

Development of data assimilation method for constructing earthquake generation cycle model

Noa Mitsui[1]; Takane Hori[2]; Shin'ichi Miyazaki[3]; Yoshiyuki Kaneda[4]; Kazuro Hirahara[5]

[1] IFREE,JAMSTEC; [2] IFREE, JAMSTEC; [3] ERI; [4] JAMSTEC,IFREE,DONET; [5] Geophysics, Sciences, Kyoto Univ.

To forecast the occurrence of future earthquakes, we should develop a quantitative forecasting model of earthquake generation cycle based on observational data, such as crustal deformation data. Data assimilation of the earthquake cycle model with the observational data is important for this aim. The researcher has presumed model parameters and initial values to reproduce the observational data by trial and error so far. We aim at the development of the method to automatically estimate the distribution of model parameters and initial values using the observational data. We develop the method that consists of two stages (1) the estimation of initial condition using a long term data and (2) the successive data assimilation because of the various time scales of data (crustal deformation and earthquake occurrence interval, etc.).

We use earthquake cycle models with one or two faults here to develop the method using a simple model as much as possible. For effective estimation of the probable distribution on parameters and their initial values, the results using the simple model in this study tell us the following necessary steps; We should do forward modeling systematically and to examine what kind of data is effective in the estimation of each parameter and how parameters are related to one another in earthquake cycle, and we use them as a priori information. We should establish an effective search algorithm for parameters and initial values. Moreover it is necessary to use the algorithm to exclude the parameter range where the observation data are hardly reproduced.