

# The NIED 2012 Seismic Hazard Model for Japan

The GEM hazard team is currently working in close collaboration with NIED scientists at the implementation of the 2012 (Model 2) PSHA Model for Japan. A proper implementation of this model requires structural changes to the hazard component of the OpenQuake-engine. These improvements will be added in 2015.

The Japan national models are described in the online reports prepared by the [National Research Institute for Earth Science and Disaster Prevention \(NIED\)](#), downloadable from the Japan Seismic Hazard Information Station [website](#). The report for the 2012 version is only available in Japanese; the most recent report available in English is the one describing the 2009 model [Fujiwara et al. \(2009\)](#).

## The seismic source model

The NIED 2012 seismic source model contains different source typologies:

- Rectangular faults [Type 1]
- Non-rectangular faults [Type 2]
- Discretised rectangular source faults [Type 3]
- Discretised rectangular ruptures without specified fault sources [Type 4]
- Zoning areas

## The ground motion model

The NIED 2012 ground motion model includes a single ground motion prediction equation, the [Si and Midorikawa \(1999, 2000\)](#) ground motion prediction equation. This ground motion model computes the ground produced by earthquake sources included in three distinct tectonic environments: earthquakes in active shallow crust, subduction interface events and intraslab events.

## References

- Fujiwara, H., Kawai, S., Aoi, S., Morikawa, N., Senna, S., Kudo, N., Ooi, M., Hao, K. X., Wakamatsu, K., Ishikawa, Y., Okumura, T., Ishii, T., Matsushima, S., Hayakawa, Y., Toyama, N. and Narita, A. (2009). "Technical reports on national seismic hazard maps for Japan." Technical note of the National Research Institute for Earth Science and Disaster Prevention, Vol. 336.
- Si, H. and Midorikawa, S. (1999). New attenuation relationships for peak ground acceleration and velocity considering effects of fault type and site condition. J. Struct. Constr. Eng. AIJ 523, 63-70 (in Japanese with English abstract)
- Si, H. and Midorikawa, S. (2000). New attenuation relationships for peak ground acceleration and velocity considering effects of fault type and site condition. In Proceedings of the 12th World Conference on Earthquake Engineering [Online version](#)

# Model summary table

This table summarises the main characteristics of the original implementation of this model

<b>1</b>	<b>Datasets availability</b>	
1.1	Earthquake catalogue	This model is built using many catalogues most of them available (e.g. Utsu catalogue, JMA catalogue)
1.2	Geological database	Information about faults is distributed though the <a href="#">J-SHIS Website</a>
1.3	Strong-motion database	There's no direct link between a strong motion database and the GMPEs selected for the calculation of hazard based on this model.
1.4	Site characterization database	The database describing local soil condition is available on the <a href="#">J-SHIS Website</a> .
<i>Notes</i>		
<b>2</b>	<b>Methodology for model development</b>	
2.1	Scientific participation (SSHAC levels) and review process	The preparation of the model follows a well defined process which involves a large portion of the Japanese scientific community.
2.2	Documentation describing model preparation	Many of the methodologies adopted are described in <a href="#">Fujiwara et al. (2009)</a>
2.3	Codes used for model preparation	Not available
<i>Notes</i>		
<b>3</b>	<b>PSHA input model</b>	
3.1	<b>Seismic Source Model</b>	
3.1.1	Area sources	Included
3.1.2	Grid sources	Not included
3.1.3	Crustal faults	Included
3.1.4	Subduction faults	Included
3.1.5	In-slab seismicity	Included
3.1.6	Non-parametric ruptures	Included
3.1.7	Magnitude-area scaling relationships	See Appendix 1 of <a href="#">Fujiwara et al. (2009)</a>
3.2	<b>Ground Motion Model</b>	
3.2.0	Tectonic regionalisation	Included
3.2.1	Models for active shallow seismicity	Included
3.2.2	Models for subduction interface	Included
3.2.3	Models for subduction intraslab	Included
3.2.4	Models for stable continental regions	Not included
3.2.6	Models for volcanic areas	Not included
3.3	<b>Site Response Model</b>	
3.2.5	Models for deep non-subduction sources	Not included
3.3.1	Based on GMPEs	Yes
3.3.2	Based on site-response analysis	No
3.4	<b>Epistemic uncertainties</b>	
3.4.1	Seismic Source Model	Included for some sources

3.4.2	Ground Motion Model	Not included
3.4.3	Site Response Model	Not included
<i>Notes</i>		
<b>4</b>	<b>Hazard Input Description</b>	
4.1	Hazard input document	
4.2	Input files	Available
<i>Notes</i>	Information describing the input can be downloaded from this website: <a href="http://www.j-shis.bosai.go.jp/">http://www.j-shis.bosai.go.jp/</a>	
<b>5</b>	<b>Calculation</b>	
5.1	Software	Not available
5.2	<b>Results</b>	
5.2.1	Hazard curves	Available
5.2.2	Hazard maps	Available
5.2.3	Uniform hazard spectra	Not available
5.2.4	Disaggregation	Not available
5.2.5	Stochastic event sets	Not available
5.2.6	Ground motion fields	Not available
<i>Notes</i>	The results of the calculation can be downloaded from this website: <a href="http://www.j-shis.bosai.go.jp/">http://www.j-shis.bosai.go.jp/</a>	

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