

# EARTHQUAKE DYNAMICS IN A CELLULAR AUTOMATON MODEL

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The complexity of lithosphere dynamics is hardly amenable to simple deterministic differential equations. This is the reason why a different approach, aimed to reproduce the statistical mechanical properties of earthquakes has attracted progressively increasing interest. This approach incorporates what are assumed to be the basic microphysical aspects into a dynamically evolving automaton. A variety of models is thus possible, and there seems to be little way to ascertain the merits and defects of the various approaches since they all, at the expense of introducing more parameters, appear capable of satisfactorily representing the real phenomenology. We set the clock back and attempt to derive a general and as simple as possible automaton which nevertheless incorporates strain diffusion, a process often disregarded in simple models in spite of its crucial importance. Our automaton is based on a homogeneous grid of cells and its rupturing is not controlled by a fixed threshold but by a more flexible quantity which can be interpreted as an increase of the ground strain level or as a decrease in the critical value of fracture. The automaton also considers local dissipation of energy and both diffused and localized time-dependent strain applications. This simple model is capable of reproducing earthquake dynamics with the same efficiency of the most complicated automata.