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Acoustic Emission Measurements in a deep Gold Mine in South Africa; Spectral Analysis (JAGUARS-Project)

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We installed an Acoustic Emission (AE) Network in Mponeng Mine/South Africa with eight AE sensors and one triaxial accelerometer in order to close the observational gap and link seismological observations with laboratory experiments. The network is able to record seismic events with frequencies up to 200 kHz. It is located at a depth of 3540m in an area where stress changes due to nearby active mining often trigger microseismic events. A detailed introduction in the network is given by Philipp et al (this meeting).

Here the preliminary evaluation in terms of frequency content of the first data recorded in June 2007 is presented. Several hundreds of microseismic events per day with a broad frequency range (50 Hz to 200 kHz) are successfully identified. High frequency events ($>$40 kHz) are recorded from distances up to 50m from the network. Events with frequencies 6-40 kHz and 1-6 kHz are recorded from distances up to 400m. We calculated corner frequencies after correcting the spectrum for Q and background noise. Since the frequency characteristics of AE sensors, including the acoustic coupling to the rock, are not determined yet, we limit this analysis to the waveforms with signal power within f= 1 kHz to 25 kHz. In this frequency range we found signals with corner frequencies of 1 kHz corresponding to a source radius of about 3m on both sensor types.