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Power spectral analysis of micro-earthquake sequence recorded by the Taiwan Chelungpu-fault Drilling Project

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Taiwan Chelungpu-fault Drilling Project (TCDP) deployed a set of comprehensive 7-level borehole seismometers (BHS) after a successful 2-km-deep vertical hole drilling across the slip zone generated by the 1999 Mw 7.6 Chi-Chi earthquake. The TCDP BHS have capability to record micro-events down to magnitude 0.5, which are complete for recording and are all located at a seismogenic layer around 10 km deep. We here apply the power spectral analysis to time series of hourly counts of the TCDP micro-earthquake sequence. We find from the power spectrum of those micro-events a strong signal with the frequency of 1 cycle per day (cpd), which possibly indicates tidal triggering on those micro-events. We also find the power of that 1-cpd signal shows a strong seasonal variation associated with the large gradient in the power of 1-cpd Earth tide. Our result elucidates that the tidal triggering effect can be shown clearly in the power spectrum of the TCDP micro-earthquake sequence.