Adjoint tomography of the southern California crust

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The purpose of our research is to improve 3D wavespeed models using the accuracy of `SPECFEM3D` simulations embedded within an inversion scheme based on adjoint methods. Our first application is for a southern California crust and upper mantle model (*Komatitsch et al.*, 2004). We make measurements on 52,000 seismograms using the `FLEXWIN` algorithm (*Maggi et al.*, 2009) and iterate the starting model 16 times, following the procedure discussed in *Tromp et al.* (2005); *Liu and Tromp* (2006); *Tape et al.* (2007). One example of the net changes made to the model is shown below, along with the corresponding improvement of fit to the seismograms.

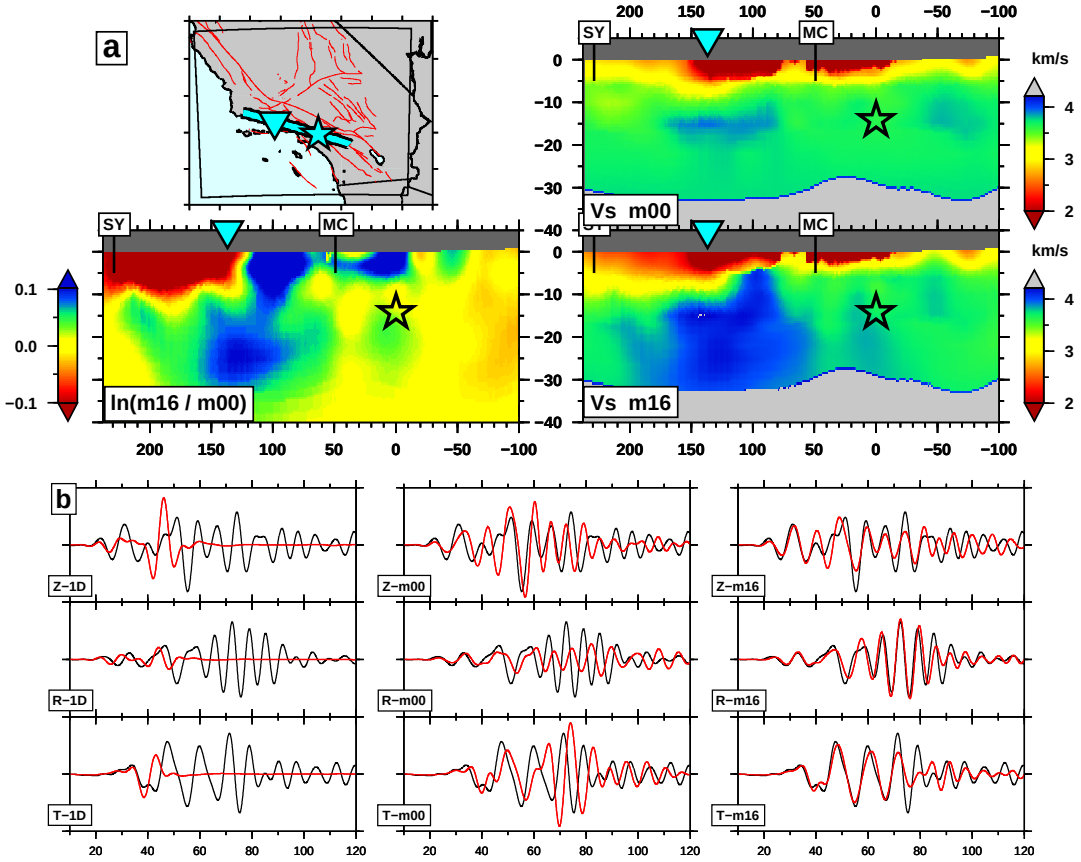

Figure 1: Cross sections of the tomographic model with corresponding seismograms. Boxed labels with vertical lines denote the location of the faults for reference: MC, Malibu Coast, SY, Santa Ynez. (a) Path for a M_w 5.4 earthquake (☆) beneath Chino Hills to station STC (▽), within the Ventura basin. (b) Synthetic seismograms (red) and recorded seismograms (black) for the period range 6–30 s. Left column, 1D model; center column, initial 3D model ($\mathbf{m}_{00}$); right column, final 3D model ($\mathbf{m}_{16}$).

References

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