Interoccurrence time for two-dimensional spring-block model and natural earthquakes

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Abstract

We introduce a new nonconservative self-organized critical model. This model is equivalent to a quasistatic two-dimensional version of the Burridge-Knopoff spring-block model of earthquakes. Our model displays a robust power-law behavior. The model gives a good prediction of the Gutenberg-Richter law and an explanation to the variances in the observed b values.

And we study the interoccurrence time distributions of events by analyzing synthetic catalogues and three natural catalogues of the Japan Meteorological Agency (JMA), the Southern California Earthquake Data Center (SCEDC) and the Taiwan Central Weather Bureau (TCWB). This transition demonstrates that the interoccurrence time statistics of earthquakes possess the hybrid Weibull and log Weibull statistics. We further find that the crossover magnitude m_c^{**} from the superposition regime to the pure Weibull regime is averagely proportional to the plate velocity.

References

Olami, Z., Feder, H.J.S., and Christensen, K., Self-Organized Criticality in a Continuous, Nonconservative Cellular Automaton Modeling Earthquakes. Physical Review Letters 68, 1244 (1992)

Hasumi, T., Chen, C.C., Akimoto, T., Aizawa, Y., The Weibull–log Weibull transition of interoccurrence time for synthetic and natural earthquakes. Tectonophysics 485 (2010) 9-16