NATURAL DISASTERS: RANDOMNESS OR ORDER?

In ancient times, it was a common belief that great catastrophes were sent by God or the gods to Earth because the sins committed by men. Today we know that these events always have some other reasons, physical ones, and very complex in general. But, does the occurrence of these phenomena obey some mathematical laws?
It seems to be that: Statistics can unveil surprising common patterns across a great variety of natural disasters: earthquakes, volcanic eruptions, forest fires, the extinction of species, hurricanes, etc. One very simple computational model, the "sand pile" model (based on an underlying Galton-Watson branching process) can serve as a metaphor of the genesis of complexity and the difficulty of predictions in these systems. In this project we will learn the implications of these facts.

[1] P. Bak. How Nature Works, Springer (1999).
[2] M. Buchanan. Ubiquity, why catastrophes happen, Broadway (2002).
[3] B. D. Malamud. Tails of natural hazards, Physics World 17(8) (2004), 31–35.