African Seismological Commission (AfSC) - Asian Seismological Commission (ASC)
Preparatory Joint Working Group on Neo-Deterministic Seismic Hazard Assessment (pJWG NDSHA)

Newsletters

Vol. 3 No.1 January 1, 2025

More reliable physics in seismic hazard assessment (SHA) for disaster risk reduction (DRR)
(More reliable physics in SHA for DRR)

This issue

News: We are delighted to announce that Prof. Chiara Bedon, from the Department of Engineering and Architecture at the University of Trieste, and Prof. Giovanna Vessia, from the Department of Engineering and Geology at the University "G. d'Annunzio" of Chieti-Pescara, Italy, have joined our group. We also extend our gratitude to our members from Asia and Africa for recommending esteemed colleagues.

Comment to "A View of the Linkup Between the Neodeterministic and the Probabilistic Seismic Hazard Assessments"

The authors correctly and clearly state that: "NDSHA, the most influential modification to the widely adopted PSHA in terms of methodology, involves the rebuilding of the whole scientific framework of SHA, and it is convenient for highlighting the impact of large earthquakes in seismic fortification. The authors of this article explain their understanding of the NDSHA approach and point out that the kernel step of NDSHA is to replace the GMPE in PSHA with physics-based ground-motion synthesis", and duly criticize the limits of GMPE, but, at the same time, they fly over even more fundamental drawbacks of PSHA, well described in the literature (Tao et al., 2024), as also reported in earlier newsletters. If necessary, please visit the link https://asc-iaspei.org/task-groups/newsletter/ to download earlier newsletters.

Reference:

Tao, Z. R., Tao, X. X., Xiao, P., 2024. A view of the link between the Neodeterministic and Probabilistic Seismic Hazard Assessments. *Seismological Research Letters*. DOI: 10.1785/0220230254.

2024 Annual report

1. SHORT INTRODUCTION

The Joint Working Group on Neo-Deterministic Seismic Hazard Assessment (JWG NDSHA), launched in mid-2023 associated with the International Union of Geodesy and Geophysics (IUGG) General Assembly in Berlin, belongs to both the Asian Seismological Commission (ASC) and the African Seismological Commission (AfSC). From 2023 to 2024, new activities were tested and practiced, with limited but prospective results. For example, JWG cosponsored the 13th International Workshop on Statistical Seismology (statsei-13) conference in Shenzhen, Guangdong Province, China. Before statsei-13, JWG also joined in the pre-statsei workshop, "Earthquake hazard assessment as a platform of dialogue: ACES, CSEP, CSES, NDSHA and others", in Beijing, China. In 2024, JWG members actively took part in international meetings, and worked as conveners.

On the African side, in the newly founded African Disaster Mitigation Research Center (ADMiR), the JWG's scientific and logistic activities are prioritized on the agenda for 2024. Participation in the ASC GA, the European Seismological Commission (ESC) GA, and the AfSC GA has been one of the important activities of the JWG since 2024, in which the experiences and lessons will be beneficial for contributing to the 2025 International Association of Geomagnetism and Aeronomy (IAGA) - The International Association of Seismology and Physics of the Earth's Interior (IASPEI) GA, and beyond.

In science, the paper of Panza and Bela (2019), both being scientific advisors of the JWG, was elected as the best paper in 2023 by Elsevier, echoing the increased impact of NDSHA. The necessity of the development and application of NDSHA has been proved by recent earthquakes which caused disasters with record-breaking features within other SHA paradigms but well predicted by the NDSHA. Yet regional imbalance in the development and application of NDSHA calls for a joint endeavor with international and interdisciplinary characteristics. In 2024, proposed by Prof. Zhongliang Wu, two authors, Prof. Zengping Wen and Prof. Guoxin Wang, finished the book review for *Earthquakes and Sustainable Infrastructure–Neodeterministic (NDSHA) Approach Guarantees Prevention Rather Than Cure*, which has been published in the journal *Earthquake Science*. They introduce the Panza-Rugarli law and properly suggest its intensive testing (falsification/validation) accordingly to Popper: a theory in the empirical sciences can never be proven, but it can be falsified, meaning that it can (and should) be scrutinized with decisive experiments. This can be a goal of all JWG-NDSHA interested members.

We acknowledge the guidance and endorsement of the ASC and AfSC as well as local institutions such as the Institute of Geophysics, China Earthquake Administration, and Institute of Earthquake Forecasting, China Earthquake Administration. We greatly appreciate the help from Prof. Giuliano Panza, Prof. Zhongliang Wu, Prof. Antonella Peresan, Prof. Kun Chen, Prof. Zengping Wen, and Prof. Guoxin Wang. We also thank the help from other agencies and/or organizations such as the journal *Earthquake Science*.

2. HIGHLIGHTED ACTIVITIES

- 2024 Wushi, Aksu Prefecture, Xinjiang, China M_W7.0 earthquake

Reported by China Earthquake Networks Center (CENC), a M_W7.0 earthquake struck Wushi County, Aksu

Prefecture, Xinjiang, China at 18:09:04 (UTC) on 2024-01-22. The epicenter is estimated to be at 41.26°N 78.63°E with a focal depth at 22 km. The largest known event in this area before the Wushi M_W7.0 quake is a M6.4 event in 1987 (41.26°N 79.17°E). Accordingly, M_{design}=6.4+0.7=7.1 can be immediately defined, thus the Wushi M_W7.0 within ~45 km from the epicenter of the 1987 M6.4 event in the Wushi County is enveloped by the expeditious prediction of M_{design} for the area. The value M=7.1 should be considered both at the stage of rescue and reconstruction.

- JWG joined in statsei13 meeting

On March 16-20, the 13th international workshop on statistical seismology (Statsei13, http://www.statsei13.org.cn/) was held in Shenzhen, China, with 112 participants from 18 countries/regions. JWG joined in the Statsei13 as a cosponsor of the meeting. In the meeting, at least 4 reports related to NDSHA, and 3 reports related to PSHA, were presented, in which informal dialogues between different SHA approaches were facilitated. It was the first appearance of JWG on the international stage. In connection to Statsei13, on March 12, a Pre-Statsei Workshop was held in Beijing, at the Institute of Earthquake Forecasting, China Earthquake Administration, with 9 presentations from China, Italy, Japan, and UK. The slogan of the pre-statsei workshop is “Earthquake hazard assessment as a platform of dialogue: ACES, CSEP, CSES, NDSHA, and others”.

- JWG joined in ESC GA 2024

On September 22~27, 2024, the 39th General Assembly (GA) of the European Seismological Commission (ESC) was held in Corfu, Greece. Some JWG members took part in the GA on site and gave oral/poster presentation. Prof. Antonella Peresan is one of the conveners of Session 13, “New data and methods for earthquake risk assessment: Statistical models and machine learning tools applied to ground and satellite data (Part 2)”, and Session 02, “Sinergy in advancing the models, observations, and verification toward Operational Earthquake Forecasting (Part 2)”. She also gave the presentation titled as “An approach to rockfall hazard scenarios based on earthquake ground motion modelling”, and the presentation of the paper "Ground Motion Forecasting for the 2023 Al Haouz and 2004 Al Hoceima Earthquakes in Morocco: insights from Maximum Considered Earthquake concept and Mdesign definition" by Hassan et al. With the help of engineering seismologist Prof. Kun Chen, the poster from Dr. Yan Zhang and his colleagues was also shown in the conference.

- JWG took part in the 15th General Assembly (GA) of the Asian Seismological Commission (ASC)

On September 22~27, 2024, the 39th General Assembly (GA) of the European Seismological Commission (ESC) was held in Corfu, Greece. Some JWG members took part in the GA on-site and gave oral/poster presentations. Prof. Antonella Peresan is one of the conveners of Session 13, “New data and methods for earthquake risk assessment: Statistical models and machine learning tools applied to ground and satellite data (Part 2)”, and Session 02, “Sinergy in advancing the models, observations, and verification toward Operational Earthquake Forecasting (Part 2)”. She also gave the presentation titled as “An approach to rockfall hazard scenarios based on earthquake ground motion modeling”, and the presentation of the paper "Ground Motion Forecasting for the 2023 Al Haouz and 2004 Al Hoceima Earthquakes in Morocco: insights from Maximum Considered Earthquake concept and M_{design} definition" by Hassan et al. With the help of

engineering seismologist Prof. Kun Chen, the poster from Dr. Yan Zhang and his colleagues was also shown at the conference.

3. Content of Newsletter Vol. 2

-Issue 1

Important events of JWG
Experiment with GPT4.0
Future Directions: Physics-based ground motion modeling, Vancouver, Canada, October 10-13, 2023
Minute: Webinar on the 2023 Morocco M_S6.8 earthquake

-Issue 2

15th General Assembly of Asian Seismological Commission (ASC)
2024 Noto Peninsula, Japan M_W7.5 earthquake
2024 Wushi, Aksu Prefecture, Xinjiang, China M_W7.0 earthquake
Warm encouragements from Prof. Zhongliang Wu
Warm regards from Prof. Li Li
Supplementary issue: Physics-based seismic hazard assessment: recent progress and scientific debate
Correction: the last picture in the Newsletter Vol 2, issue 1

-Issue 3

JWG is joining the ASC GA
Follow up about 2024 Noto Peninsula, Japan M_W7.5 earthquake.
JWG's affiliated commissions I: the Asian Seismological Commission (ASC)
JWG Library (4)
Supplementary issue: ASC General Assembly in 2024

-Issue 4

Prof. Panza talking about NDSHA
Antonella Peresan: the new Policy Officer for the EGU Natural Hazards Division
JWG joined in statsei13 meeting
Supplementary issue: ESC 2024 GA is calling for abstracts

-Issue 5

Vladimir G. Kossobokov elected foreign fellow of Accademia XL
The AfSC 4th General Assembly underway
Session 15 of the 15th ASC GA calling for participation
JWG Library (5)

-Issue 6

Prof. Kossobokov received his foreign academician certificate in Rome, Italy
Earthquake hazard has much greater impact on the society: Prof. Panza
Session 10 for DEEP 2024 is calling for participation

-Issue 7

NDSHA-related session in the ASC 15th GA: Abstracts (I)

-Issue 8

NDSHA-related session in the ASC 15th GA: Abstracts (II)

-Issue 9

Book Review: Earthquakes and Sustainable Infrastructure–Neodeterministic (NDSHA) Approach Guarantees Prevention Rather Than Cure (recently published in Earthquake Science)

-Issue 10

JWG members took part in the 39th General Assembly (GA) of the European Seismological Commission (ESC)

-Issue 11

JWG members took part in the 2024 International Symposium on Deep Earth Exploration and Practices (DEEP-2024)

JWG members took part in the Workshop on Modern Methods of Seismic Hazard Assessment and Earthquake Forecast/Prediction

-Issue 12

JWG took part in the 15th General Assembly (GA) of Asian Seismological Commission (ASC)

The preparatory Joint Working Group on Neo-Deterministic Seismic Hazard Assessment (pJWG NDSHA): updating (A letter released in ASC GA 2024)

JWG Library (6)

To facilitate the exchange and discussion within the JWG, our newsletter will be attaching an important paper for the group to study. In this issue, we attach the paper Joint Multi-Scenario-Based Earthquake and Tsunami Hazard Assessment for Alexandria, Egypt, by Badreldin et al., published in *Applied Sciences*. (2024) 14(24): 11896, DOI: 10.3390/app142411896. If you have any paper recommended, please contact us.

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