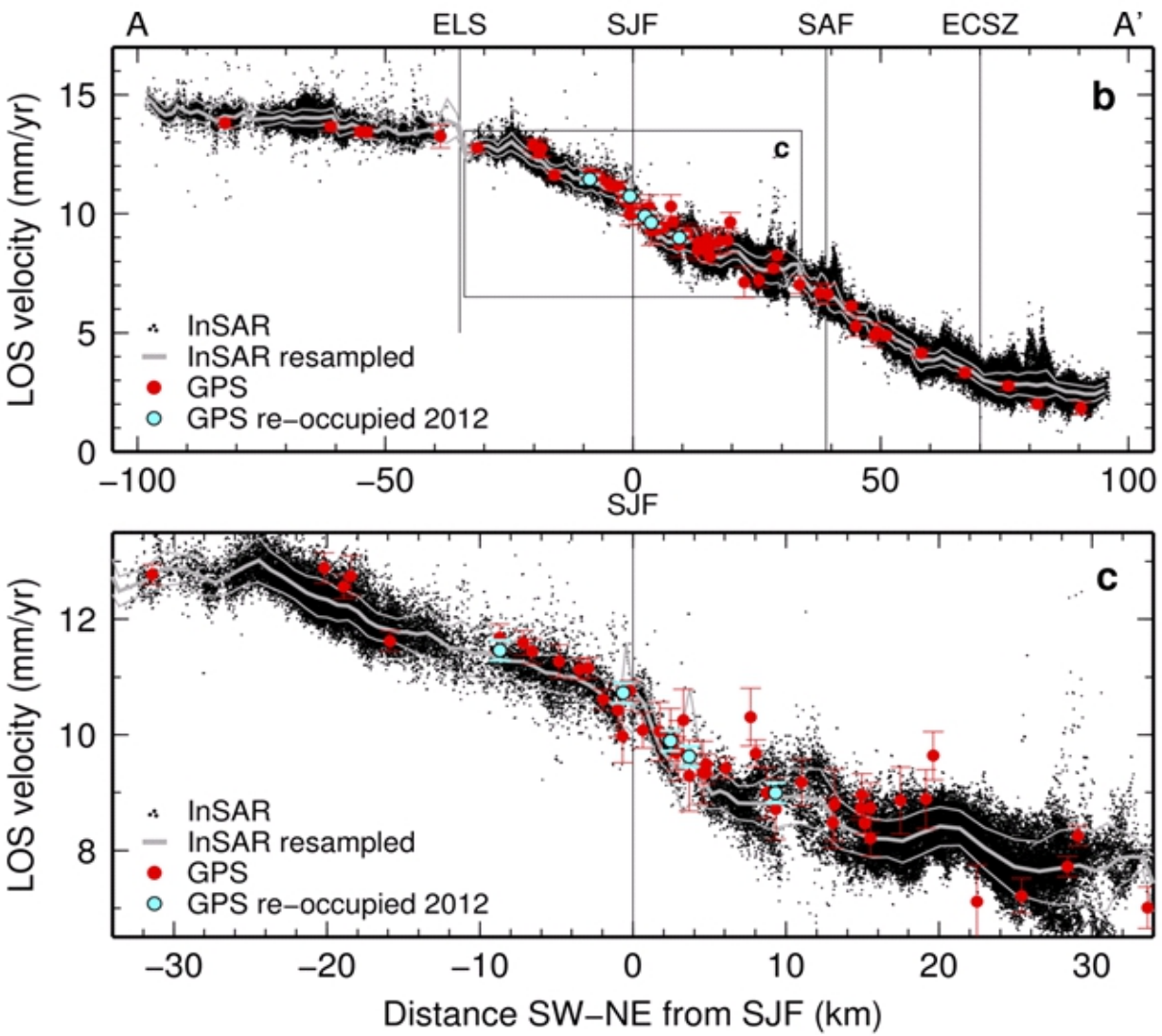
Hi-res data: Fault zone effects



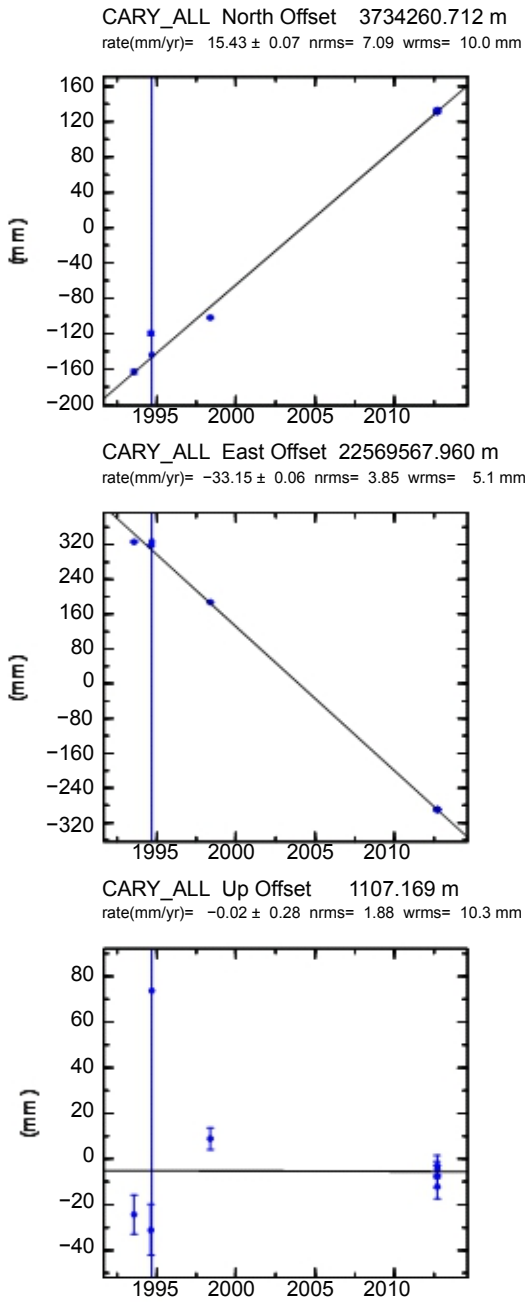

−117˚00'
−116˚30'
33˚30'
33˚30'
GPS CMM4 + PBO
reoccupied 2012
Alignment array
LOS mm/yr
6
8
10
12
14

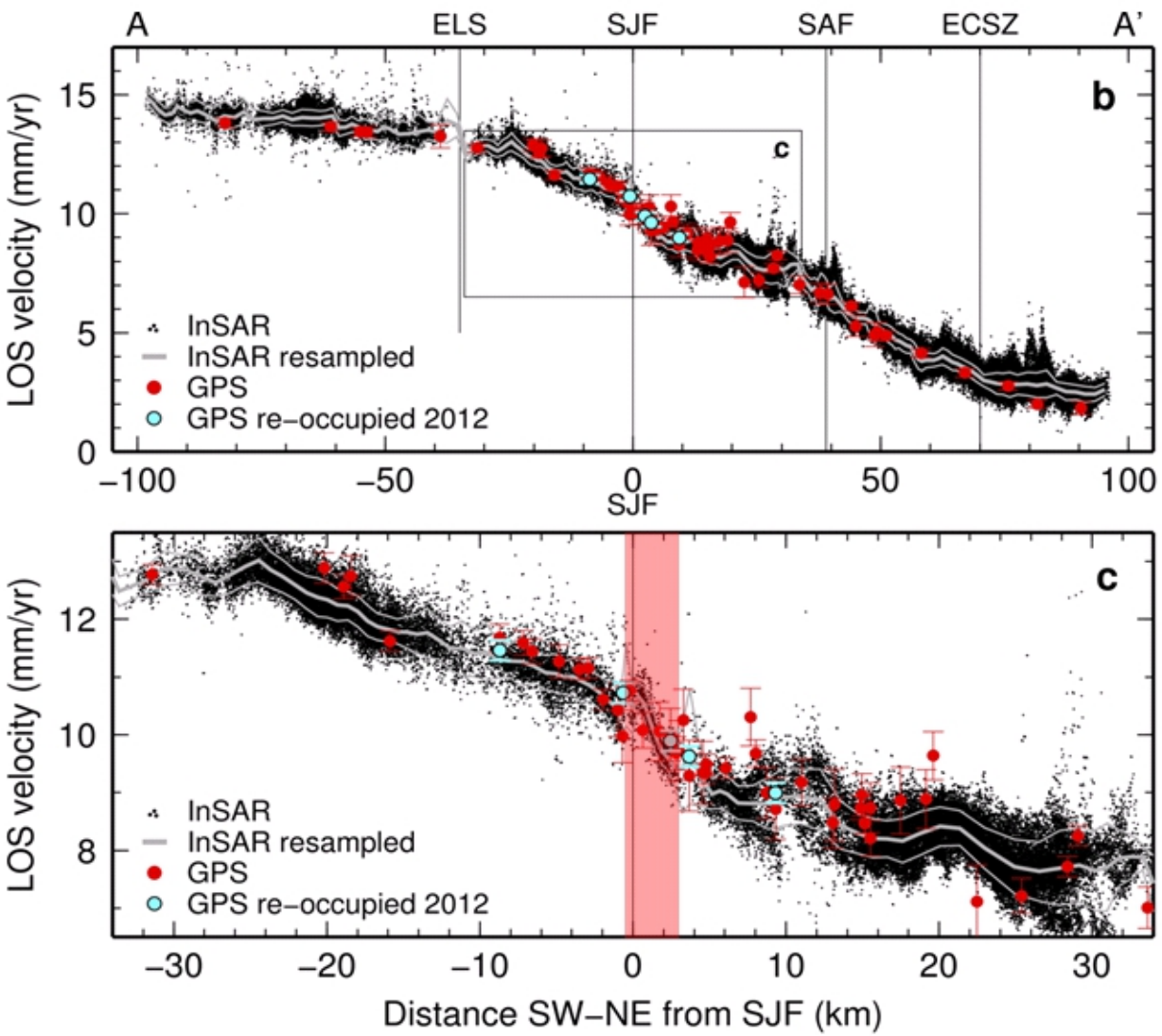
Data: San Jacinto



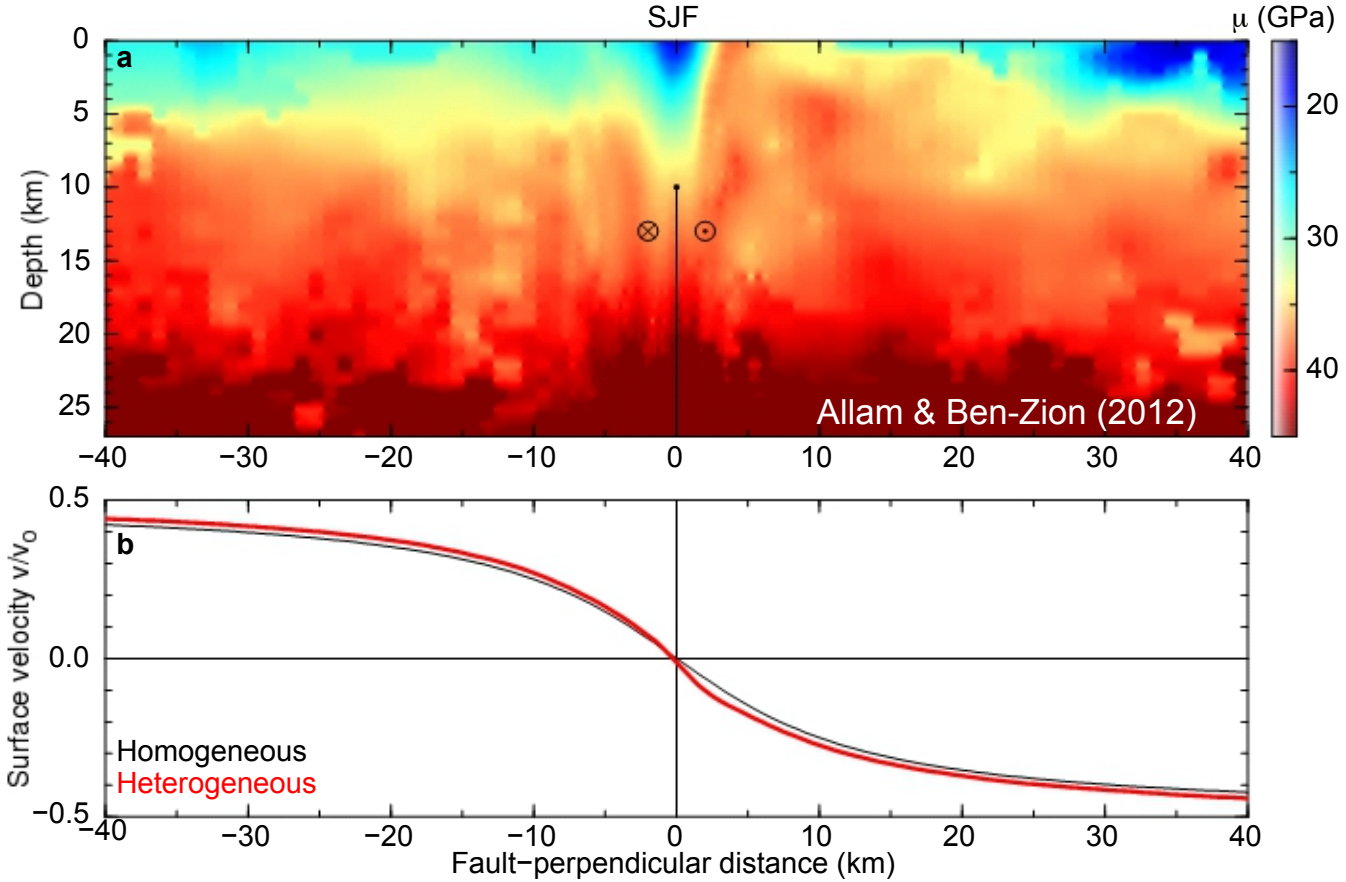


Data: San Jacinto



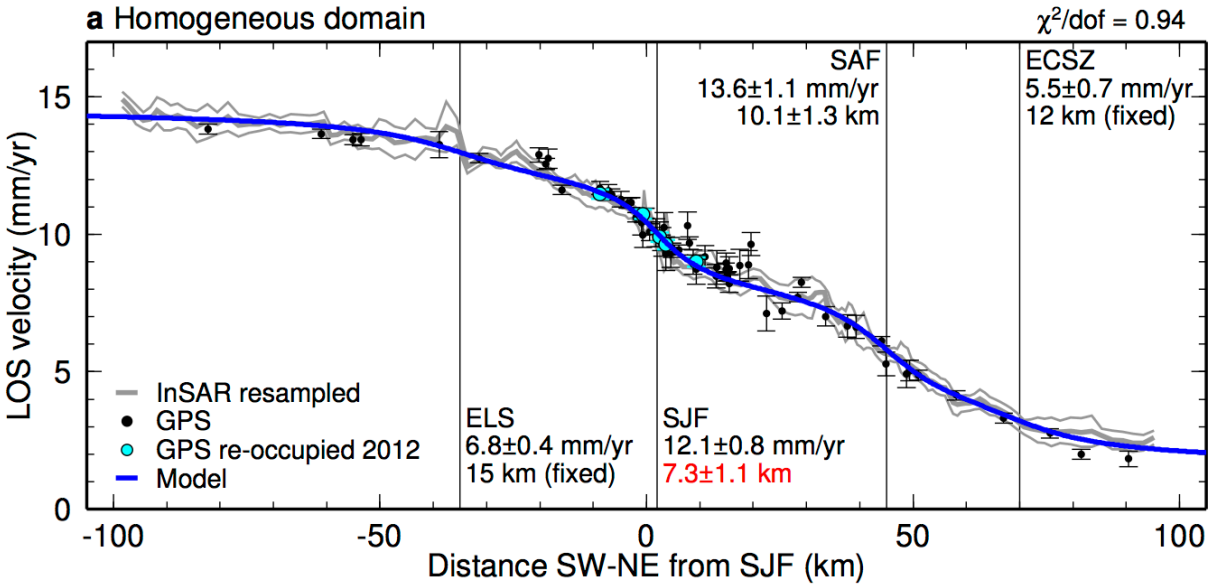


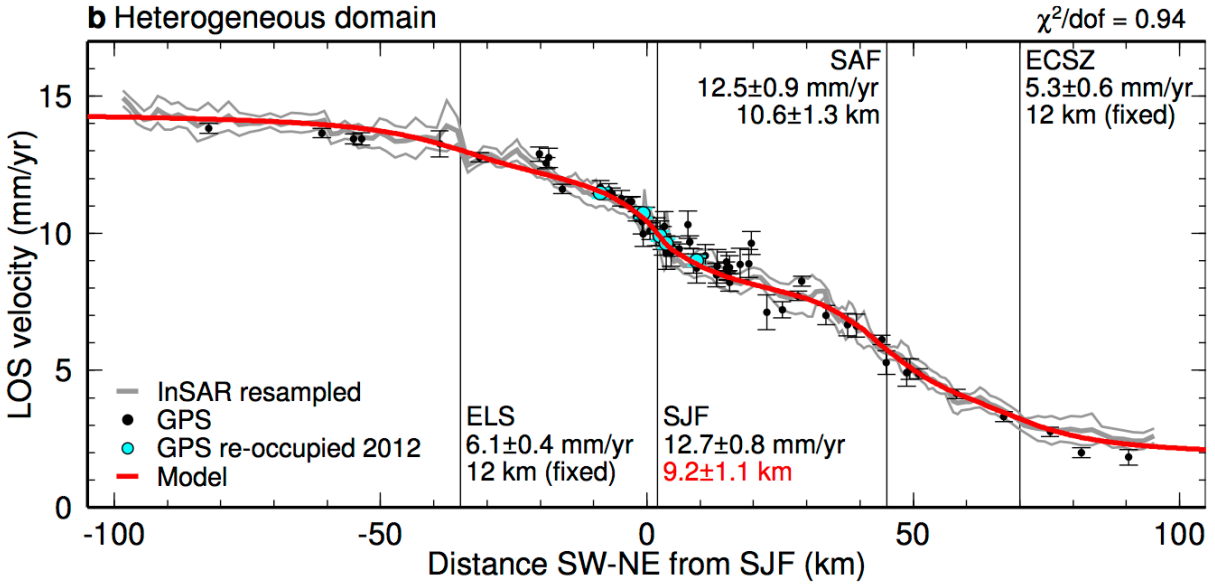
San Jacinto: compliant fault zone



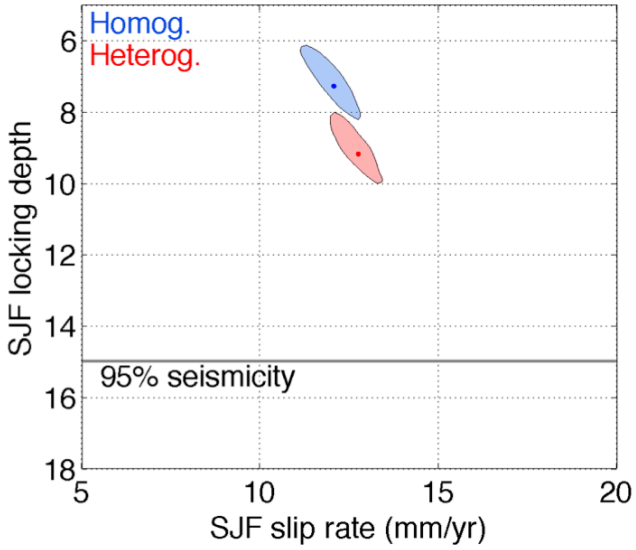
- Inferred modulus reduction 30 - 40% within 2km, smaller reductions may extend as deep as 10km
- Increases local strain rate by 40 - 50%

San Jacinto: compliant fault zone

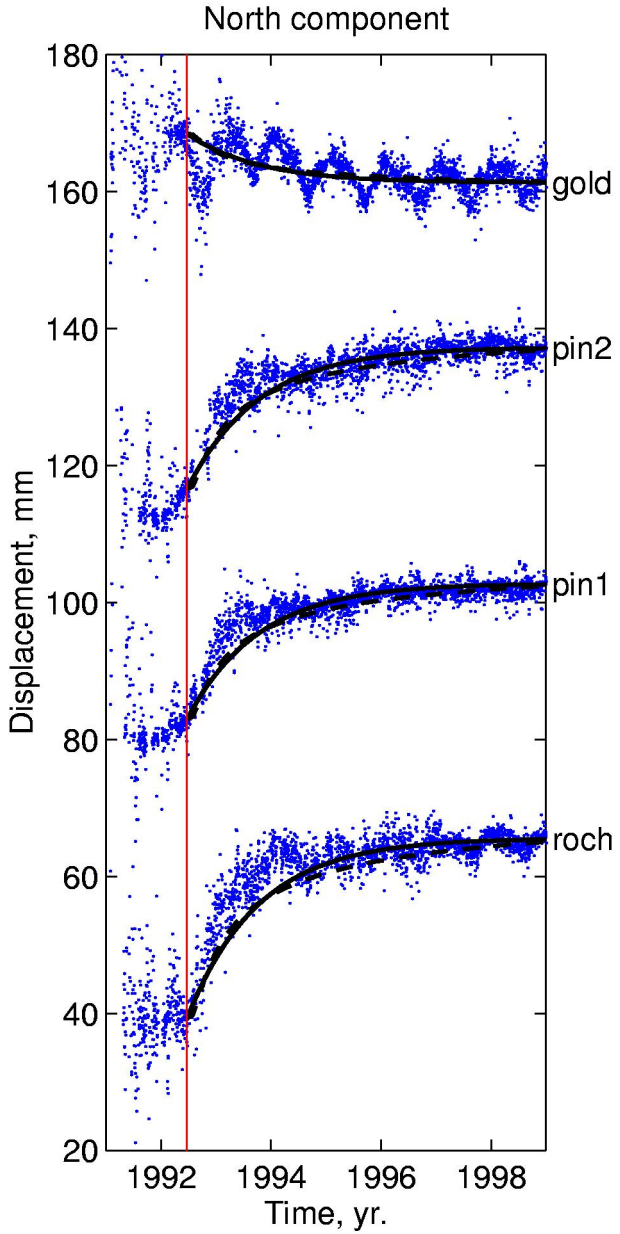




- Best-fitting locking depth increases from 7.3km to 9.2km
- Otherwise, small effect



Postseismic transients



Post-Landers CGPS data (Fialko, 2004)

-Rapid initial relaxation followed by a more gradual decay

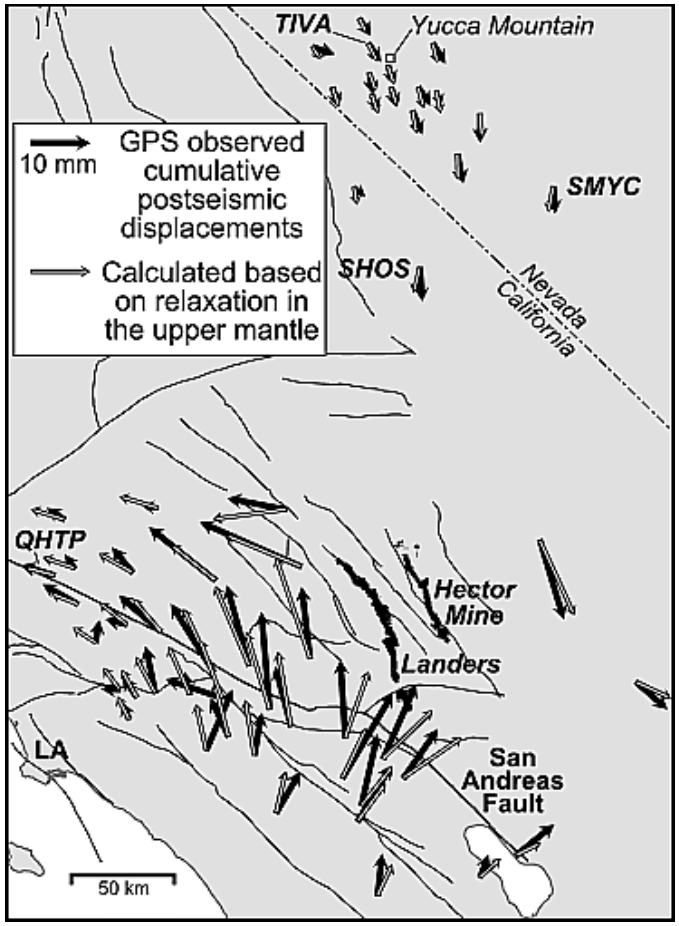
-Non-exponential (not consistent with linear Maxwell viscoelastic behavior)

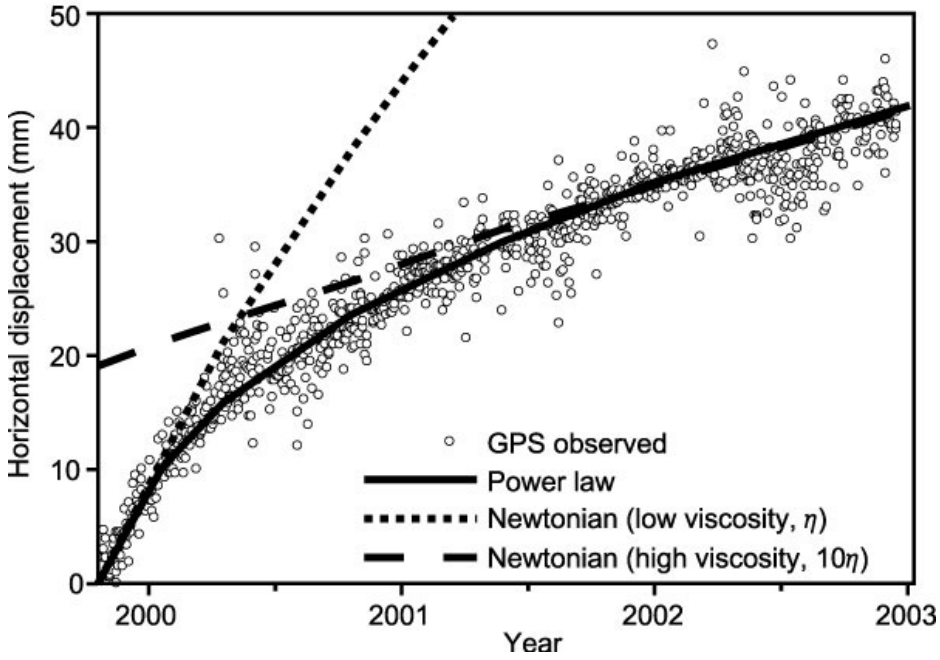
-Possible explanations:

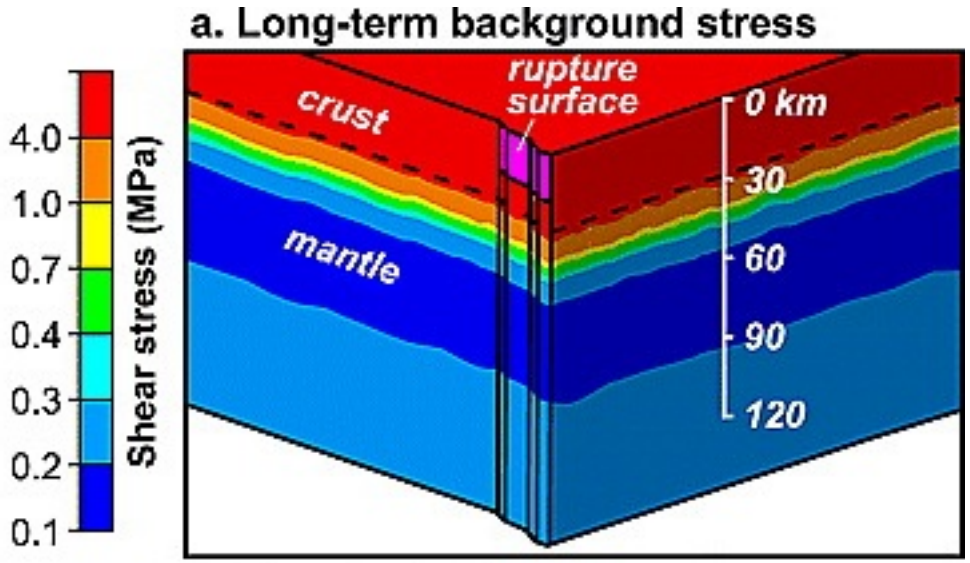
Bi- (or multi-) viscous rheology (Pollitz, 2005)

Power-law rheology (Freed and Burgmann, 2004)

Rate-and-state friction (or some other form of localized creep, e.g., Hearn et al., 2002; Perfettini and Avouac, 2005; Barbot et al., 2009)

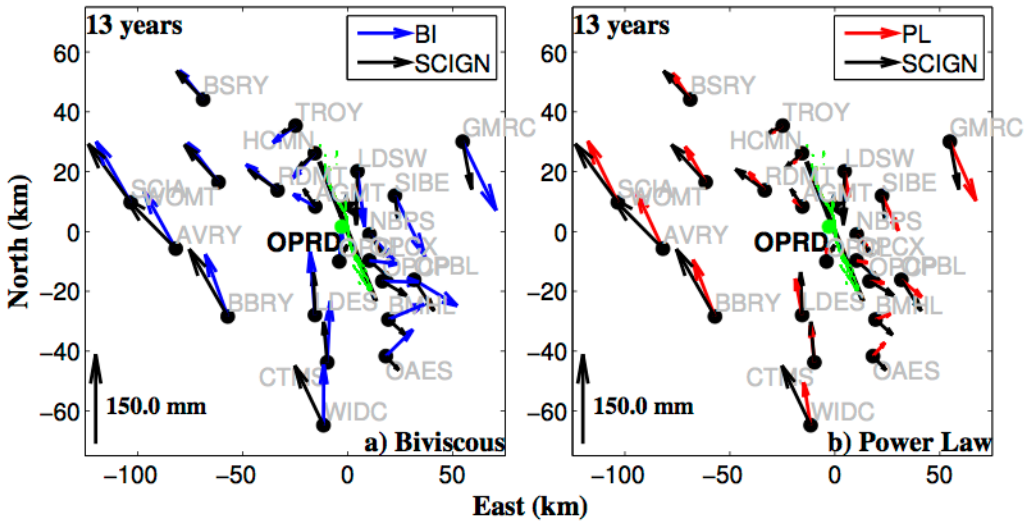


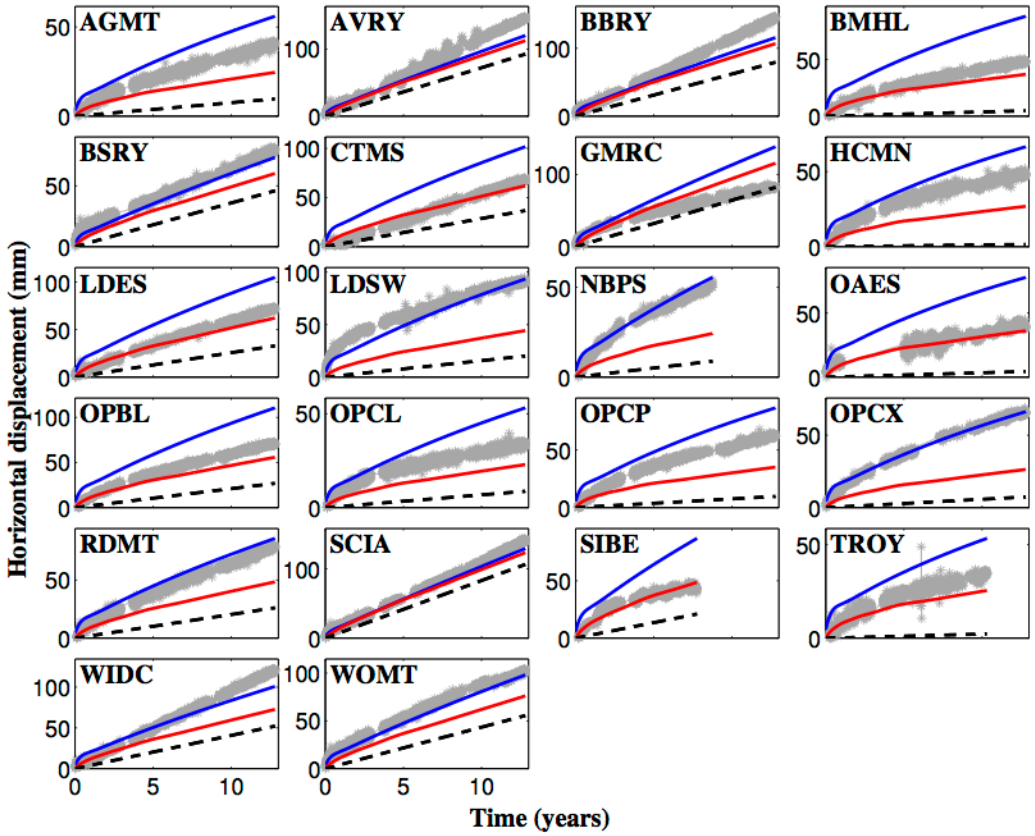




postseismic deformation (Mojave earthquakes)

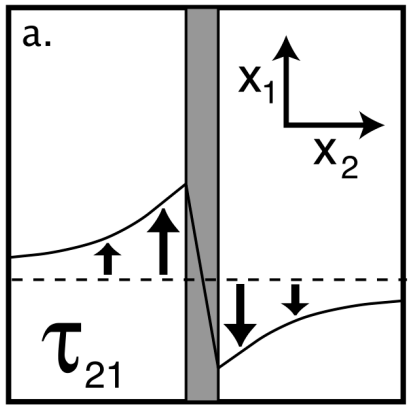
Freed et al., 2012

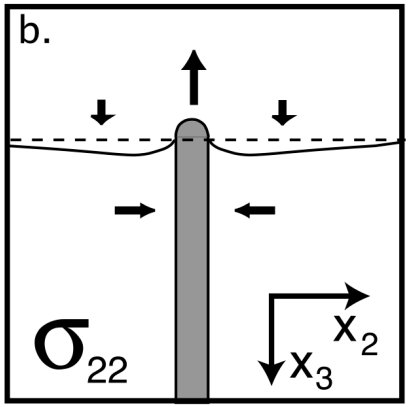


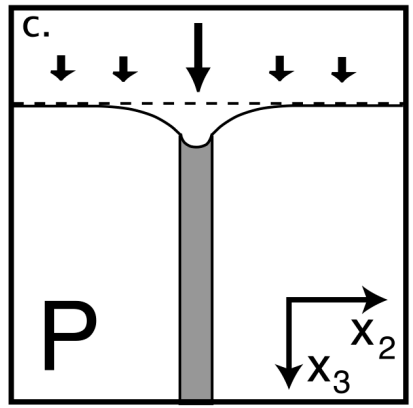


postseismic deformation (Mojave earthquakes)

Takeuchi and Fialko, subm.

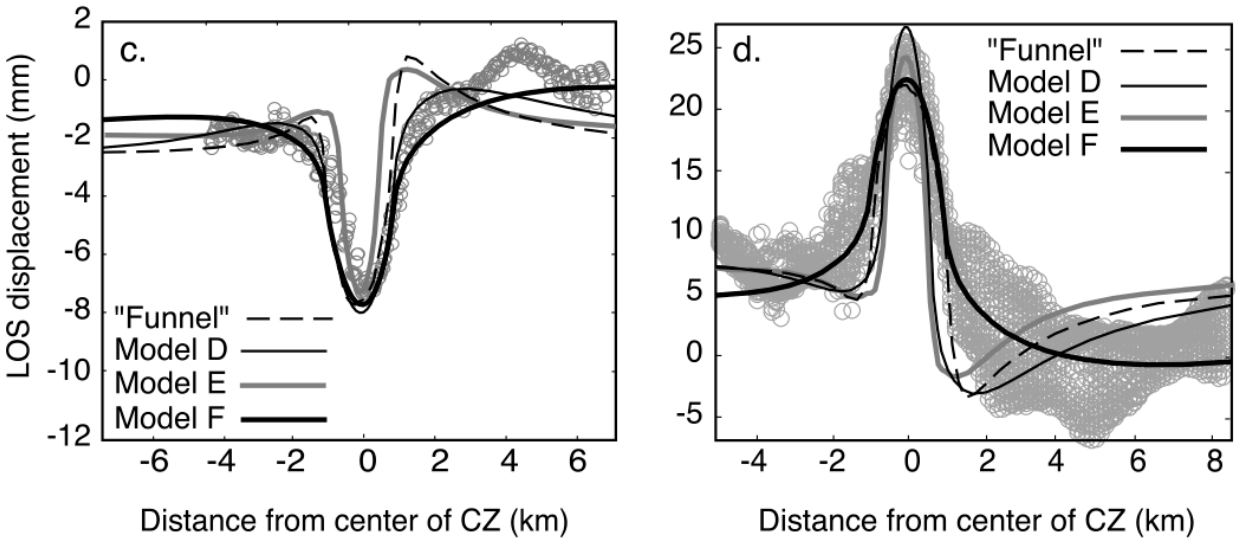






Fault zones as (absolute) stress sensors

$$\delta\varepsilon \sim \frac{G - G'}{GG'}\delta\sigma - \frac{\sigma_0}{G'^2}\delta G'$$



Hearn and Fialko, 2009