DISCRIMINATION BETWEEN EARTHQUAKES AND EXPLOSIONS IN THE CENTRAL UNITED STATES

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The ratios of amplitudes have been proposed as discriminants between earthquakes and explosions. The success of ratio results to discriminate has depended on the specific frequencies, phases, and the region used for study.

In the present study the signals recorded at station FVM, were partitioned into passbands of 0-2Hz, 2-4Hz, 4-6Hz, 6-8Hz and 8-10Hz and the ratios of different phases were considered for each passband. In addition ratios of the 0-2Hz, 2-4Hz, 4-6Hz, 6-8Hz and 8-10Hz were determined for the Pg, Sg, Lg, and Rg. The ability to discriminate tends to increase with increasing frequency.

The amplitudes of the whole signal, Lg and Rg vary differently for earthquakes and explosions from 0-2Hz to 6-8Hz. Before correcting for instrument response, the amplitudes tend to increase over the range 0-2Hz to 6-8Hz for earthquakes and tends to decrease over the same passband for explosions. This variation of amplitudes occurs for the whole signal, Lg and Rg. Analysis of 75 explosions fails to find a single event which has increasing amplitudes from 0-2Hz to 6-8Hz on all three components for all three of the phases which include the whole waveform, Lg and Rg. Only 4 out of 40 earthquakes have a decreasing trend on all three components for amplitudes of same three phases. This variation of amplitudes is not affected by distance at distances between 20 and 340 km, or by source strength.

6 known explosions and 5 known earthquakes recorded at another digital station (CCM), were to be as either earthquakes or explosions in all cases, and were correctly identified.

After correction for instrument response, both at station FVM and CCM exhibit decreasing values of ground motion with increasing frequency, but the slope for explosions is significantly greater than that for explosions.