Estimating Attenuation Coefficients and P-Wave Velocities of the Shallow San Jacinto Fault Zone from Betsy Gunshots Data Recorded by a Spatially Dense Array with 1108 Sensors

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We estimate values of P wave velocity and P attenuation coefficients (Q_P) for the subsurface material at the Sage Brush Flat site along the Clark branch of the San Jacinto Fault Zone. The data are generated by 33 Betsy gunshots and recorded by a spatially dense array of 1108 vertical component geophones deployed in a rectangular grid that is approximately 600 m x 600 m. We automatically pick the arrival times of the seismic body waves from each explosion arriving at stations within 200 m. These measurements are used to derive an average velocity map with velocity values ranging from 500 m/s to 1250 m/s. We estimate the energy of the early P waves by squaring the amplitudes in a short window relative to the automatic picks. These energies are fitted to a decay function representing the geometrical spreading and intrinsic attenuation. By separating the stations into spatial bins and calculating attenuation values for each by linear regression, we construct a Q_P values map. Most of the Q_P values are in 5-20 range, which is consistent with other studies of shallow fault zone regions.