

The 3rd call for earthquake forecast models

Research group "Earthquake Forecast System based on Seismicity of Japan (EFSSJ)" (the group's secretariat is located at Earthquake Research Institute (ERI)) in collaboration with Collaboratory for the Study of Earthquake Predictability (CSEP)

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Last modified on August 2011

[Japanese version webpage](#)

1. Introduction

We call for earthquake forecast models for the 3rd round of the earthquake forecast testing experiment in Japan, carried out as the Japanese node of an international project "Collaboratoy for the Study of Earthquake Predictability (CSEP)" (For more information on the experiment, see the special issue [Earth Planets Space 63(3), 2011]). This is the same as the 1st call and the 2nd call. The difference from the former two is that, this time, we do not call for models in the 3-year class. More importantly, modelers are encouraged to take into account the effect of the 11 March 2011 Mw9.0 off the Pacific coast of Tohoku Earthquake on model optimization. Because seismicity is expected to remain high in all parts of Japan over the coming years, forecasts generated by the models submitted before the quake may not be skillful and reliable anymore. Thus, if you would like to withdraw your models from the experiment, please contact us. Further, before the model submission deadline, we can provide modelers with two types of the JMA catalogs in the CSEP format for model optimization and development: one is the catalog complete with final solutions for the earthquake parameters from 1 January 1965 to 28 February 2011 and the other is the preliminary determination of epicenters (PDE) catalog from 1 March 2011 to 1 August 2011 (as of 3 August 2011).

Testing class: 1-day • 3-month • 1-year

Submission deadline: 31 October 2011

Start date of the experiment: 1 November 2011

Please send a submission form and forecast models to the Testing Center (ZISINyosoku-submit@eri.u-tokyo.ac.jp).

- Submission form ([Japanese,English](#))
- Earthquake forecast model (Program code or numerical table and README file)

!! Attention !! How to access data

Most of forecast models require data sources such as earthquake catalogs for model development and optimization. If the JMA earthquake data are needed for such purpose, please e-mail the Testing Center. We can provide modelers with two types of the JMA catalogs in the CSEP format. One is the catalog complete with final solutions for the earthquake parameters from 1 January 1965 to 28 February 2011 and

the other is the preliminary determination of epicenters (PDE) catalog from 1 March 2011 to 1 August 2011. Note that the PDE catalog, updated and revised daily, often contains erroneous locations and incomplete listings, even for large events. Ongoing process to detect and locate earthquakes by JMA is given in Table 1 (as of 3 August 2011).

Table 1. Ongoing process to detect and locate earthquakes by JMA (as of 1 August 2011)

Period	Magnitude	Status	Open/Close	Memo
~ Feb 28 2011	all magnitudes	finalized catalog	Open	--
Mar 1 ~ Mar 10	M 3	PDE catalog	Open	--
Mar 11 ~ Mar 12	M 5	PDE catalog	Open	--
--	M 5	in progress	not yet	--
Mar 13 ~ May 31	M 5	PDE catalog	Open	--
--	4 M < 5	in progress	Middle Oct 2011	--
--	3 M < 4	in progress	End of 2011	--
Jun 1 ~ July 30	M 3	PDE catalog	Open	Tohoku : M > 1.5 Kanto · Chubu : M > 0.5 ~ 1 (Boso off to South Ibaraki M 2)

Below is a brief description of the 3rd-round call-for-models. This is the same as the 1st call and the 2nd call. But, this time, we do not call for models in the 3-year class.

2. The Rules of the Experiment

Our approach is based on the CSEP testing centers that are modeled after the RELM: Refer the RELM special issue [Seismol. Res. Lett., 78(1), 2007] and the CSEP website. A summary of the game's rules specific to Japan is given below.

- 2.1. Participants and release of test results
 - 2.1.1. Modelers: Researchers who submit their earthquake forecast models: each model provides with a prospective earthquake forecast. Models cannot be withdrawn from the test without agreement of the Testing Center.
 - 2.1.2. Testing Center: The facility with the CSEP infrastructure at ERI. Each earthquake forecast model is submitted to this Center and is evaluated independently from the modeler. All forecast results are stored: therefore additional prospective tests can be integrated at later stages without compromising integrity of prospective testing experiment.
 - 2.1.3. Release of test results: The information on test results is closed to public access. But password-protected web pages will be used to allow a participant community to access this information.
- 2.2. Testing regions
 - 2.2.1. Region that covers Japan (Fig. 1: [eps](#), [jpg](#)) for a depth range $d \leq 100$ km with a node spacing of 0.1° .
 - 2.2.2. Region that covers the Japan's mainland (Fig. 2: [eps](#), [jpg](#)) for $d \leq 30$ km with a node

spacing of 0.1 °.

- 2.2.3. Region that covers Kanto (Fig. 3: [eps](#), [jpg](#)) for $d \leq 100$ km with a node spacing of 0.05 °.
- 2.3. Testing classes
 - 2.3.1. 1-day forecast: Forecast models must define a number of earthquakes for each magnitude bin in the magnitude range $4.0 \leq M \leq 9.0$ (0.1 magnitude unit steps) at each node for consecutive 1-day time windows, each starting at midnight in Japanese Standard Time. The magnitude step $M = 4.0$ covers the magnitude range $3.95 \leq M < 4.05$.
 - 2.3.2. 3-month forecast: Same as (2.3.1) but the time-window length is 3 months.
 - 2.3.3. 1-year forecast: Same as (2.3.1) but the time-window length is 1 year and the magnitude range is $5.0 \leq M \leq 9.0$ (0.1 magnitude unit steps).
- 2.4. Future earthquakes that will be forecast: The official bulletin for future earthquakes is the revised JMA bulletin. No declustering is applied to the JMA catalog. In other words, models will be evaluated against observed earthquake data in the JMA nondeclustered catalog using the forecast evaluation methods described below (2.5).
- 2.5. Forecast evaluation methods: In spite of the testing regions (2.2) and testing classes (2.3), the official suite of tests used in the CSEP is used. Current CSEP standards include N-, L-, S-, M- and R-Tests ([Schorlemmer et al., 2007](#), [Zechar et al., 2010](#)), and CL-test ([Werner et al., 2011](#) submitted).

3. Earthquake Forecast Model Submission

Program code or numerical table will be submitted for each forecast model. Before model submission, each modeler must download (a) and (b), depending on your choice among the testing regions (2.2) and testing classes (2.3).

- (a) GridML: List of nodes (list of longitude-latitude pairs), each at which forecast numbers of events for a predefined magnitude range are computed. For example, the node (122.45 24.15) represents the center of the box with the four edges (122.4 24.1), (122.4 24.2), (122.5 24.2), and (122.5 24.1) for the case of a node spacing of 0.1 °.
- (b) ForecastML template: Template of a numerical table containing forecast numbers of events. Each model must output a numerical table in the format according to the template. Because of large file size, you may consider these points.
 - Modelers may download a zip file containing one template file that have been compressed to reduce file size.
 - Right-click on the "Uncompressed" and choose "Save Link As ..." from the context menu for downloading an uncompressed (original) template file.
 - It may take a long time to open the template, when using a XML editor. An alternative is to use a simple word processor such as WordPad.
- Region that covers Japan (2.2.1)
 - 1-day forecast (2.3.1): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
 - 3-month forecast (2.3.2): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
 - 1-year forecast (2.3.3): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
- Region that covers the Japan's mainland (2.2.2)
 - 1-day forecast (2.3.1): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
 - 3-month forecast (2.3.2): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
 - 1-year forecast (2.3.3): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
- Region that covers Kanto (2.2.3)
 - 1-day forecast (2.3.1): (a) [GridML](#); (b) ForecastML template ([Zipped](#), [Uncompressed](#))
 - 3-month forecast (2.3.2) : (a) [GridML](#); (b) ForecastML template ([Zipped](#),

Uncompressed)

- 1-year forecast (2.3.3): (a) GridML; (b) ForecastML template (Zipped, Uncompressed)

Each modeler will collaborate with staff members of the Testing Center in order to work on installation and function-check of his or her program code.

A modeler who cannot make his or her code as an open source for the 1-year testing class (2.3.3) submits a numerical table formatted according to (b). In this case, the modeler must understand that his or her model will be considered as a new participant in a planned experiment, because of no warranty to ensure objectivity on the use of the model same as that used in the present experiment. We thus encourage program-code submission.

4. Contact information

The secretariat (N. Hirata, H. Tsuruoka, K. Z. Nanjo, S. Yokoi) of the research group "Earthquake Forecast System based on Seismicity of Japan (EFSSJ)" is responsible for the Testing Center at Earthquake Research Institute, University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, 113-0032 Tokyo, Japan.

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- Website: <http://www.eri.u-tokyo.ac.jp/ZISINyosoku>

5. Figures

- Fig. 1. Testing region (in blue) that covers Japan (2.2.1; eps, jpg). Forecast analysis is done at nodes "+".
- Fig. 2. Testing region that covers the Japan's mainland (2.2.2; eps, jpg). See the caption in Fig. 1.
- Fig. 3. Testing region that covers Kanto (2.2.3; eps, jpg). See the caption in Fig. 1.