SEISMIC STUDIES OF THE REYNOLDS COUNTY EARTHQUAKE SEQUENCES, 1964-1966

James Edward Zollweg, B.S.

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frequency asymptotes generally proportional to ω^{-1} or ω^{-2}. Corner periods ranged from 0.3 sec to 1.0 sec for events ranging in seismic moment from about 6E18 to 3E22 dyne-cm. Assuming a shear-wave velocity of 2 km/sec, the data imply that source dimensions ranged from 200 to 700 m and stress drops were 0.1 to 40 bars. If the shear-wave velocity is assumed to be 3.6 km/sec the source dimensions are increased by a factor of less than two, but the stress drops are considerably smaller.

The high-frequency asymptotes of the observed spectra at the Rolla, Missouri station varied with time, suggesting that some time-dependent source process was responsible. The data do not permit the process to be identified, but likely possibilities are a change from partial to complete stress drop events, directivity effects arising from a change in the mode of rupture on the fault surface, or changes in the focal mechanisms of the events. Source spectra computed for a few well-observed events indicate that foreshocks were partial stress drop events, early aftershocks (until 26 October 1965) were a mixture of partial and complete stress drop events, and later aftershocks tended to be complete stress drop earthquakes.

Ellington spectra were generally characterized by well-defined corner periods and ω^{-1} high-frequency asymptotes, indicating most were partial stress drop earthquakes. Observed corner periods ranged from 0.3 to 1.3 sec for events with seismic moments between 1E19 and 5E20 dyne-cm.

The observation of some time-variant source process for the Centerville sequence raises some possibility that similar far-field, low station-density observations may be successfully used as tools in

earthquake prediction. The failure to observe a similar process for the Ellington series suggests that development of such a tool may be difficult at best, and that it may have to be developed almost on a case-by-case basis. The observations may have more bearing on the reason why the Centerville energy release (time-dependent spectrum variations) occurred as a foreshock-main shock-aftershock series, and the Ellington energy release (partial stress drop events with no spectrum variation) occurred as an earthquake swarm. The generality of these observations remains to be established.