Lg SOURCE PARAMETER ESTIMATES IN VARIOUS EARTH MODELS

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This work addresses the application of the m_{bLg} magnitude scale in a sedimentary embayment environment. The m_{bLg} magnitude scale was proposed to provide a measure of earthquake magnitude from the Lg phase as recorded on vertical component, short-period WWSSN seismometers in central and eastern North America. The Lg phase was originally defined for the largest sustained amplitude ground motion around 1 Hz. This definition of Lg has since been broadened to include the frequency range from 0.1 to 10.0 Hz. The Lg phase is believed to be a superposition of higher mode surface waves approximating an Airy phase. The Lg phase exhibits characteristics of Rayleigh (P, SV) and Love wave (SH) particle motion.

Interest in the use of the m_{bLg} magnitude scale in an embayment environment was initiated by the analysis of strong motion accelerometer (SMA) recordings of the 25 March 1976 earthquake which had an epicenter near Marked Tree, Arkansas. This event was assigned a magnitude of $m_{bLg} = 5.0$. This magnitude was based on North American WWSSN and Canadian seismograph station recordings. This event was also recorded by SMA recorders at Arkabutla, Mississippi, which is an embayment site. These SMA records were used to produce synthetic WWSSN short-period, vertical records which yielded an m_{bLg} value of 5.7. The more than five times greater than expected ground motion recorded at the Arkabutla site raised questions about the effect on Lg magnitude

estimates from embayment stations.

An attempt is made to explain the discrepancy between the magnitudes from the standard seismographs and the strong motion record at Arkabutla, Mississippi, by use of synthetic *Lg* spectral modeling. Two separate earth models are considered. One, the central United States model, and the other an embayment model which includes a very low velocity surface layer. Synthetic *Lg* spectra were generated for each of the earth models. The same size source was used in each model. Comparison of the vertical component spectral amplitude level obtained from the two earth models is made to determine the nature of the m_{bLg} bias between the central United States and embayment models for an event of constant seismic moment. The spectral amplitude levels of the radial and SH components for the two earth models were also compared in order to quantify the effect an embayment would have on these components of strong ground motion.

This study also models the decay of the *Lg* phase with epicentral distance. Synthetic spectra of *Lg* wave trains generated in the embayment model are analyzed to determine the nature of spectral amplitude decay in an embayment model.