# Subsurface Fault Damage Zone of the 2014 Mw 6.0 South Napa Earthquake, California, Viewed from Fault-Zone Trapped Waves

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Prominent fault-zone trapped waves (FZTWs) were generated by aftershocks of the 2014 M6 South Napa earthquake and recorded at three dense linear arrays across the surface rupture of the West Napa Fault Zone (WNFZ) and the Franklin fault, which appears to be southward continuations of the WNFZ. We analyzed waveforms of FZTWs from 55 aftershocks in both time and frequency to characterize the fault damage zone associated with this M6 earthquake. Post-S coda durations of FZTWs increase with epicentral distances and focal depths from the recording arrays, suggesting a low-velocity waveguide along the WNFZ to depths in excess of 5-7 km. Locations of the aftershocks showing FZTWs, combined with three-dimensional (3D) finite-difference simulations, suggest the subsurface rupture zone having a S-wave speed reduction of ~40-50% and at least a ~500-m-wide deformation zone along with the ~14-km-long mapped surface rupture zone. The low-velocity waveguide on the WNFZ extends further southward but with a more moderate velocity reduction of ~30% at ray depth, suggesting continuity between the WNFZ and Franklin Fault. Recently, we examined the data recorded at 7 REFTEK130 seismometers deployed near the WNFZ and obtained additional constraints on the results from the data recorded at three cross-fault arrays, implying that the waveguide effect may have localized and amplified ground shaking along the WNFZ and the faults farther to the south. We try to search the FZTWs recorded at these temporal stations at the WNFZ for teleseismic earthquakes. Such type of FZTWs has been observed at the seismic array deployed atop the Calico Fault in Mojave Desert for teleseismic events; they provide an additional constraint on the deep portion of the fault compliant zone.