

Environmental Simulation Laboratory

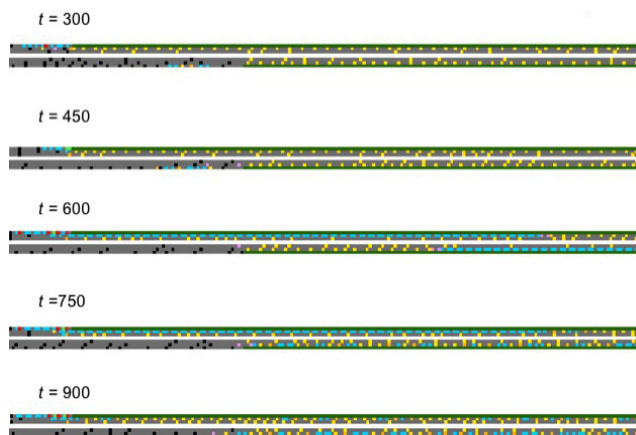
Akira TOMIZUKA

tommy@nagasaki-u.ac.jp

Our world is full of intertwining natural and societal phenomena that are extremely complicated and difficult to predict. In order to understand the essence of natural and societal structures, our lab attempts to reproduce some of these complex phenomena using computer simulations that are created using the laws of physics and some simple rules. Our research focuses on various topics, such as predicting the quantity of carbon dioxide produced by traffic jams, stabilization of the world's population, shellfish morphosis, predicting the cycles of fruiting plants, influence of pasturage on vegetation, relaxation of progress in forest fires, the carbon cycle, climate change due to greenhouse gases, and rises in sea level due to global warming.

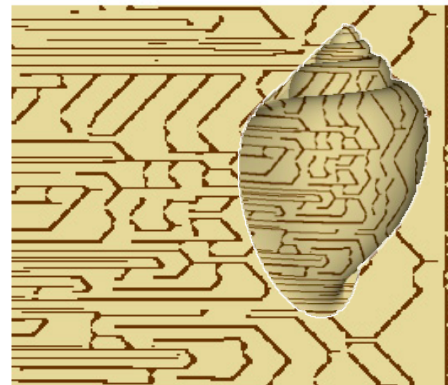
Some of our research topics are shown below:

Traffic Flow



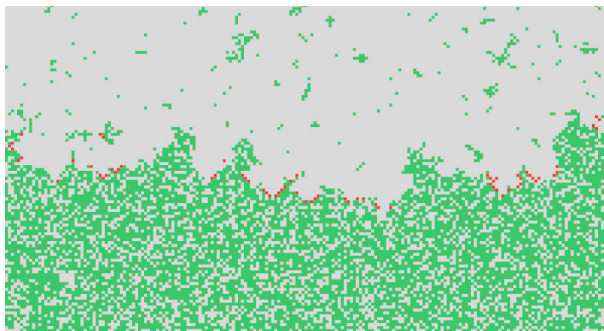
Traffic jams caused by construction on a three-lane highway. We estimate the amount of CO₂ emissions that occur as a result of traffic jams.

Shell's Patterns



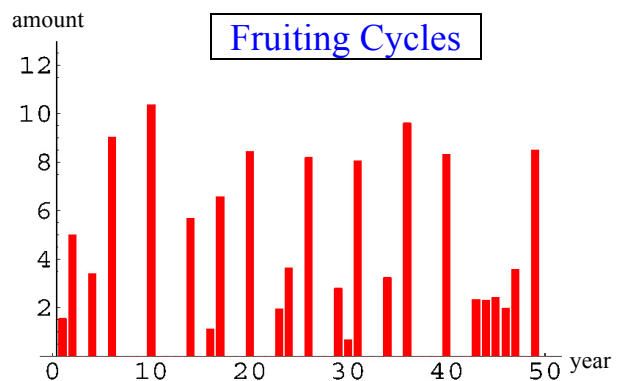
These patterns are caused by the reaction and the diffusion of two kinds of chemical substances that contribute to the activation and the obstruction of pigments, respectively. Rich brown areas indicate activation states.

Forest Fires



Progress of a forest fire (from top to bottom) in an environment that is 65% forest. This forest will be lost entirely if fires go unchecked.

Fruiting Cycles



Only trees that have stored more energy than the threshold value will fruit, which requires a substantial amount of energy.