Tidal stress/strain and acoustic emission activity at the Underground Research Laboratory, Canada

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We study the correlation between the phase of the moon, and the occurrences of acoustic emissions (AEs) monitored at the Underground Research Laboratory in Canada. There is a unique data set where AEs, very small excavation induced seismicity events, have been monitored at depth since 1997. The maximum amplitude of the seismic waves of the AEs corresponds to a moment magnitude between -7 and -5. We use this data in this study.

On 9 December 1997, a significant increase of AEs began and this activity decayed with time day by day. During the period of the decay, we observed that the activity often increased. Most of these increases corresponded with moments of new or full moon. We investigate whether the increase of AEs is correlated with the moments of new or full moon using a statistical method. We consider two models concerned with the daily occurrence rate of AEs. In the first model, the existence of the correlation is not assumed. In the second model, the existence is assumed. Using AIC (Akaike Information Criterion), it is shown that the second model is a significantly better fit to the observed time series of AEs.