Preface to the Focus Section on the 24 August 2014 Magnitude 6.0 South Napa Earthquake

by Erol Kalkan

On 24 August 2014, a M_w 6.0 earthquake struck northern California. Its epicenter was located 9 km south-southwest of the city of Napa, which was impacted drastically by the event. The recorded peak horizontal ground acceleration in downtown Napa was as high as 62%*g*. This earthquake was the largest earthquake to strike northern California during the past 25 years, since the 1989 M_w 6.9 Loma Prieta earthquake. The South Napa earthquake killed one and injured approximately 200, and it caused significant damage to residential construction and famous wineries in Napa and the surrounding areas. This *Seismological Research Letters* focus section, which I had the fortune to edit, contains a selected set of six original technical papers. These papers cover different aspects of the South Napa earthquake from seismological, geodetic, geological, and engineering perspectives.

The first paper, by Brocher *et al.* (2015), presents an overall summary of the earthquake by focusing on earthquake source modeling, fault stress variation, strong ground motion attenuation, site response, performance of earthquake early warning, and key field observations regarding the surface fault rupture.

The next paper, by Dreger *et al.* (2015), refines the kinematic finite-source model for the mainshock by combining seismic waveform, Global Positioning Systems, and Interferometric Synthetic Aperture Radar geodetic data and uses this model to investigate 3D wave propagation effects on the strong-motion wavefield. Their results show that the earthquake ruptured principally up-dip and toward the northwest, which likely had a significant directivity effect leading to the high level of strong ground motion observed in the Napa Valley and its vicinity. The constrained geodetic source model is presented next by Barnhart *et al.* (2015), using a large amount of optical imagery data for the spatial distribution of the fault slip that occurred during the Napa earthquake; this study highlights the importance of rapidly updated geodetic observations, both *in situ* and remotely sensed, for event source characterization and response. Using data from a dense network of strong-motion instruments, Wei *et al.* (2015) present the inversion scheme for constraining the coseismic slip distribution of the Napa event. This study indicates that the rupture propagated unilaterally to the northwest and that most of the coseismic slip occurred along the shallow portion of the northern fault segment about 10 km along strike from the epicenter.

The paper by Baltay and Boatwright (2015) concentrates on strong ground motion measurements and evaluates the performance of ground-motion prediction equations (GMPEs). This study highlights wave propagation characteristics in the region, in particular the amplified long-period seismic waves due to combined effects of basin-trapped waves and rupture directivity. The authors also show that the recently updated GMPEs capture the general trend of the median strong ground motions as well as the data variability. The final paper of the focus section, by Boatwright *et al.* (2015), evaluates the red- and yellow-tagged building data assembled by the city of Napa to distinguish zones of moderate and extensive damage within Napa. The authors show that the distribution of red and yellow tags is well correlated with the extent of the pre-1950 development of Napa and with the underlying sedimentary basin, but it is poorly correlated with the most recent alluvial geology.

The six papers presented here meet our goals of covering a wide spectrum of topics related to the strong ground shaking and its impacts on the Napa region of northern California to inform and advance our understanding of seismic source mechanism, site response, ground-motion attenuation, and damage distribution, as well as to point out new avenues of investigation for future studies.

ACKNOWLEDGMENTS

We at *SRL* thank all the authors for their valuable contributions. The publication of this *SRL* focus section would not have been possible without the dedicated work of the many reviewers who provided valuable feedback to authors in a timely way. Their contributions to this issue cannot be overstated. Last, I would like to thank *SRL* Editor-in-Chief Zhigang Peng, Managing Editor Mary George, and the *SRL* production staff for their outstanding organization and meticulous attention to detail during various stages of this effort.

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