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Fractal analysis of ULF electromagnetic emissions in possible association with earthquakes in China

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The long-term data (during the period of 1 March 2003 through 31 December 2006) of ULF geomagnetic variations observed at Kashi station (geographic coordinates: 39.5°N, 76.0°E) in China, have been used to investigate the long-term variation of fractal dimension of ULF emissions. We have studied the changes in fractal dimension in association with several earthquakes around the observing station. It is then found that a significant change (or decrease) in the fractal dimension of the Z component has taken place before the September 1, 2003 earthquake, which lends a further support to our previous finding based on our improved polarization analysis for the same earthquake. The results obtained are discussed in the contexts of a few aspects (detectability of seismogenic emissions, comparison with previous results by other analysis methods, the importance of fractal analysis in the nonlinear process of the lithosphere and earthquake prediction).