

Broadband seismic noise characteristics of the Arabian Shield

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Abstract

A total of nine portable broadband stations were deployed across the Arabian Shield from Nov. 1995 to Dec. 1996. These stations consisted of STS-2 seismometers recorded continuously at 40 samples per second on RefTek data loggers.

Using data sections selected randomly during the deployment, noise studies showed that most stations were exceptionally quiet with noise levels near the USGS (Peterson, 1993) low noise model for frequencies higher than 0.1 Hz. At lower frequencies, the horizontal components showed increased noise levels, possibly due to instrumental characteristics. High frequency (>1 Hz) noise varied as much as 10 dB between day and night for some stations (RAYN, TAIF) while more isolated stations (HALM) were constant. Seasonal noise levels also varied, with April to June being the quietest months. Slight changes in peak microseism frequency also occurred seasonally.

The quietest stations were HALM, RAYN, AFIF and UQSK, all of which were located in central Saudi Arabia and shows noise levels near the low noise model for frequencies between 0.1 and 4 Hz. The optimal site for a new station would be near HALM as it was both quiet and showed very little diurnal variation due to cultural noise.

The low noise could be contributed to the very low detection threshold at these stations of events with $m_b = 3.5$ at distances from 10 to 100 degrees. These stations appear to be among the best sites in the world for the properties of detection thresholds and ground noise levels.