

Abstract

The Earthquake Research Institute (ERI) maintained a database mirror with International Seismological Center (ISC) from February 2010. ERI re-build database and make indexes of the ISC database from the dumped text data that saved in DVD-R when we visited to ISC on 2010. ERI updated the database mirror of ISC by Slony-I protocol considering with network band between ISC and ERI. The update is basically carried out once a day and we confirm the number of the records of both database fields after mirroring process. In past 4-year operation, database mirroring is carried out without problems except two times hard disk troubles of mirroring host. From our experience, when a network band is limited, it can conclude that it is very effective and stable to carry out database mirror by Slony-I protocol. ERI converted to the catalogue format of ERI's tool from ISC database mirror using SQL search query. Then, we offered ISC catalogue data with World Wide Web pages of Seismicity Analysis Tool: TSEIS (<http://www.eri.u-tokyo.ac.jp/tseis/isc/>) which developed in ERI. TSEIS system has many functions of hypocenter map, magnitude time plot, cumulative number time plot, cross section plot and focal mechanism plot etc. by inputting web forms. The usage of this web tool increases year by year, and this system was provided more than ten years.

In the near future, we will add a function of global standard seismicity analysis algorithm such as Epidemic Type Aftershock Sequence (ETAS). We will also develop the direct access to ISC database mirror from TSEIS system.

DataBase mirror Procedure ISC-ERI

ISC database size in PostgreSQL format is over 70GB. If we mirror it by using rsync etc., it is time consuming. Because ISC-ERI network band is not wide (=40KB/s). So, we do database mirror between ISC and ERI by using Slony-I protocol. This protocol is very simple and stable. If ISC database is updated, then difference of latest and old one created with SQL sentences. ERI download it then updated ERI's ISC database.

We checked the consistency of ISC and ERI database with the number of fields of table. We show a check result of this procedure in Fig. 1.

ISC Field	Count
isc.agency	477
isc.amplitude	25344117
isc.association	138618054
isc.event	7525084
isc.fault_planes	181556
isc.hypoc_acc	6650380
isc.hypoc_err	5830868
isc.hypocenter	6758377
isc.hypocenter_misc	273736
isc.intensity	102872
isc.last_date	103
isc.moment_tensor	536935
isc.moment_err	41159
isc.netbag	7103264
isc.network_quality	7471879
isc.phase	107159383
isc.phase_info	5782956
isc.phase_misc	2357001
isc.principal_axes	82777
isc.pub_comments	6735318
isc.report	155825
isc.scalar_moment	85936
isc.site	17501
isc.staagg	24404707
isc.sta	489359
isc.sta_summarystats	5274
isc.sta_timehistory	363945
isc.firstp_defining	32198494

Fig1. check sheet of ISC database mirror

ETAS analysis tool

TSEIS web page does not have ETAS analysis module now. We have developed standalone tool: XETAS. In the following, we show a case study of North Nagano Prefecture activity in Japan. This tool is now available at <http://www.eri.u-tokyo.ac.jp/tsuru/software/>.

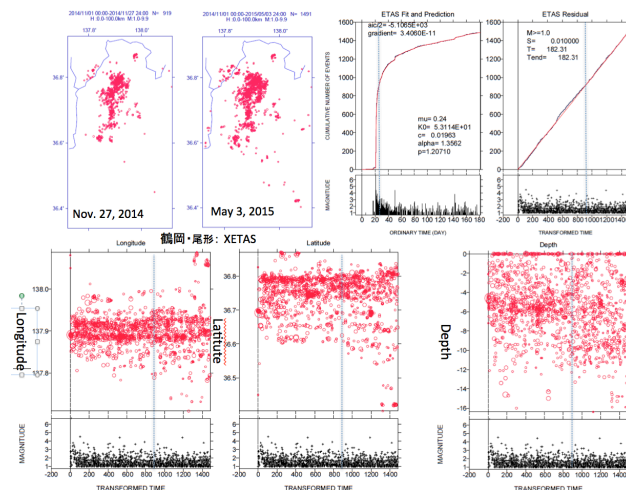
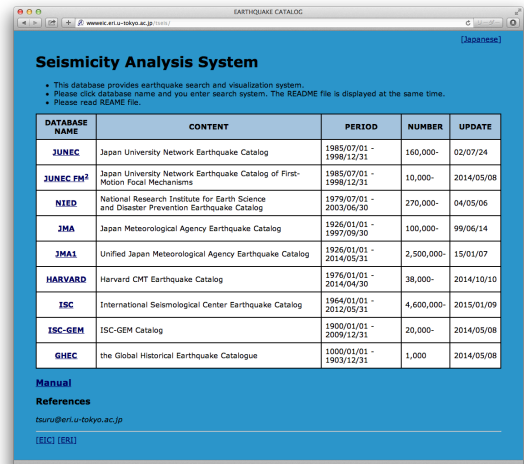


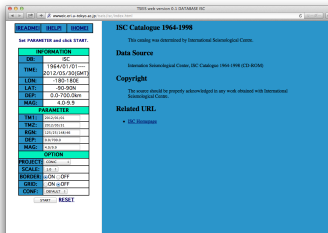
Fig.2 Example of the outputs of the visualization package 'XETAS' which applies Omori-Utsu formula or ETAS model to monitor seismic activity and aftershock activity.

Seismicity Analysis Tool: TSEIS

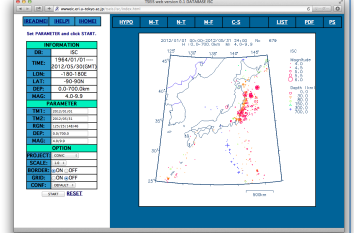
For a number of years ERI has been maintaining a database and a search and analysis tool that allowed researchers to use various earthquake catalogues. In addition, ISC database is available at <http://www.eri.u-tokyo.ac.jp/tseis/isc/>. This tool has many functions to search catalog, to plot figures and to output PDF format files.



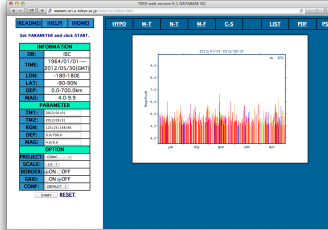
Main page of catalog



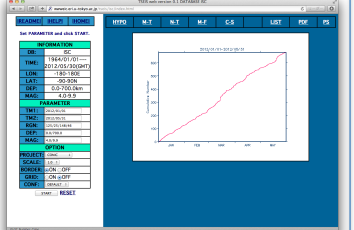
Map



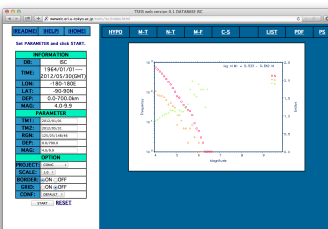
M-T plot



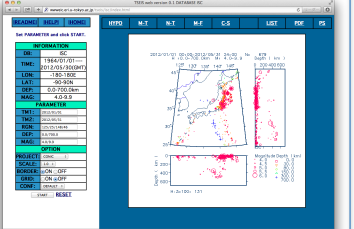
N-T plot



Magnitude-Frequency plot



Cross-Section plot



List output

PDF output

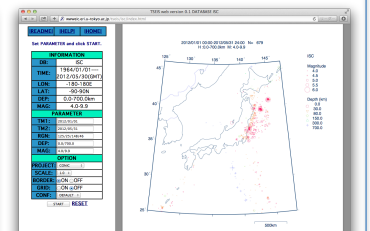


Fig. 3 Snapshot images of TSEIS tool web page.