

Laboratory experiment of the geyser activity

Takeshi Nishimura[1]; Eiichi Sugiyama[2]

[1] Geophysics, Science, Tohoku University; [2] Science, Tohoku Univ.

The geyser that intermittently effuses hot water is so called a time predictable system, and the activity is explained by a boiling process due to de-pressurization in hot water. However, it is still unknown the reason why short or long effusion appears in such stable system, as Onikobe geyser in Japan sometimes effuses hot waters every 6 min or 10 min. To investigate the control factors of such unstable characteristics, we made a laboratory model of the geyser and examine how the model exhibits.

The model consists of a 500 ml flask vertically connecting to a glass tube with a length of ca.70 cm and an inside diameter of 6 mm. The flask is connected with a large water pool so that new water is automatically supplied after each effusion. We constantly heat the flask by a mantle heater, and reproduce intermittent effusions of hot water from the top of glass tube. We measure the interval and duration times of effusion.

We run this model twice for 8 hours and 2.5 hours. Both experiments indicate a time predictable behavior in the mode. In the 8 hours experiment, we find two dominant peaks at 170 s and 230 s in the frequency distribution of interval times of effusions as the Onikobe geyser in Japan sometimes exhibits in unstable period. In the 2.5 hours experiment, however, the interval times of effusions widely distribute from 90 s to 260 s, which is not found in natural geyser. It is still unknown the mechanisms to determine such frequency distributions, but it is noteworthy to mention that a large number of small bubbles are recognized in the 8 hours experiment.