# Ambient Noise Tomography of Southern California

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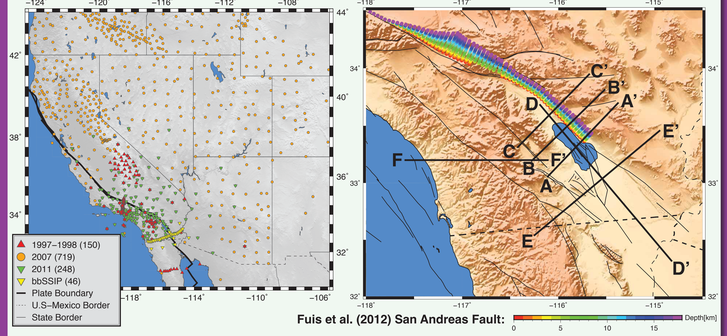
## Introduction

- 3D velocity model of southern California from Ambient-Noise Surface-Wave Tomography
- Data recorded at 849 broadband stations, over four years, 1997-1998, 2007, and 2011
  These epochs were chosen to include our own **b**road**b**and **S**alton **S**eismic **I**maging **P**roject (bbSSIP), a 40-station transect across the Salton Trough, as well as campaign stations in Mexico and U.S.A., and permanent stations.
- Group-velocity block model: 0.05° x 0.05° lateral, 2 sec periods from 4 to 40 seconds
- Shear-wave block model: 0.05° x 0.05° lateral and 1 km vertical
- Initial model for shearwave inversion: Harvard Community Velocity Model (CVM-H 9.11)







Fuis et al. (2012) San Andreas Fault: Depth[km] 0 5 10 15


### Acknowledgements

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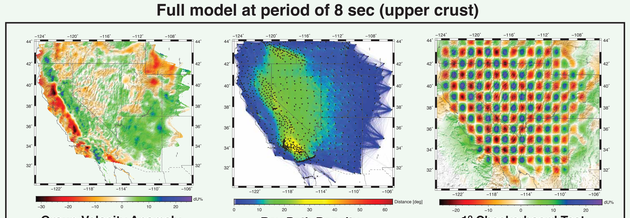
### Want to see more?

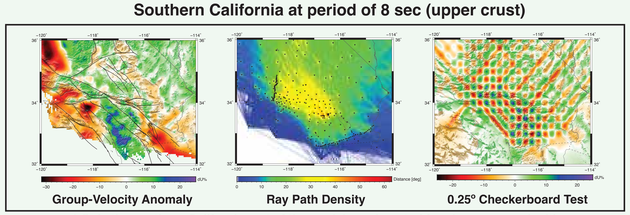
**Scan this QR code (http://goo.gl/RkjTcB) to download the poster, see more of the model, or contribute a comment!**

## Rayleigh Wave Group-Velocity Maps

**Full model at period of 8 sec (upper crust)**

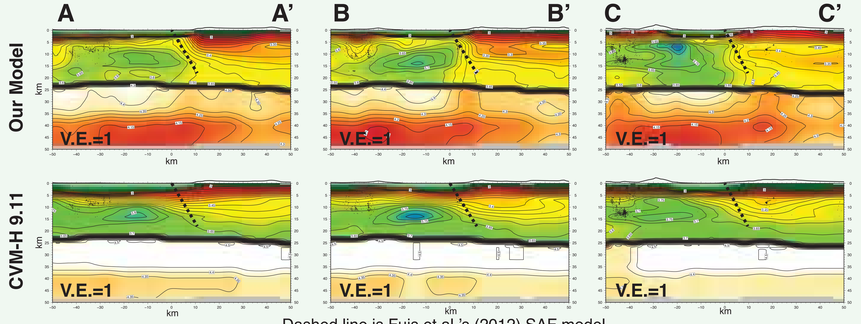



**Southern California at period of 8 sec (upper crust)**




* Only the southern California part of the model was inverted for shear wave velocities

## San Andreas Fault

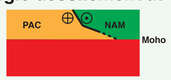



Dashed line is Fuis et al.'s (2012) SAF model

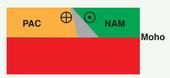
- **Vertical to gradually dipping lateral velocity contrasts under the southern part of the SAF**
- **In general agreement with the dipping SAF model [Fuis et al., BSSA, 2012]**
- **Velocity contrasts continue below the seismogenic zone down to the Moho, and in some places below the Moho.**

**Does the SAF rupture the entire crust?**

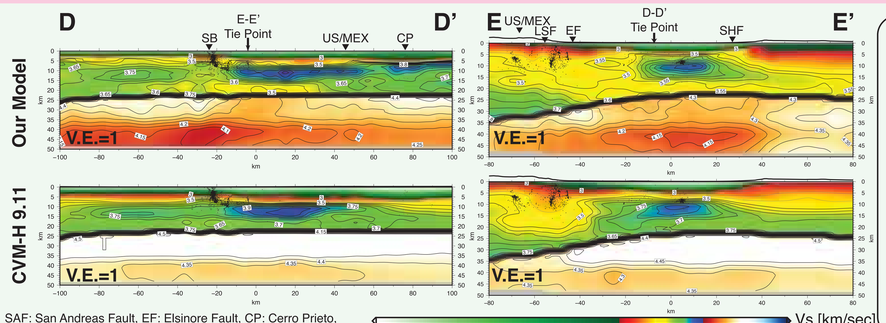

**Low-angle decollement at depth?**




**Broad shear zone at depth?**




## Salton Trough




SAF: San Andreas Fault, EF: Elsinore Fault, CP: Cerro Prieto,
LSF: Laguna Salada Fault, SB: Salton Buttes, SHF: Sand Hills Fault

Vs [km/sec] 1 2 3 4 5

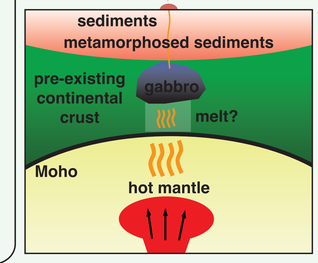
**Spatially stacked high-velocity middle crust, low-velocity lower crust, and low-velocity upper mantle:**

**Mid-Crustal High-Velocity Layer**
- Elongated parallel to trough axis, becomes shallower towards the SE
- ~6 km thick, similar to ocean crust
- Vs ~3.8 km/s, could be gabbroic composition, typical of oceanic crust

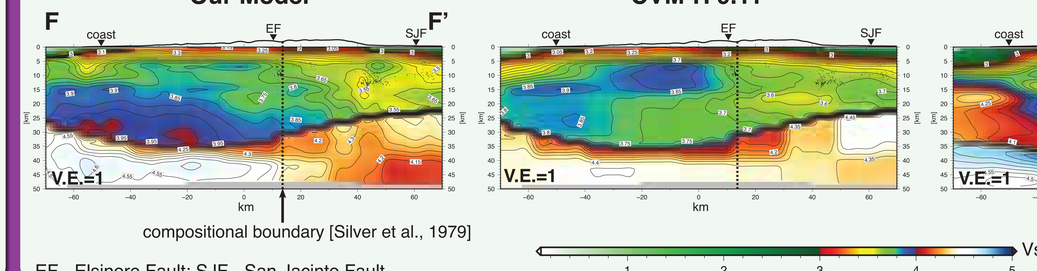
**Lower-Crustal Low-Velocity Layer**
- Lowest beneath Brawley Seismic Zone
- 0.1-0.2 km/s slower than adjacent crust, may be due to partial melt

**Upper Mantle Low-Velocity Zone**
- Lowest velocity beneath the Salton Buttes Quaternary volcanic domes
- Vs ~4.1 km/s, similar to LVZ under Gulf of California [Wang et al., Nature, 2009]
- Velocity reduction suggests partial melt of ~5% [Takei, JGR, 2002]

### Conceptual Model




## Peninsular Ranges




compositional boundary [Silver et al., 1979]

EF - Elsinore Fault; SJF - San Jacinto Fault

Vs [km/sec] 1 2 3 4 5

- **Velocity in western Peninsular Ranges higher than eastern Peninsular Ranges, coinciding with a known compositional boundary [Silver et al., 1979]**
- **Very high velocity lower crust in western Peninsular Ranges, possible remnant of the subducting Farallon plate**
- **Low upper mantle velocities under eastern Peninsular Ranges compensate for high-topography and lack of an Airy root**