FACTORS AFFECTING THE SIGNAL-TO-NOISE RATIO OF SHORT PERIOD SEISMIC RECORDS

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The amplitudes of the vertical components of motion of the P waves generated by 12 distant earthquakes of intermediate depth are compared. The waves were recorded by similar Benioff type instruments of the Long Range Seismic Measurements Program at 43 sites of the United States.

The seismic noise of the records, conflicting with the P signal, is evaluated and compared at the 43 stations.

The ratio of the P signal to the conflicting noise at each station is compared to the average ratio of all the stations. The results are related to the local and regional geological characteristics of the site, and to the type of installation of the station.

Stations located in mines have a signal-to-noise ratio for the P phase, of the short period instruments, 1.5 times higher than stations located in tank vaults.

The group of 25 stations located on consolidated limestone and sandstone give an average ratio twice the average of 9 stations located on basement rock. A few stations located on soft sediments have an average ratio one-fourth the average of stations

on more consolidated sediments.

A group of 17 stations located in the Basin and Range Province and in the Colorado Plateau have an average ratio almost 1.5 of the normal, that is, of the average ratio obtained from all the stations. The Appalachian Plateau and Great Plains stations give a ratio one-half of the normal.

Though the 43 stations were located in selected areas, generally free from cultural noise, their signal-to-noise ratio varies by a factor of 10, depending on natural characteristics of the site or type of installation.

The maximum by which the average ratio of any individual station was above the normal was 2.5. This ratio was observed at two stations. One of them is in the Rocky Mountains, Hailey, Idaho; this ratio was obtained from 11 observations. The other station is located in the Colorado Plateau, Snowflake, Arizona; its ratio was obtained from 5 observations.

There are variations in the amplitude of the signal and in the amplitude of the conflicting noise related to the geology of the site, type of installation of the instruments, and the geological province where the station is located. The range of variations of the noise is larger than the range of the variations of the signal.