

Verification of the Combined Model of a Geyser (Periodic Bubbling Spring) by Underground Investigation of Kibedani Geyser

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We have proposed a mathematical model(Kagami, 2000), a dynamical model (Kagami, 2002) and a modified dynamical model of a geyser(a periodic bubbling spring)(Kagami, 2003) based on observation of Hirogawara geyser (Yamagata, Japan)(Ishii et al., 1999) and model experiments of the geyser (Katase et al., 1999). Numerical simulations of the modified dynamical model reappear dynamics of spouting of geysers(periodic bubbling springs) and it becomes possible that parameters(volume of the underground space, depth of spouting hole and so on) under a geyser are estimated due to comparison between results of simulation and those of observation. Then we have reported trials that we compared results of numerical simulation with those of observation of Hirogawara geyser or Kibedani geyser(Shimane, Japan) and estimated parameters under Hirogawara geyser or Kibedani geyser due to the comparison(Kagami, 2003). Subsequent additionally improved dynamical model enabled reproduction of characteristic time variation of a position of the interface between the lump of water in the hole and atmosphere during spouting of Kibedani geyser. On the other hand, a pause mode among 2 modes (spouting and pause) of Kibedani geyser could not have been reproduced by the dynamical model. Then a chain of dynamics of Kibedani geyser's spouting could be expressed completely by a combined model combining the additionally improved modified dynamical model with the mathematical model(Kagami, 2005). Concerning common parameters to both models equal value has to be had in each model. In this sense, the combined model can be considered to connote a role as verification of estimated values of parameters. But the combined model has not been verified through investigation. So, in this study, we verify the combined model through comparison between values of various underground parameters estimated by numerical simulations of the combined model and those estimated by underground investigation of Kibedani geyser. Concretely, we compare volume of an underground cave filled with gas and water, depth of the underground cave from the ground and so on estimated by numerical simulations of the combined model with investigation data of Kibedani geyser. Investigation data of Kibedani geyser are original. In this presentation, we will report evaluation of the combined model based on results of this verification and future works.