

## **SELF-ORGANIZED CRITICALITY: DOES IT HAVE ANYTHING TO DO WITH CRITICALITY AND IS IT USEFUL?**

D.L. Turcotte

Department of Geological Sciences, Cornell University, USA

e-mail: turcotte@geology.cornell.edu/Fax: +001-607-254-4780

Three aspects of complexity are fractals, chaos, and self-organized criticality. There are many examples of the applicability of fractals in solid-earth geophysics, such as earthquakes and landforms. Chaos is widely accepted as being applicable to a variety of geophysical phenomena, for instance tectonics and mantle convection. Several simple cellular-automata models have been said to exhibit self-organized criticality. Examples include the sandpile, forest-fire and slider blocks models. It is believed that these are directly applicable to landslides, actual forest fires, and earthquakes, respectively. The slider-block model has been shown to clearly exhibit deterministic chaos and fractal behavior. The concept of self-similar cascades can explain self-organized critical behavior. This approach also illustrates the similarities and differences with critical phenomena through association with the site-percolation and diffusion-limited aggregation models.