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Scaling similarities in Dst index and pre-seismic electromagnetic time series

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Dst is an index of geomagnetic disturbance; in particular, serves as a proxy for magnetic storm occurrence. Pre-seismic electromagnetic emissions provide a promising window through which the dynamics of earthquake preparation can be investigated. First, we show that distinct changes in scaling parameters of the Dst index time series occur as an intense magnetic storm approaches. We then show that similar alterations in scaling parameters of the pre-seismic electromagnetic time series take place as a strong earthquake approaches. In both cases, a gradual reduction in complexity is revealed. In other words, a transition from a lower to a higher degree of organization is observed, indicating that the occurrence of an intense magnetic storm / strong earthquake is imminent.