SITE RESPONSE MEASUREMENTS FROM THE USGS TRI-VALLEY URBAN SEISMOGRAPH ARRAY, LIVERMORE, CALIFORNIA

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An array of 32 K2 instruments was installed in the Livermore Valley, CA, in the summer of 2013 (black + in figure). To date we have collected 1 year of triggered waveform data from numerous local and regional earthquakes (magnitudes 2.0 to 6.0), including the August 24, 2014, M6.0 Napa, CA, earthquake (70km to the NW). These data are being used to study site response and its relationship to other geophysical parameters including gravity measurements and shallow shear-wave velocity. These records will also be used to study wave propagation effects for earthquake sources inside and outside the valley. The figure below contours amplification factors for the frequency range from 0.25 to 0.5 Hz recovered from the Napa earthquake records. Values are based on whole-record spectral ratios referenced to the rock site at station SLR. The figure clearly shows the largest amplification factors coincident with the lowest values of Bouguer gravity (light blue lines) associated with the valley fill (maximum thickness ~1500m). Another prominent feature is the abrupt termination of larger amplification along the western edge of the valley associated with the abrupt range front and the location of the Calaveras fault. At frequencies above 1 Hz the Calaveras fault is a site of larger amplification, which has been observed for other faults in the Bay Area.