Nat. Hazards Earth Syst. Sci. Discuss., 3, C3418–C3428, 2016 www.nat-hazards-earth-syst-sci-discuss.net/3/C3418/2016/
© Author(s) 2016. This work is distributed under the Creative Commons Attribute 3.0 License.



### **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

# Interactive comment on "Importance of three-dimensional grids and time-dependent factors for the applications of earthquake forecasting models to subduction environments" by C.-H. Chan

C.-H. Chan

chchan@ntu.edu.sg

Received and published: 3 June 2016

Dear Sir/Madam,

I appreciate your constructive comments. I quoted those comments, which follow with my responses. All of the changes are marked with underlines in the revised manuscript.

1) explain better how the Molchan diagram computation was done.

I follow this comment and include additional description and explanation for the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



Molchan diagram in Chapter 5.1 (Lines 266-287).

2) Chapter 5.1: check your conclusions with the results show in the figure 8 and 9. I think that there is a misinterpretation of the results. I suggest to read this work: https://gji.oxfordjournals.org/content/172/2/715.full

Thanks for the reference. I revised the manuscript and included the null hypothesis test accordingly in Chapter 5.1-5.3.

3) Chapter 5.3: if you want to talk also about seismic hazard, please show some hazard maps, to check the differences between models and approaches. Or you can delete this part.

The discussion on application to seismic hazard assessment has been removed.

Sincerely yours, Chung-Han Chan, Nanyang Technological University, Singapore, June 2016.

Please also note the supplement to this comment: http://www.nat-hazards-earth-syst-sci-discuss.net/3/C3418/2016/nhessd-3-C3418-2016-supplement.pdf

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 7527, 2015.

### **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



# b. 122.0° 122.5° M<sub>c</sub>: 4.0 period: 1973-1993 M<sub>c</sub>: 3.0 Period: 1994-2011 Study region Search radius: 30 km 2.4 2.2 122.5° Figure 1 122.0°

Fig. 1.

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



Fig. 2.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



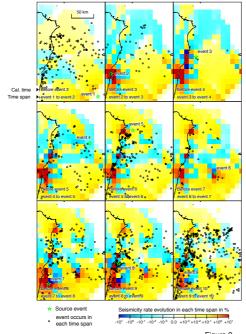


Figure 3

# **NHESSD**

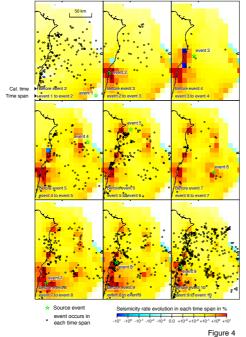
3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version





# 40° 35° Focal mechanism Catalog: F-net The Tohoku coseis. slip model by Fujii et al. (2011) (m) Period:Jan. 2010- Aug. 2011 Magnitude ≥ 6.0 30° 135° 140° 145° Figure 5

Fig. 5.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



# **a.** 4.0≤M≤4.9 b.5.0≤M≤5.9 140° Learning period: 1923-2009 Forecasting period: 2010-2011 C.6.0≤M≤6.9 d.7.0≤M≤7.9 Forecasted rate for each Black circles: forecasting events (M≥4.0) magnitude bin (/yr/km²) Forecasting time: End of August, 2011 Figure 6

Fig. 6.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



### Forecast eqs within 5 kms of each side a. Map-view Learning period: 1923-2009 Forecasting period: 2010-2011 36 b. Profile AA' C. Profile BB' d. Profile CC 139° 140° 141° 50 100 0 50 100 0 50 100 Along depth (km) Parameters for rate/state: Black dots: forecasting events (M≥4.0) Forecasted rate for M≥4.0 (/yr/km3) Ta: 50 years Figure 7 Forecasting time: End of Aug., 2011 Aσ=0.1 bar

Fig. 7.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



## Comparison between models with observations 80% Kernel function in 2D . Fraction of failure in forecasting Kernel function in 3D Rate/state in 2D . 60% Rate/state in 3D . 1 % Null hypothesis . 40% 20% The Ryukyu case 0% 20% 40% 60% 80% 100% Figure 8 Fraction of alarm-occupied space

Fig. 8.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

**Printer-friendly Version** 

Interactive Discussion



### 100% Different forecasting models compare with forecasting seismicity 80% Kernel function in 3D . Fraction of failure in forecasting Rate/state in 3D . Kernel function + rate/state in 2D Kernel function + rate/state in 3D . 1 % Null hypothesis • 20% The Kanto case 0% 20% 40% 0% 60% 80% 100% Figure 9 Fraction of alarm-occupied space

Fig. 9.

# **NHESSD**

3, C3418-C3428, 2016

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

