

New Japan PSHA based on the new long-term evaluation

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Background

- ◎ The new 「Long-term evaluation for earthquakes along Hyuganada to Ryukyu Islands (2nd edition)」 was published in 2022.
- ◎ The seismic activity model for NSHMJ is required to be updated based on this “Long-term evaluation”.

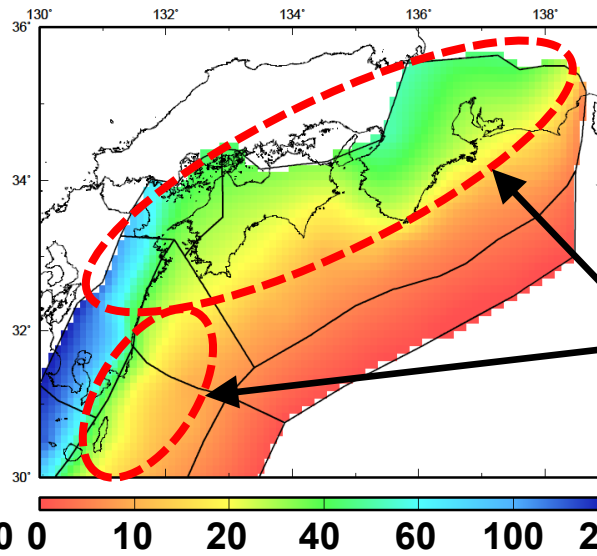
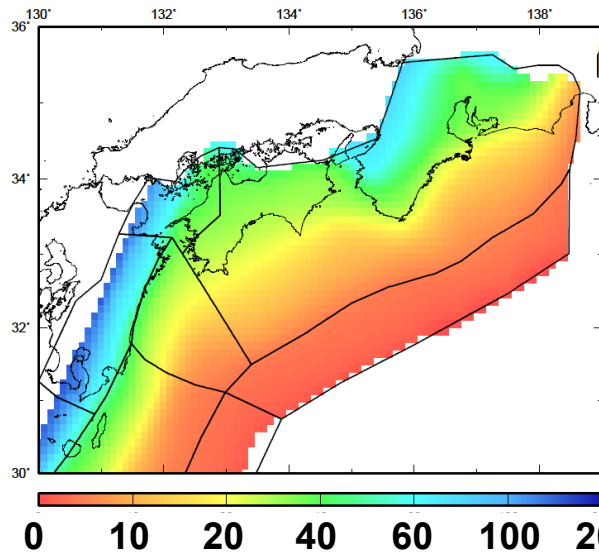
New Seismic Activity Model based on the New Long-Term Evaluation by HERP (2022)

Earthquake(s) in LTE	NSHMJ (2020 ver.)	New Model
M8-class EQs in Hyuga-nada	Not considered	M8-class EQs in Hyuga-nada
M7-class EQs in Hyuga-nada	Inter-plate EQs (M7.6)	M7-class EQs in Hyuga-nada
	Inter-plate EQs (M7.1)	
Intra-plate EQs in Aki-nada	Background EQs	Background EQs
Intra-plate EQs in central Kyushu	Background EQs	Background EQs
Intra-plate EQs in the Ryukyu Islands		Background EQs
M8-class inter-plate EQs in Ryukyu Islands (including around the Yonaguni Island)	Not evaluated (modeled as background EQs)	Background EQs
M7-class inter-plate EQs in the Ryukyu Islands	Background EQs	Background EQs
M7-class EQs around the Yonaguni Island	EQ (M7.8)	Background EQs
Tsunami EQs like the 1771 type	Not considered	Background EQs

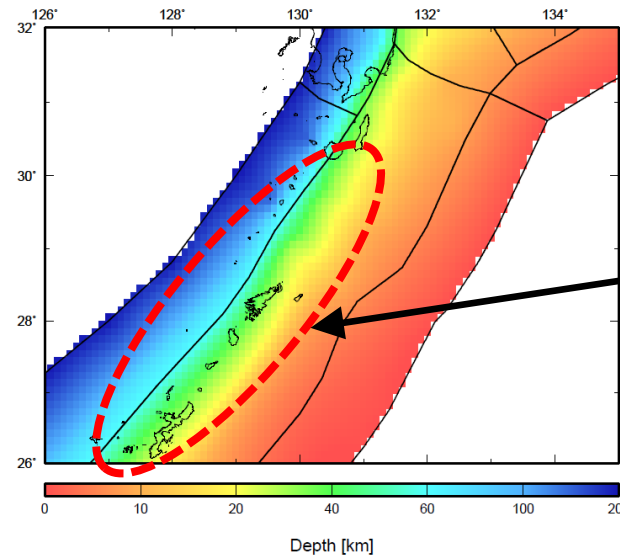
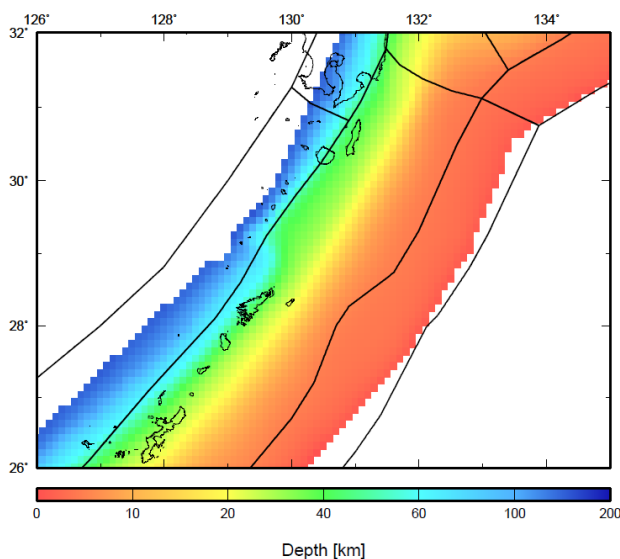
Top depth of the Philippine Sea Plate

(1) NSHMJ (2020 ver.)

(2) New Model



The upper surface of the Philippine Sea Plate is shallower in the new model.

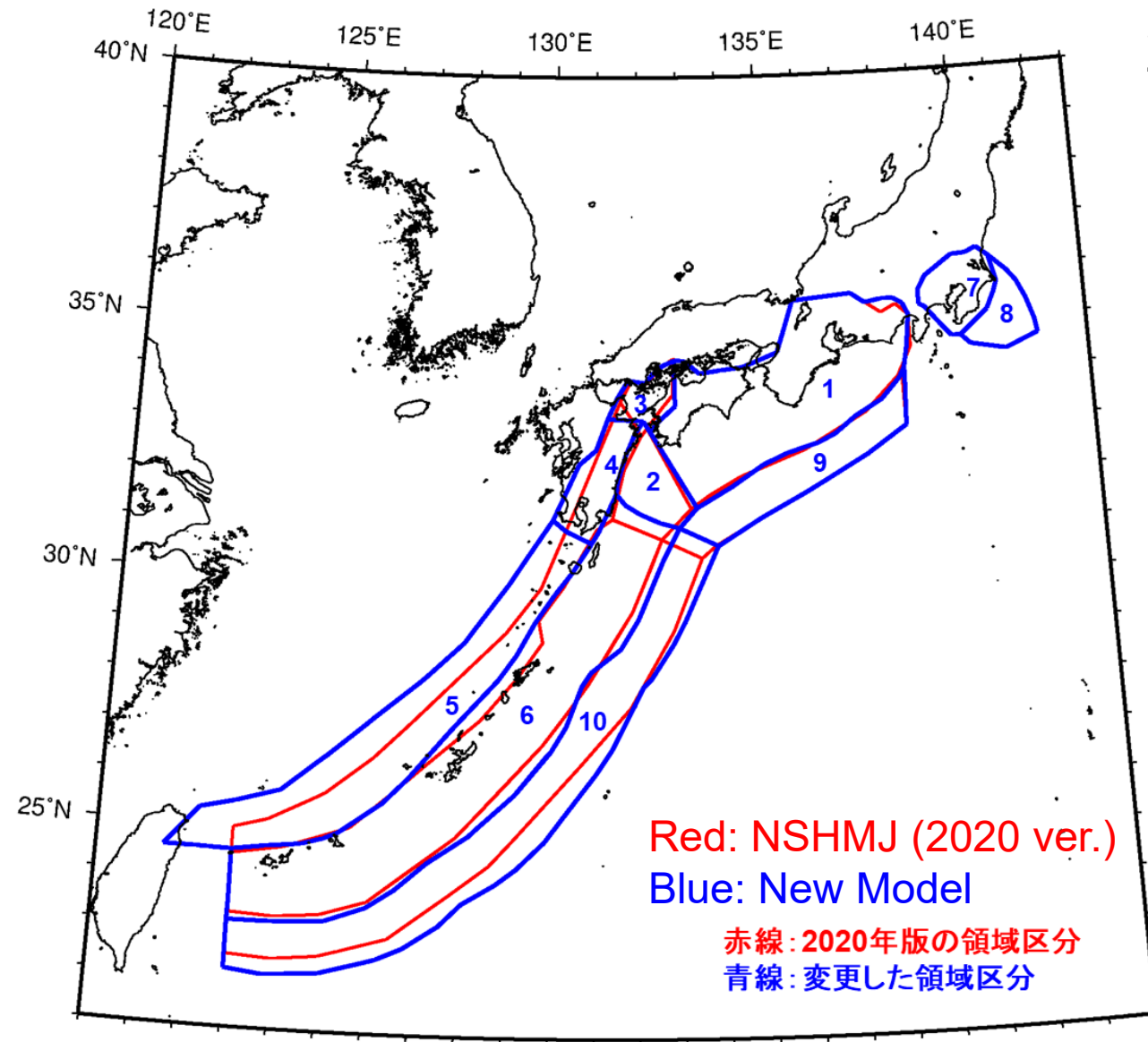


The upper surface of the Philippine Sea Plate is shallower in the new model.

Background EQs in Philippine Sea Plate

- Not only the shape of the subducting plate but also the zone shapes are changed based on the new long-term evaluation.

No.	Mmax
1	8.0/8.0
2	6.9/6.9
3	- /8.0
4	- /8.0
5	- /8.0
6	8.5/8.0
7	7.8/7.3
8	7.8/7.3
9	- /8.0
10	- /8.0

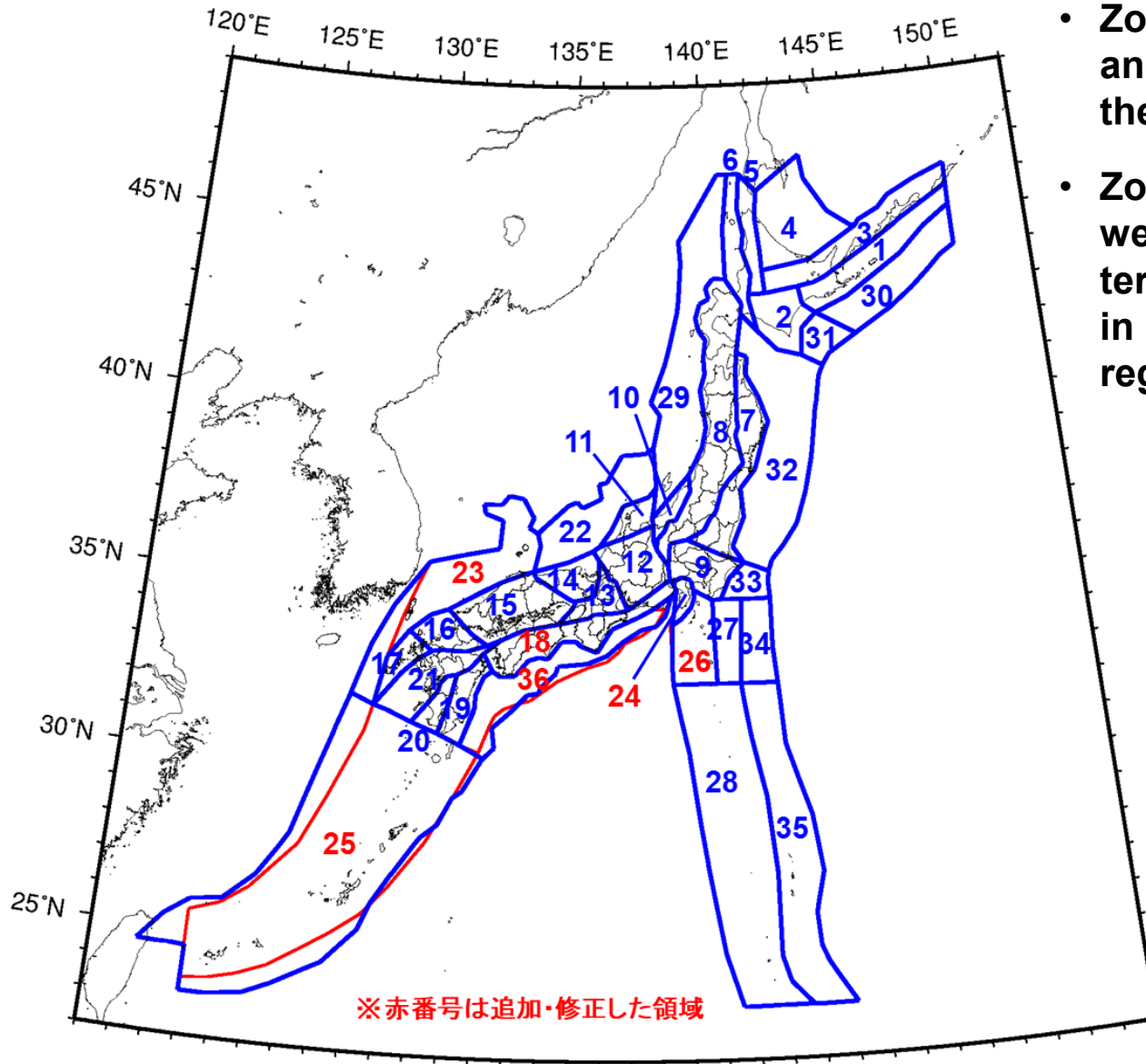


Inter-plate/intra-plate

Background Shallow Crustal EQs

- Zone shapes for Nos. 16, 25 and 36 are changed based on the new HERP's Evaluation.
- Zone No. 23 is extended to westward based on the “long-term evaluation for active faults in southwestern Japan Sea region” by HERP

No.	Mmax
22, 23, 25, 28, 30-36	7.5
Others	7.3



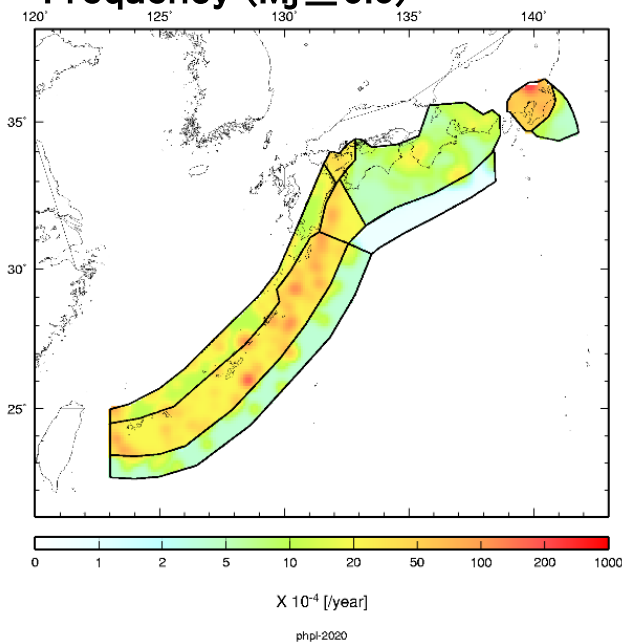
Background EQs in Philippine Sea Plate

(1) NSHMJ (2020 ver.)

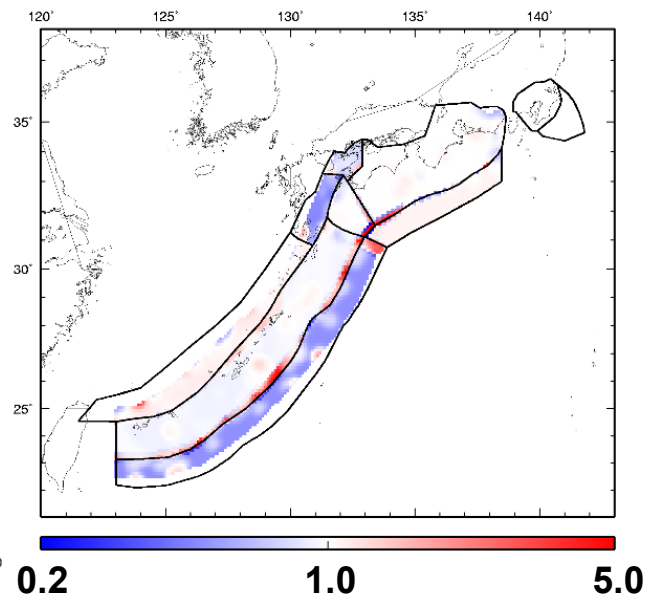
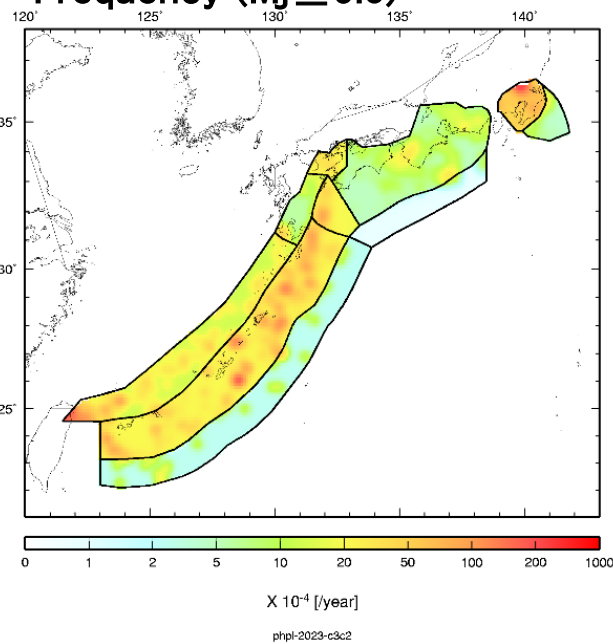
(2) New Model

(3) Ratio
((2) / (1))

Frequency ($M_j \geq 5.0$)



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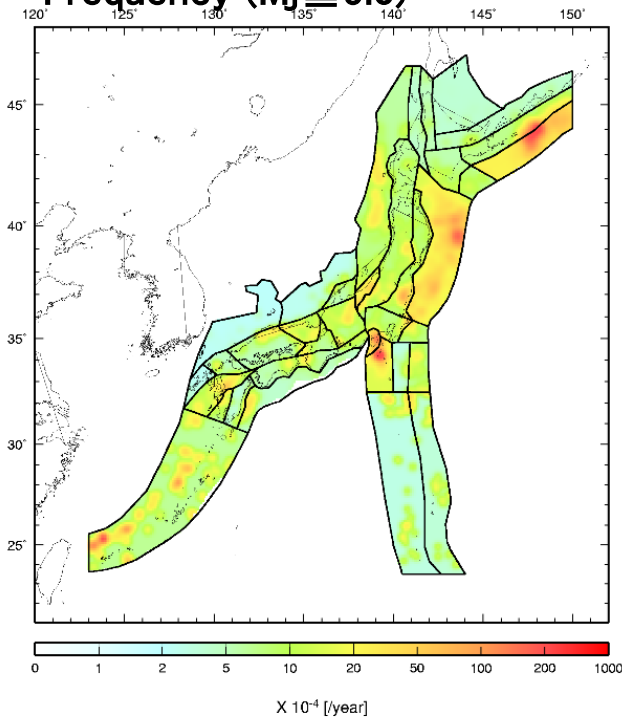


※ Inter-plate EQs + Intra-plate EQs

Background Shallow Crustal EQs

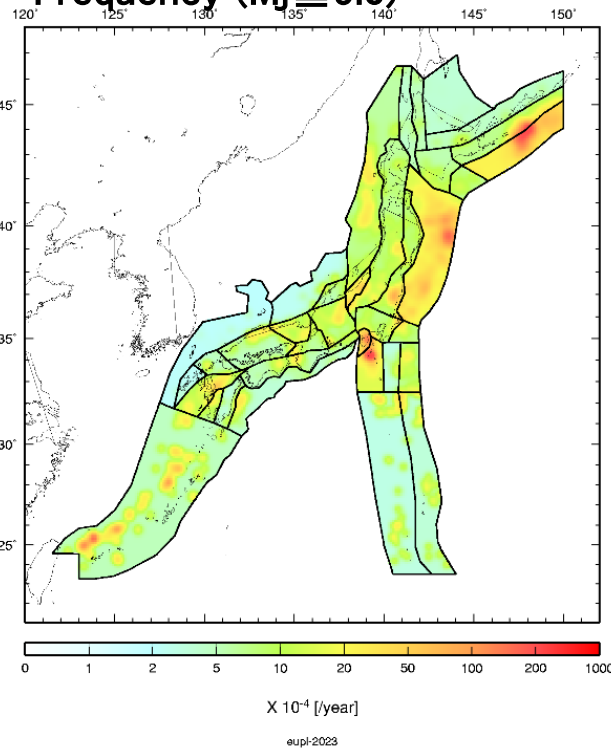
(1) NSHMJ (2020 ver.)

Frequency ($M_j \geq 5.0$)

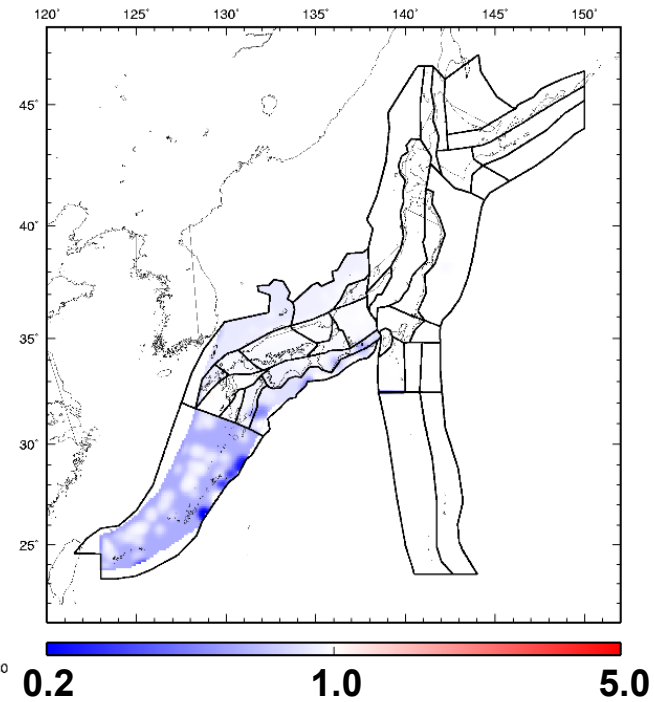


(2) New Model

Frequency ($M_j \geq 5.0$)



(3) Ratio
((2) / (1))



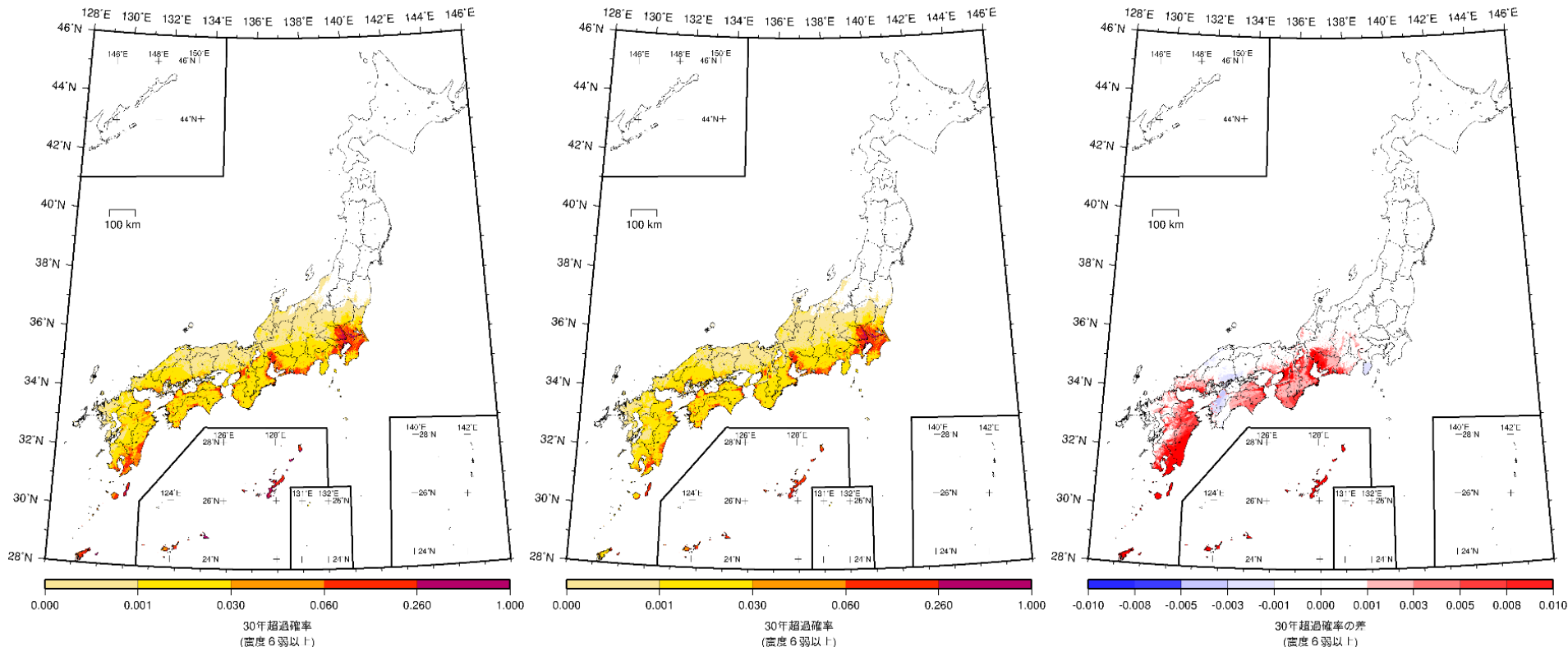
Background EQs in Philippine Sea Plate

Probability of Exceedance (PEX) of $I_{JMA} \geq 6$ -lower within 30 years

(1) NSHMJ (2020 ver.)

(2) New Model

(3) Diff. of PEX
((2) - (1))



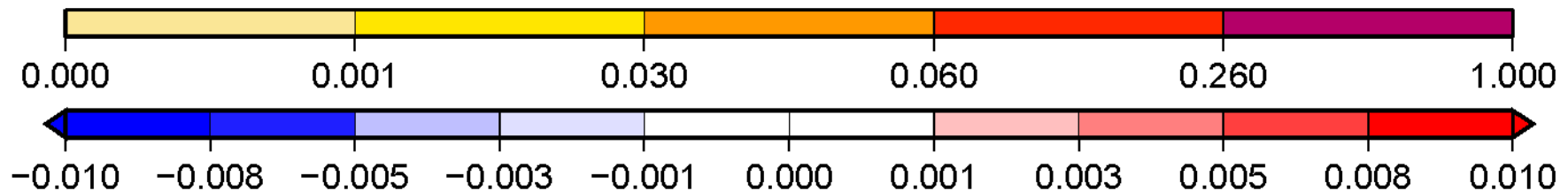
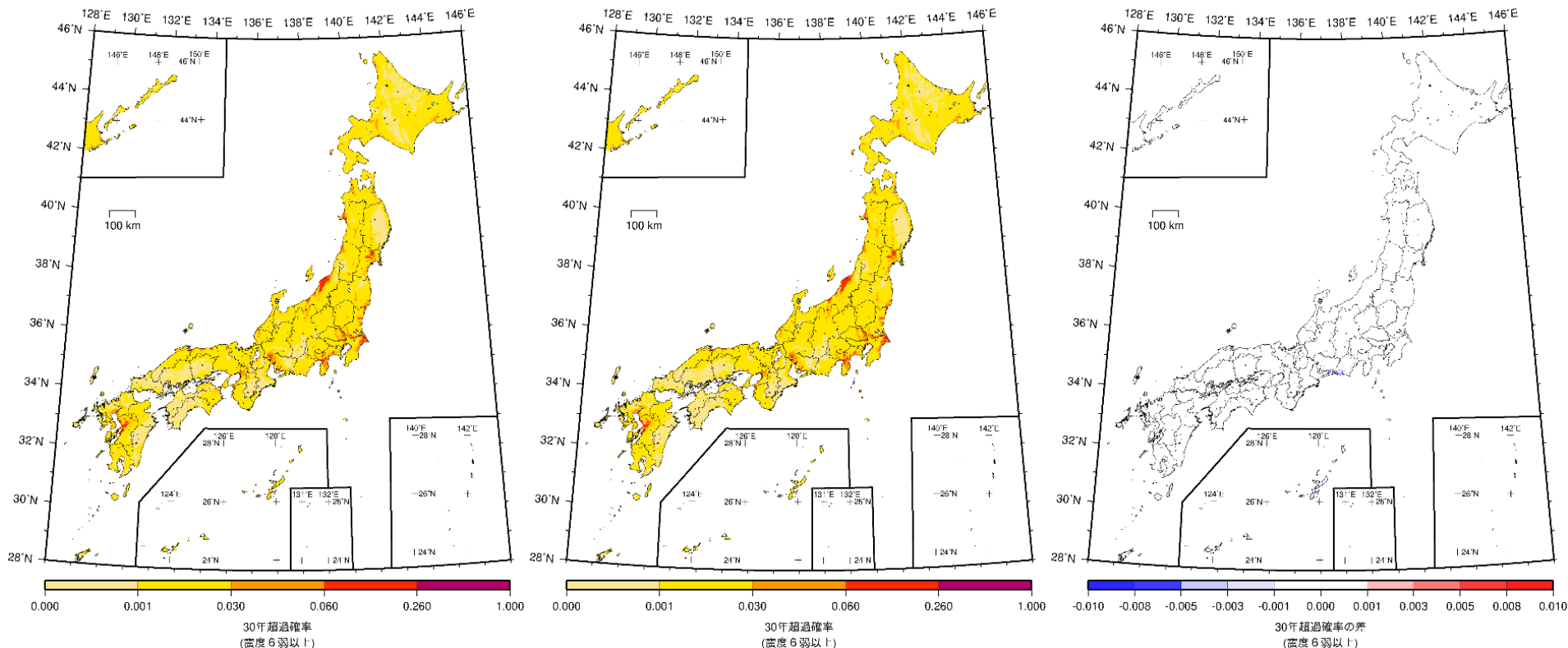
Background Shallow Crustal EQs

Probability of Exceedance (PEX) of $I_{JMA} \geq 6$ -lower within 30 years

(1) NSHMJ (2020 ver.)

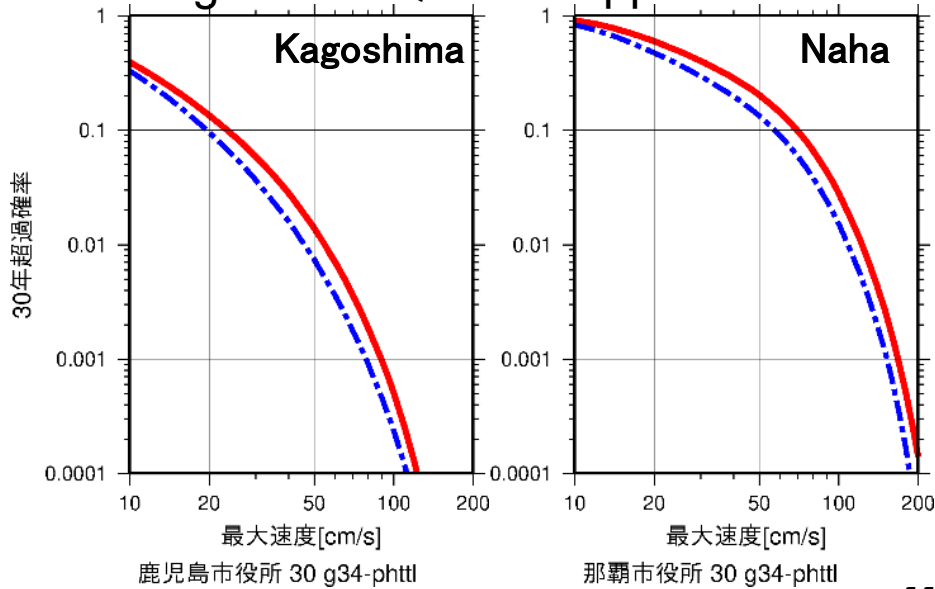
(2) New Model

(3) Diff. of PEX
((2) - (1))

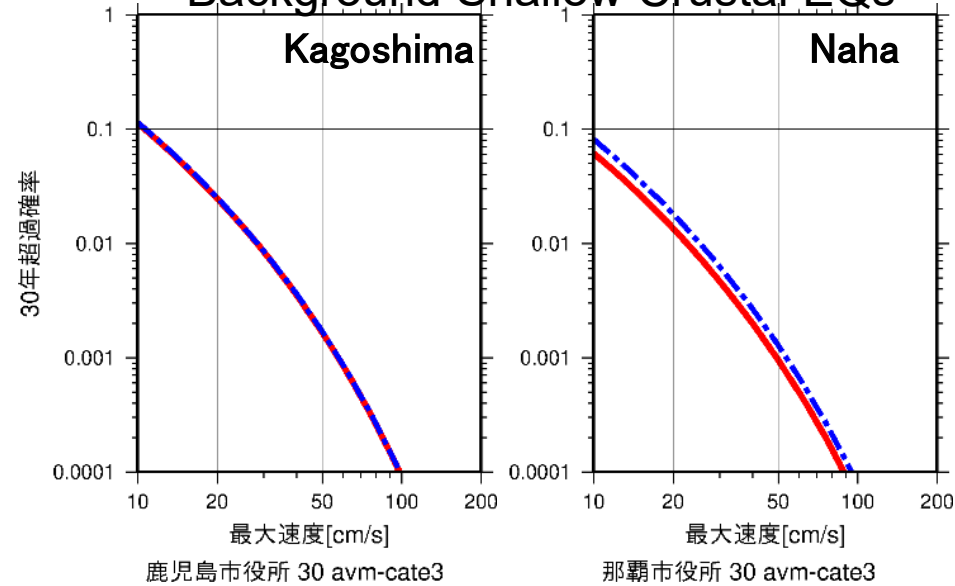


Hazard Curves of Peak Vel. on Engineering Bedrock

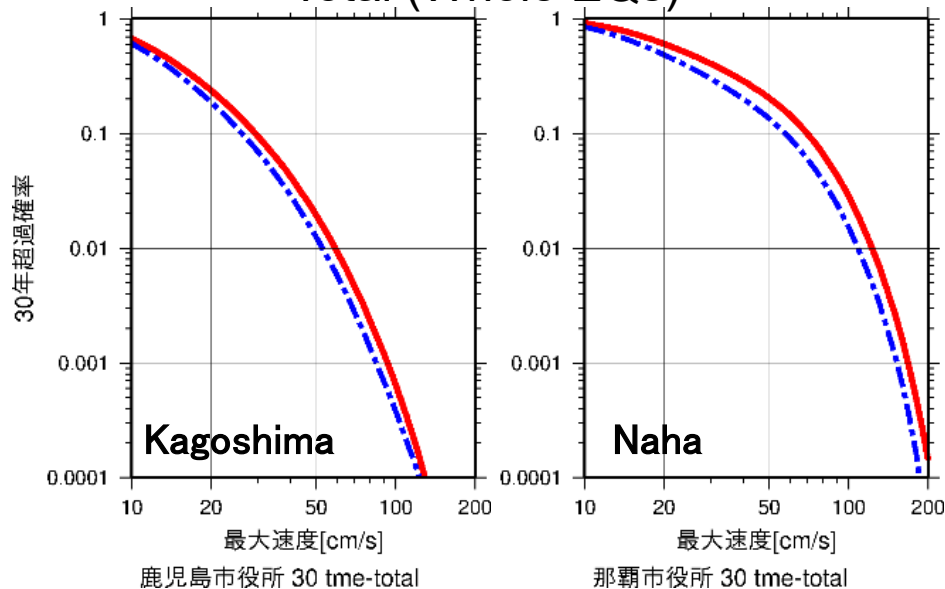
Background EQs in Philippine Sea Plate



Background Shallow Crustal EQs



Total (Whole EQs)



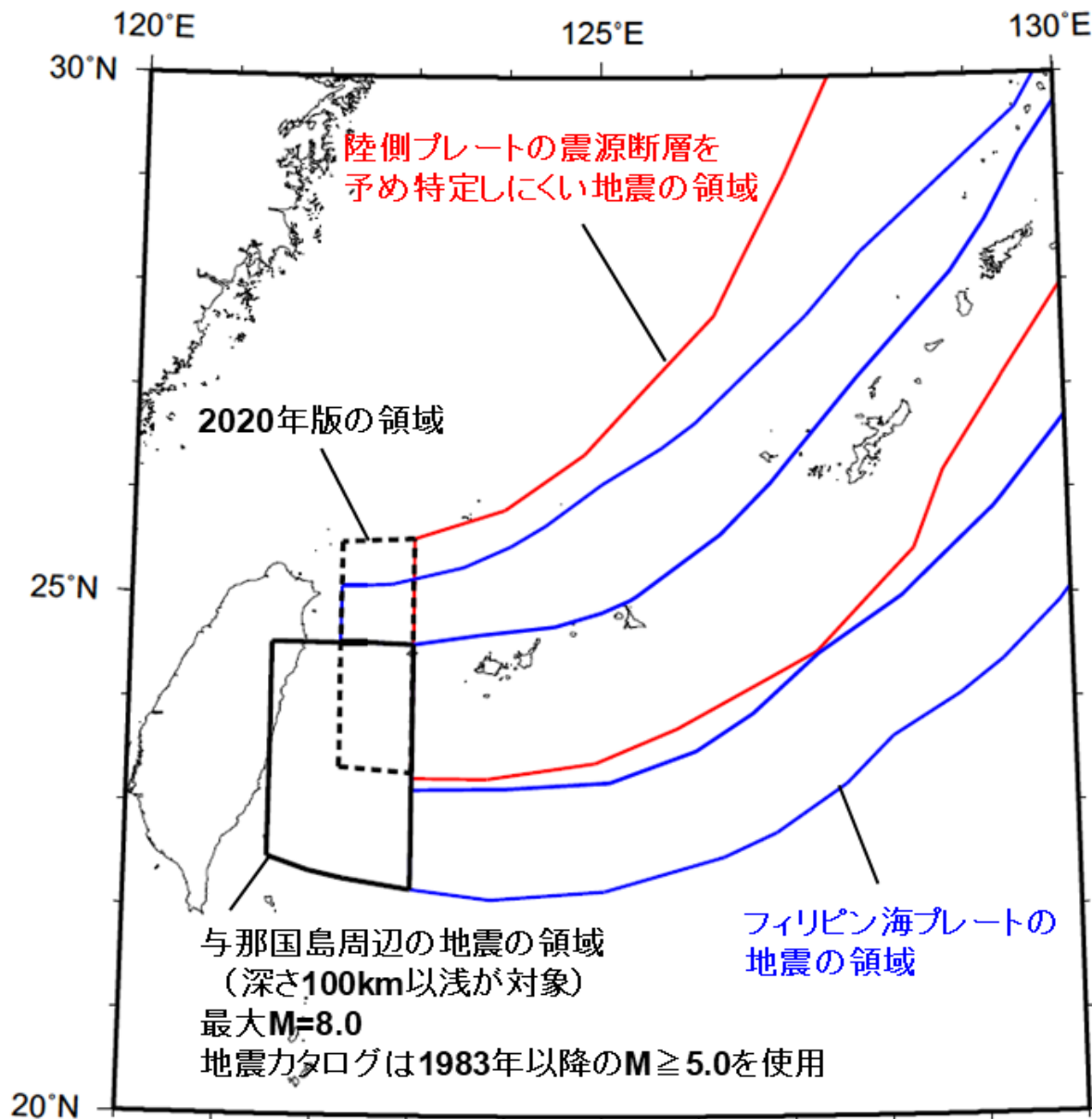
Blue: NSHMJ (2020 ver.)

Red: New Model

Seismic Hazard Assessment using new model

- ◎ We updated the seismic activity model of background earthquakes based on the new "Long-term evaluation for earthquakes along the Hyuganada and Ryukyu Islands" by HERP.
- ◎ The level of seismic hazard in the Ryukyu Islands region is increased from the National Seismic Hazard Maps for Japan (2020 version)
- ◎ The main reason for the increase in hazard level is that the upper surface of the Philippine Sea Plate is shallower than in the current model. As a result, the minimum distances to the source faults for subduction earthquakes have been shortened, and the ground motions have become larger.
- ◎ We are preparing to introduce this model in the next version of NSHMJ
- ◎ Modeling that takes the slip rate into account is a future issue.

与那国島周辺の震源断層を予め特定しにくい地震

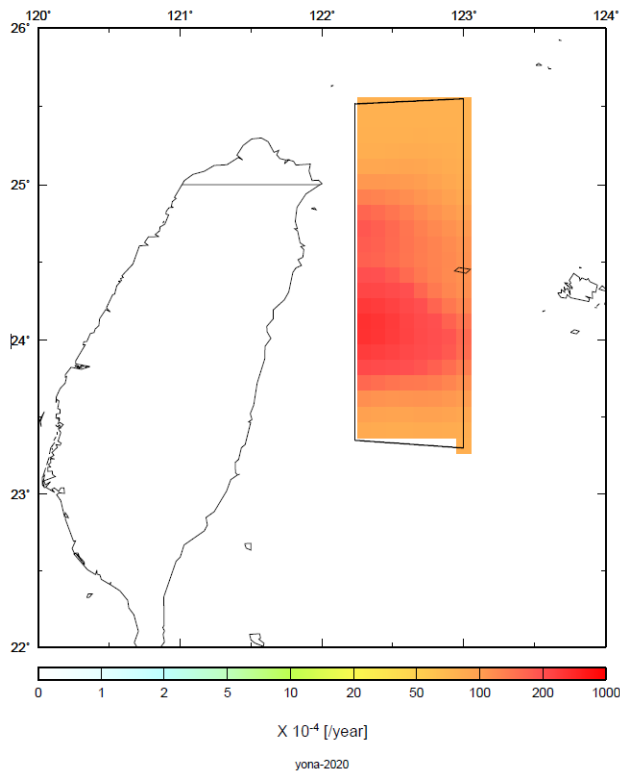


- 与那国島周辺の西端は評価対象となった地震の震央を包含する東経121.5度に設定
- 地殻内地震、プレート間地震、プレート内地震の区別をせずにモデル化
- 「巨大地震」が評価されていることを考慮して最大マグニチュードは 8.0 に設定
- 現モデルにおける北半分の領域はフィリピン海プレートの地震、陸側プレートの浅い地震の領域を拡張

与那国島周辺の震源断層を予め特定しにくい地震

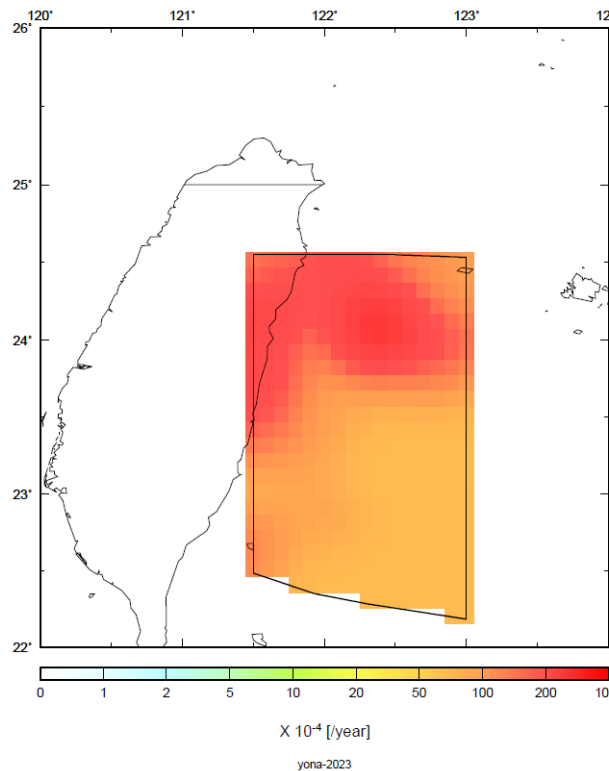
(1) 確率論的地震動予測地図 2023年起点 (=2020年版)

$M \geq 5.0$ 頻度



(2) 新モデル案

$M \geq 5.0$ 頻度



(3) 頻度の比 ((2) / (1))

注: 2020年版の領域外も白

