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

Newsletters

Supplementary issue to Vol. 1 No.5

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

Abstract to StatSei13: Towards an operational combination of the annual consultation, time-dependent NDSHA and EEWS

We propose an interdisciplinary approach to time-dependent neo-deterministic seismic hazard assessment (TD-NDSHA) for the China Seismic Experimental Site (CSES) at one year time scale (Zhang et al., 2022; 2023), and we show that it provides statistically significant results. The proposed approach is based on the NDSHA (Bela and Panza, 2021), with the 'controlling' earthquakes defined by the Annual Consultation on the Likelihood of Earthquakes. Considering the alert regions provided by the Annual Consultation, the expected strong ground motion parameters and the macroseismic intensities are mapped by the NDSHA algorithms. The estimated intensities are then subject to comparison with the intensities produced by the actual earthquakes. Evaluation of the performance performed using confusion matrix and Molchan error diagram, respectively, indicating that the combination outperforms random forecasting.

The TD-NDSHA may also contribute addressing the 'blind zone' of the network-based on-site EEWS. We suggest a practical approach according to which, when in a region a temporary increase of seismic hazard is declared, additional stations are deployed in such a way that the 'blind zone' is temporarily reduced. We propose that the 'blind zone' can be reduced in the identified areas of interest (e.g., MMI $\geqslant$ VI), by 1) Deploying a limited number of additional seismic stations, according to information provided by TD-NDSHA; 2) Switching of the EEW from multi-station mode to single sensor mode and even skipping the process of location and magnitude-determination/prediction procedures; and 3) Using the stations within the 'blind zone' for reducing the size of the 'blind zone', that is, if a station detects destructive S waves, it sends out the message via electromagnetic signal to another station with larger epicentral distance.

Statistical seismology plays an important role in the application and validation of all elements of the proposed approach, namely the annual consultation, TD-NDSHA, and EEW. Here we propose an operational combination of these three fields, with the aim to reduce the impact of earthquake disasters, well conscious of the fact probabilistic seismic hazard analysis has been debunked in the geophysical literature (e.g. Stark, 2022).

Main references

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Please feel free to contact Yan Zhang (zhangyan@cea-igp.ac.cn) if you have problems when you submit your abstract. The abstract submission of StatSei13 will be closed on Dec. 22, 2023. We appreciate your contribution and support to the meeting, in which pJWG acts as co-sponsor.

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