Reguła Drossel-Schwabl (DS)

Omawiany przez nas model pochodzi z pracy z 1992 r. autorstwa Drossel’a i Schwabl’a. Stąd model ten nazywamy modelem **DS** albo **DS FFM** (**F**orest **F**ire **M**odel).
Co ciekawe wiele z wyników z tej klasycznej pracy zostało później zanegowana - dzięki rozwojowi technologii (szybsze komputery) powtórzono symulacje dla większej liczby komórek…
No i okazało się, że część obserwacji w oryginalnej pracy wynika ze zbyt mały symulacji a nie z własności samego modelu.
Nie zmienia to jednak faktu, że … -> next slide ;)

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Self-Organized Critical Forest-Fire Model

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A forest-fire model is introduced which contains a lightning probability f. This leads to a self-organized critical state in the limit $f \to 0$ provided that the time scales of tree growth and burning down of forest clusters are separated. We derive scaling laws and calculate all critical exponents. The values of the critical exponents are confirmed by computer simulations. For a two-dimensional system, we show that the forest density in the critical state assumes its minimum possible value, i.e., that energy dissipation is maximum.

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More Realistic than Anticipated: A Classical Forest-Fire Model from Statistical Physics Captures Real Fire Shapes

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Abstract: The quantitative study of wildfire data world wide revealed that wildfires exhibit power-law like frequency-area distributions. Although models exist to predict the spread of a specific fire, there is as yet no agreement on the mechanism which drives wildfire systems on the landscape scale. A classical model in this context is the Drossel-Schwabl cellular automaton (DS-FFM) which robustly produces a power-law like frequency-area statistic for fire sizes. This model originated in statistical physics where it was used to illustrate the concept of self-organized criticality. A conjecture has been made in the literature that this model is not able to produce the spatial patterns of actual wildfires and hence is of no ecological significance. We test this conjecture by comparing the shape of simulated fires in the DS-FFM to those of 68 fires in the boreal forests of Alberta, Canada. Our results suggest that, contrary to the conjecture, the Drossel-Schwabl model performs well in producing realistic fire shapes. It can hence not be excluded as a candidate mechanism behind wildfire systems. We do show, however, that the performance depends on the size of the fire. Best results are obtained for fires of 400-2,000 ha. Very large fires of 2,000-20,000 ha and smaller fires of 20-200 ha differ from the simulated burn scars in the distribution and median size of islands of unburnt vegetation. Nevertheless, the overall fit remains good even for these size classes.

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