Formulation of FORTRAN Program Package for Seismicity Analysis

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There are various earthquake catalogues in Japan such as the unified Japan Meteorology Agency catalogue whose duration interval amounts to about 85 years. Moreover, duration interval is over 1000 years if historical earthquake catalogues recorded by historical documents are included (e.g. Usami, 2003). Seismicity analyses using these earthquake catalogues have been widely done because these catalogues have fundamental information to understand physics of earthquakes. Seismicity analysis often needs a large quantity of data and therefore, various computer program packages have been developed and published (e.g. Wiemer and Wyss, 1997; Tsuruoka, 1997). For example, a program package called Zmap (Wiemer and Wyss, 1997) written by Mat-lab language has been widely used because this software is substantially superior to previous ones on quick learning and graphical visualization. However, it is not easy to extend the package to include a new analysis of seismicity because explanations for each programs and variables are not necessarily adequate. Great effort is required to modify or improve original program even for minor modification, though the original package enables us to make seismicity analyses quite easily. Therefore, we try to produce a FORTRAN program package which allows easy modification or improvement for seismicity analysis.

This program package mainly consists of three parts, i.e. programs for basic seismicity analysis, such as a program which extracts earthquakes under an arbitrary condition (origin time, earthquake magnitude, hypocentral location...), one for magnitude-frequency distribution, magnitude time diagram, and cumulative magnitude curve, one which estimates spatiotemporal variations of the a- and b- values of the Gutenberg-Richter relationship by using the maximum likelihood method, one which estimates spatiotemporal variation of seismic activity, programs which calculate displacement, strain and stress fields accompanied by fault movement in a semi-infinite homogeneous medium and supplementary ones.

Seismicity analysis included by original program package does not require to open main-program, and all variances and input-output files are totally controlled by parameter file. Moreover, careful explanations on each program and variables are appended in order to make a modification or an improvement easy. Now, we are updating for publication.