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Interactive comment on "Exploring the shallow structure of the San Ramón thrust fault in Santiago, Chile (~ 33.5 S), using active seismic and electric methods" *by* D. Díaz et al.

T. Rockwell (Referee)

trockwell@mail.sdsu.edu

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I have annotated a hard-copy of the Diaz et al. manuscript and covered back to a PDF, which I have posted here. The authors are welcome to contact me directly for clarifications, or if my hand writing / annotations is/are illegible.

Interactive comment on Solid Earth Discuss., 6, 339, 2014.

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Exploring the shallow structure of the San Ramón thrust fault

D. Díaz et al.

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Abstract

The crustal-scale west-vergent San Ramón thrust fault system at the foot of the main Andean Cordillera in central Chile is a geologically active structure with Quaternary manifestations of complex surface rupture along fault segments in the eastern border of Santiago city. From the comparison of geophysical and geological observations, we assessed the subsurface structure pattern affecting sedimentary cover and rock-substratum topography across fault scarps, which is critic for evaluating structural modeling and associated seismic hazard along this kind of faults. We performed seismic profiles with an average length of 250 m, using an array of twenty-four geophones (GEODE), and 25 shots per profile, supporting high-resolution seismic tomography for interpreting impedance changes associated to deformed sedimentary cover. The recorded traveltime refractions and reflections were jointly inverted by using a 2-D tomographic approach, which resulted in variations across the scarp axis in both velocities and reflections interpreted as the sedimentary cover-rock substratum topography. Seismic anisotropy observed from tomographic profiles is consistent with sediment deformation triggered by west-vergent thrust tectonics along the fault. Electrical soundings crossing two fault scarps supported subsurface resistivity tomographic profiles, which revealed systematic differences between lower resistivity values in the hanging wall with respect to the footwall of the geological structure, clearly limited by well-defined east-dipping resistivity boundaries. The latter can be interpreted in terms of structurally driven fluid content-change between the hanging wall and the footwall of a permeability boundary associated with the San Ramón fault. The overall results are consistent with a west-vergent thrust structure dipping ~ 55° E at subsurface levels in piedmont sediments, with local complexities being probably associated to fault surface rupture propagation, fault-splay and fault segment transfer zones.

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Fig. 1.

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