

Magnetic Storm Free ULF Analysis in Relation with Earthquakes in Taiwan

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Despite early optimism, pre-earthquake anomalous phenomena can be determined by using enhanced amplitude at the ultra-low-frequency range from geomagnetic data via the Fourier transform. In reality, accuracy of the enhanced amplitude in relation to earthquakes deduced from time-varied geomagnetic data would be damaged by magnetic storms and/or other unwanted influence resulted from solar activity and/or variations in the ionosphere, respectively. We substitute values of the cross correlation between amplitudes summarized from the earthquake-related (0.1-0.01 Hz) and the comparable (0.01-0.001 Hz) frequency bands for amplitude enhancements as an index of determination associated with seismo-magnetic anomalies to mitigate disturbance caused by magnetic storms. A station located about 300 km away from the others is taken into account to further examine whether changes of the cross correlation values are caused by seismo-magnetic anomalies limited within local regions or not. Analytical results show that the values suddenly decrease near epicenters few days before and after 67% (=6/9) earthquakes ($M \geq 5$) in Taiwan between Sep. 2010 and March 2011. Seismo-magnetic signals determined by using the values of cross correlation methods partially improve results yielded from the Fourier transform alone and provide advantage information regarding forthcoming earthquakes in the time and spatial domains.

Keywords: Seismo-magnetic anomaly, Ultra low frequency