

Model-based studies for geoscience education, related with seismology

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For a few decades, some data have been indicating an evident decrease in activity of geoscience education in Japan. It is caused with an undesirable positive feedback loop of decreasing among in the number of classes and teachers of geoscience at high school and of entrance examinations in geoscience to Universities. We called it 'a deflation spiral' in the geoscience education (Okamoto,2002). Moreover, the current decay might lead to the end of geoscience at high school. So, it is already regarded as an example of 'endangered species' (Okamoto,2002).

We start at our modeling study to estimate the extinction period of our teaching subject itself, applying the models of population ecology. The results forecast a fatal future of it. Urgent correspondence should be required.

Next, we propose some model-based studies related with seismology, answering to the request from conveners. The main models are employing numerical simulations which are simplified and modified for educational use. We can visualize most of these results using a three dimensional rendering freeware tool named Povray3.5. It consists of:

- i) Tsunami propagation under various virtual bathymetries.
- ii) Seismic wave propagation under simplified structures: Moho 2 layer model and Prem model (Dziewonski & Anderson, 1981).
- iii) Some cellular automata showing earthquakes behavior: Go-game model (Ohtsuka,1971), Sand-pile model (Bak et.al, 1989)
- iv) Time predictable model (Shimazaki & Nakata, 1980) for characteristic earthquakes.

These models can provide a new strategy in teaching geoscience. The students will easily understand the simplified mechanism of nature or be interested in a curious behavior of nature. Of course, the models also have their limit to their simplicity, so we always have to check the efficiency of our tactics.

Finally, we claim that the 'raison d'etre' of geoscience at high school through model-based study is:

- i) How complex nature is simplified to some interesting models.
- ii) Students are impressed by current vital activity of modern science.
- iii) Recognition of a possibility of system size catastrophe or mass extinction which are never treated in the other subjects.