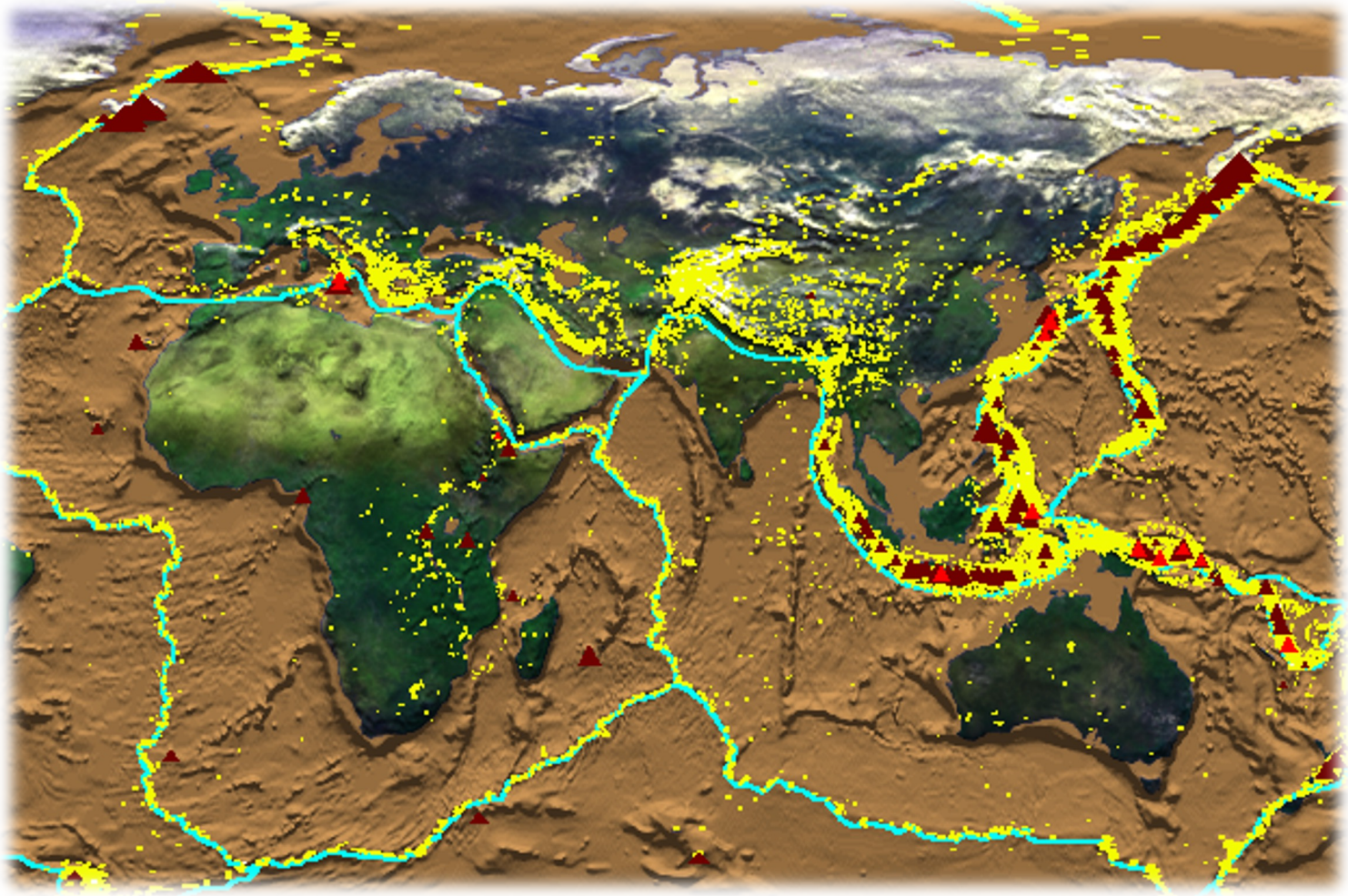
AfSC-ASC Joint Working Group on Neo-Deterministic Seismic Hazard Assessment (JWG-NDSHA)

Seismic disaster risk reduction (DRR) in Asia and Africa



Seismic disaster risk reduction (DRR) in Asia and Africa

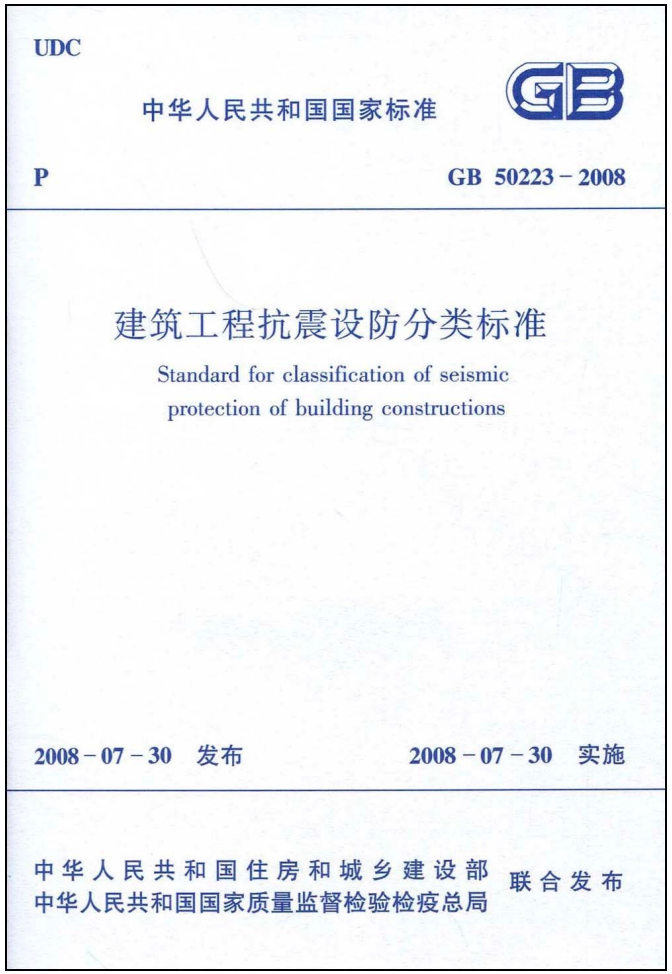
Asian Seismological Commission

African Seismological Commission

Lessons and experiences of the past

(1) SHA is important for the management and control of seismic risk to protect lives and economy

Eurocodes


UDC

中华人民共和国国家标准

P GB 50223－2008

建筑工程抗震设防分类标准

Standard for classification of seismic protection of building constructions

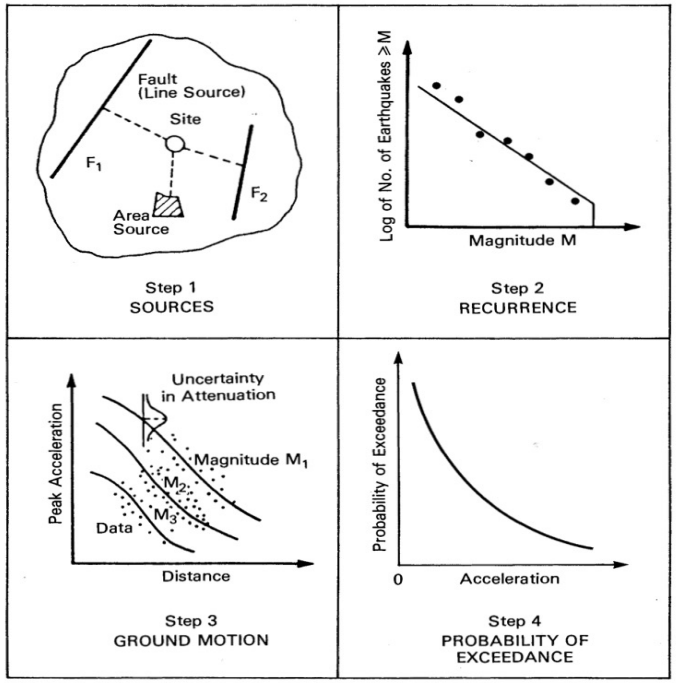
2008－07－30 发布 2008－07－30 实施

中华人民共和国住房和城乡建设部
中华人民共和国国家质量监督检验检疫总局 联合发布

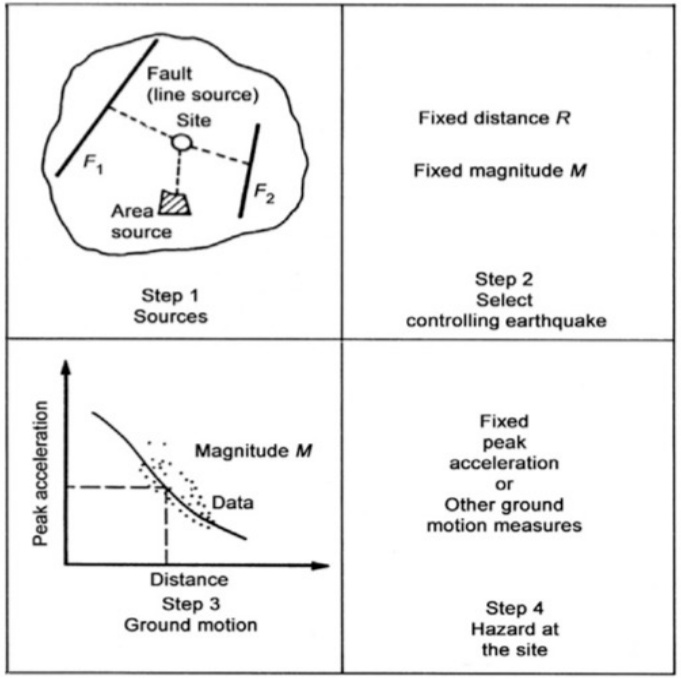
China Code

Lessons and experiences of the past

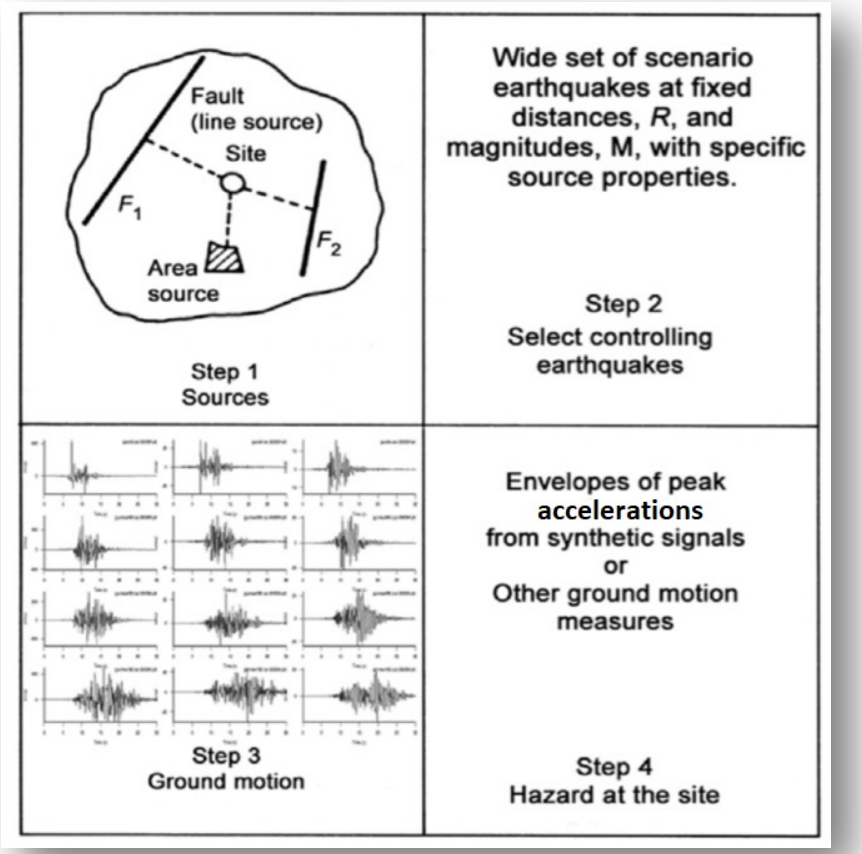
(2) SHA methodologies



PSHA



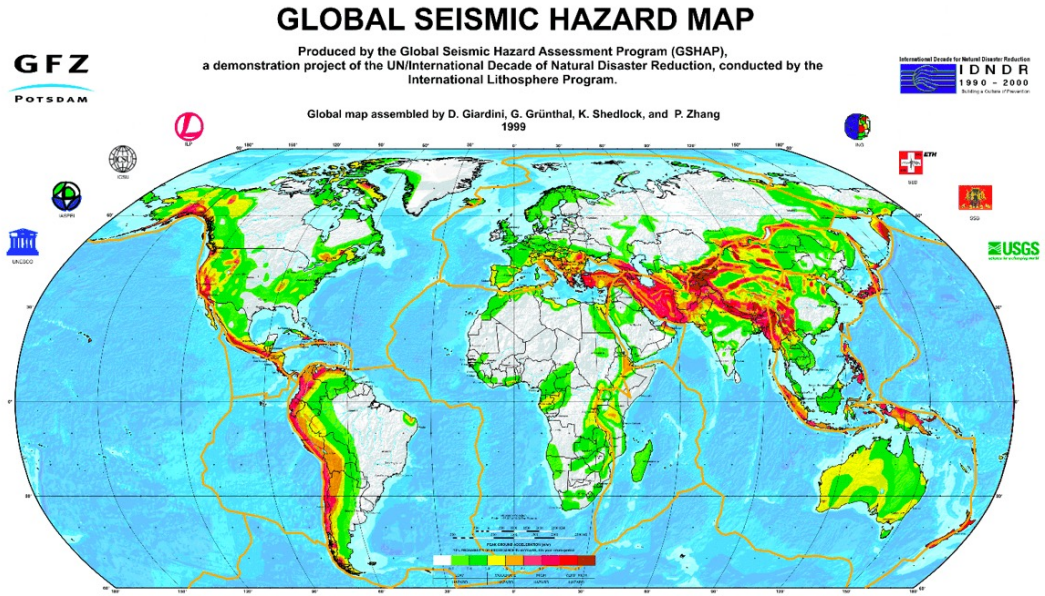
DSHA



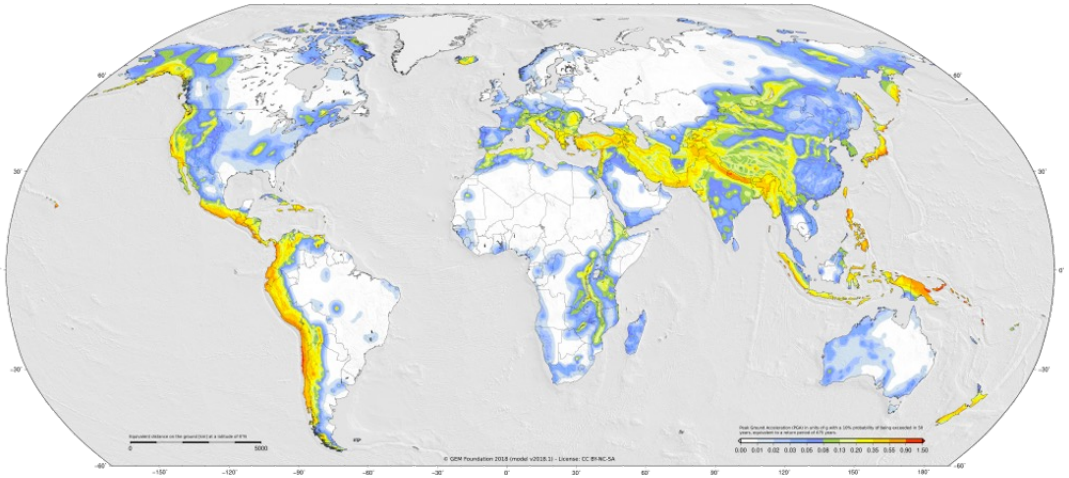
NDSHA

Lessons and experiences of the past

(3) The state of the art of (global/regional) SHA



The Global Seismic Hazard Map, v. 1999

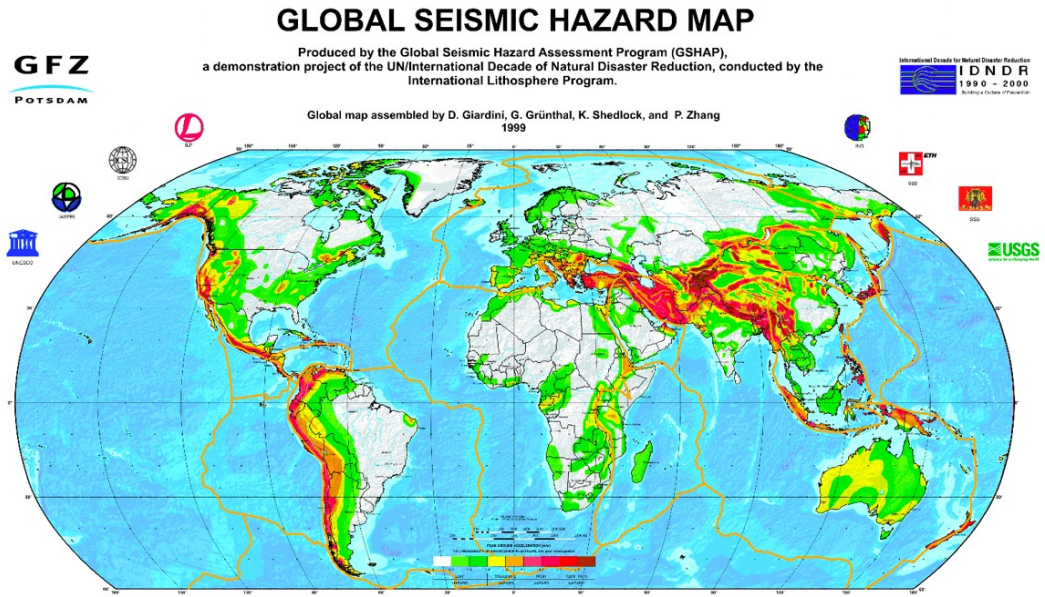


The GEM Global Seismic Hazard Map, v. 2018.1

Currently global SHA is conducted only through probabilistic approach and this has generated great debate in the scientific/technical communities (e.g. Earthquakes and Sustainable Infrastructure - 1st Edition (https://www.elsevier.com/books/earthquakes-and-sustainable-infrastructure/panza/978-0-12-823503-4) and Advanced Seismic Hazard Assessment. Pure and Applied Geophysics, 168). Deterministic SHA is only used for specific cases such as nuclear power plants.

Lessons and experiences of the past

(3) The state of the art of (global/regional) SHA

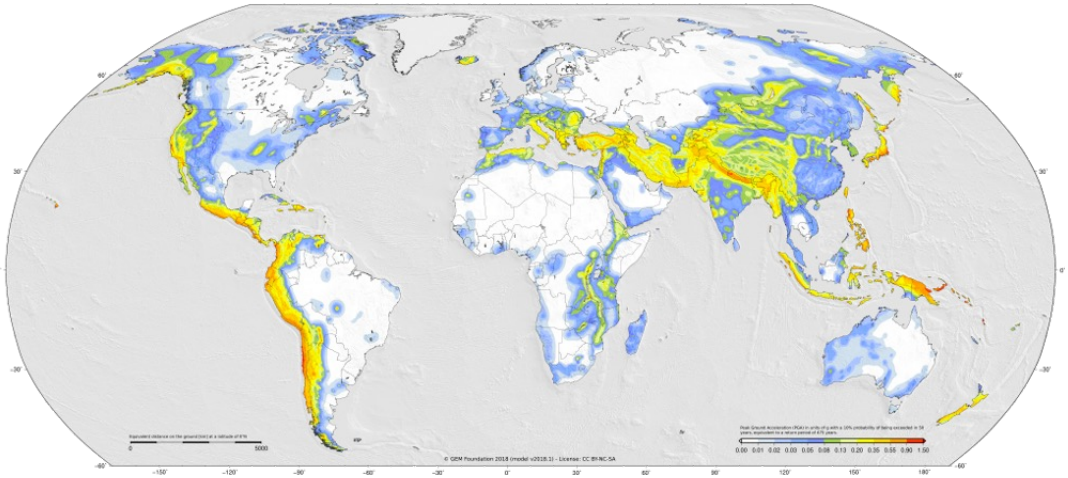


The Global Seismic Hazard Map, v. 1999

However, the declared legacy of the Global Seismic Hazard Assessment Program (GSHAP) is to establish a common framework to evaluate the seismic hazard over geographical large scales, i.e., countries, regions, continents, and finally the globe. Today, for most of the Earth's seismically active regions in Europe, Northern and Southern America, Central and Southeast Asia, Japan, Australia, and New Zealand, the GSHAP hazard map is proven outdated, very often wrong as it has been shown on many occasions: GSHAP was proven wrong after the 2010 Haiti disaster; after the 2011 Tohoku mega-earthquake, it was even shown that the GSHAP maps could have been proved misleading at the time of their official publication in 1999 (Panza et al., 2022).

Lessons and experiences of the past

(3) The state of the art of (global/regional) SHA



The GEM Global Seismic Hazard Map, v. 2018.1

The GEM Foundation released, at the end of 2020, several national and regional earthquake hazard and risk models and other global model digital data products. In fact, some 20 years after its launch, it has been possible to prove that GSHAP is totally unreliable. In fact, several are the evidences of how useless and misleading can be most of its published results.

GEM is on the wrong track, if it continues to base seismic risk estimates on a refined “standard method” to assess seismic hazard. How long it will be necessary to wait to prove that GEM is as wrong as GSHAP? Should Science Community wait for a decade to find GEM is as wrong as GSHAP? (Panza et al., 2022)

Lessons and experiences of the past

Why PSHA is so widely used?

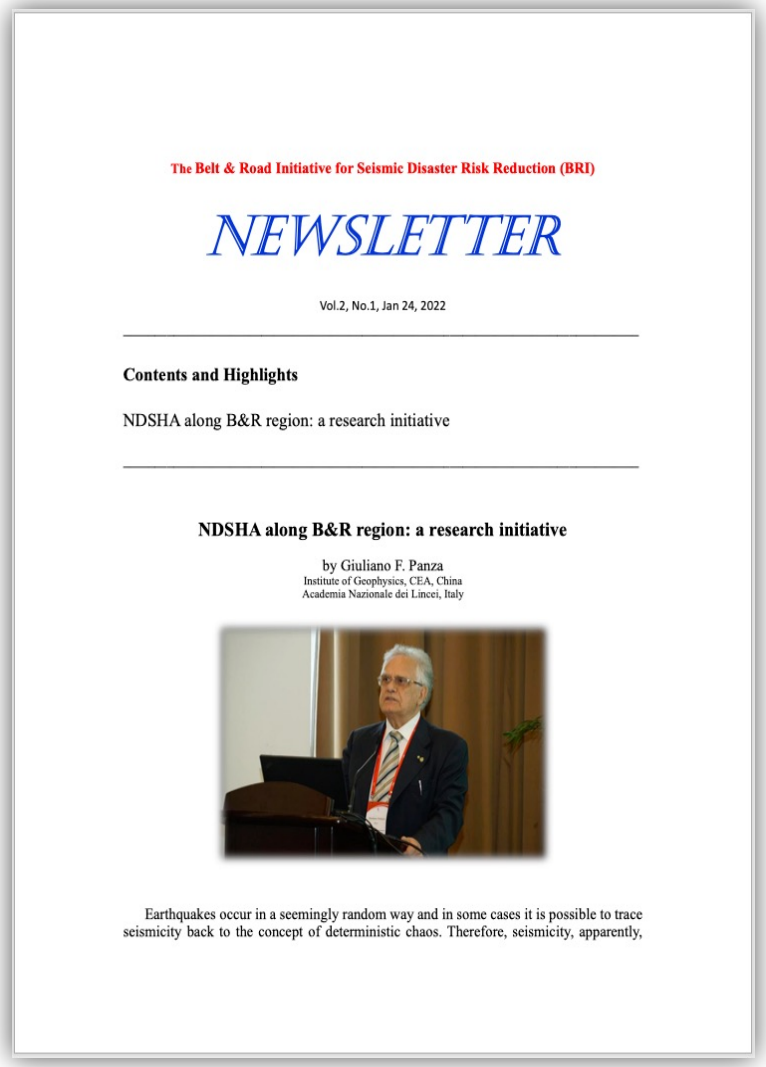
- Easy-to-use open software (e.g., OpenQuake), with manuals
- Widely available input data (or standard input information provided with software)
- No need to fully understand the codes, data or process: the system can provide an output anyway

What is needed to make NDSHA widely used?

- Training of young experts in the field (change of perspective)
- Create easy-to-use software, with manuals, made available to trained young experts
- Communicating with the engineering communities and the public

NDSHAs in different countries/regions (updated 2022)

Regional endeavor: the Belt and Road Initiative (BRI) for seismic disaster risk reduction



The Belt & Road Initiative for Seismic Disaster Risk Reduction (BRI)

NEWSLETTER

Vol.2, No.1, Jan 24, 2022

Contents and Highlights

NDSHA along B&R region: a research initiative

NDSHA along B&R region: a research initiative

by Giuliano F. Panza
Institute of Geophysics, CEA, China
Academia Nazionale dei Lincei, Italy

Earthquakes occur in a seemingly random way and in some cases it is possible to trace seismicity back to the concept of deterministic chaos. Therefore, seismicity, apparently,

Belt and Road: the economic belt of the Silk Road, and the maritime silk road in the 21st century, proposed by China

BRI: Initiative for seismic safety along the Belt and Road

2022 AfSC-ASC Joint Assembly: keynote of Prof. Panza, and response

NDSHA along Belt & Road region: a research initiative

2000 EGU GUTENBERG medal

AGU International Award 2018

Giuliano F. Panza

14th General Assembly of the Asian Seismological Commission
3rd General Assembly of the African Seismological Commission

1

Recalling:

(a) that at the ceremony for the award of the title of Honorary Professor of the CEA Institute of Geophysics (2005), Mr. Zhao Ming, deputy director of CEA-DIC and representative of CEA Leaders, introduced me, as **Marco Polo in Seismology**,

(b) the NRIAG-Egypt Medal of Honor, 2014 award, and

(c) the recent interactions with **Mohamed El Gabry** and **Zhongliang Wu**

I would like to propose

to set up a joint AfSC and ASC working group on

NDSHA

62

The proposal of the joint working group, receive positive and active responses at 2022 AfSC-ASC Joint Assembly

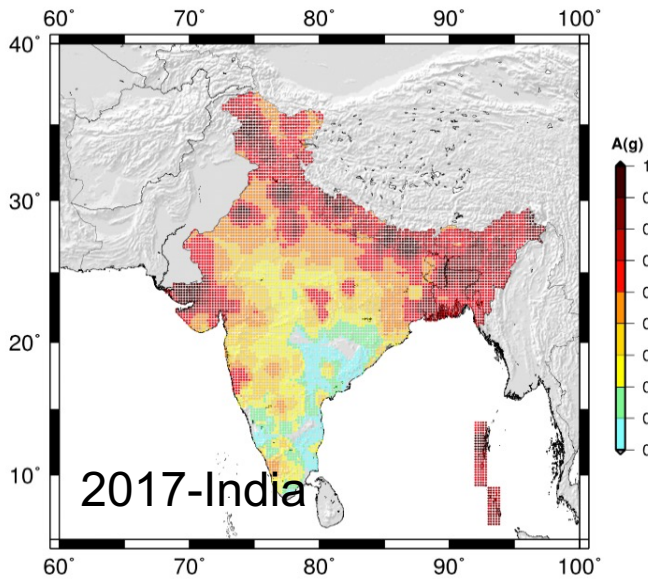
What is next?

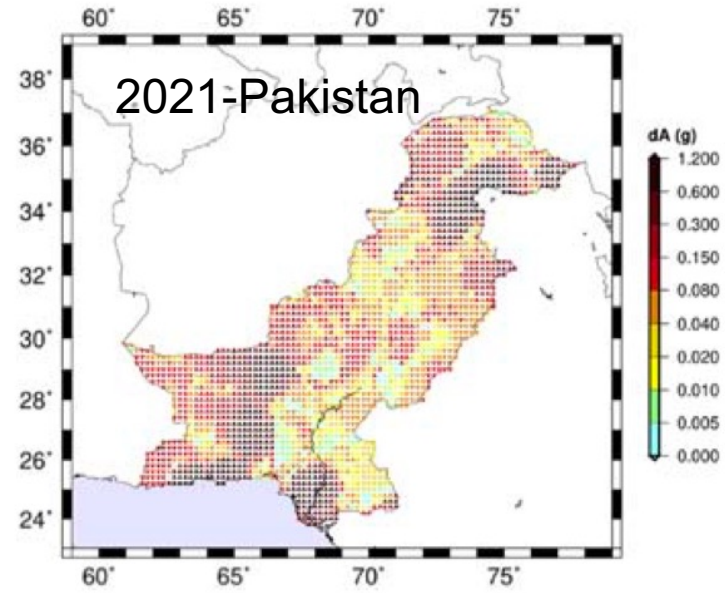
- Scope and Long-term Goal of the JWG
- Activities planned for the JWG
- Financial issues of the JWG
- Organization and governance of the JWG

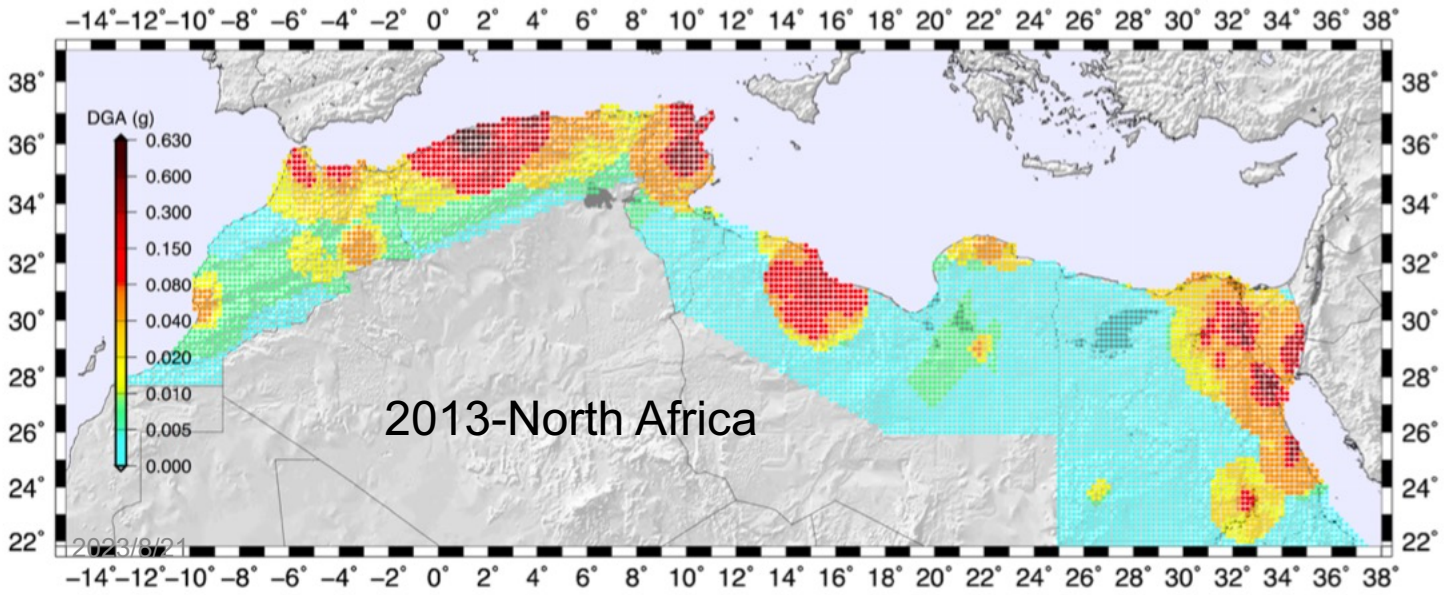
Scope and Long-term Goal

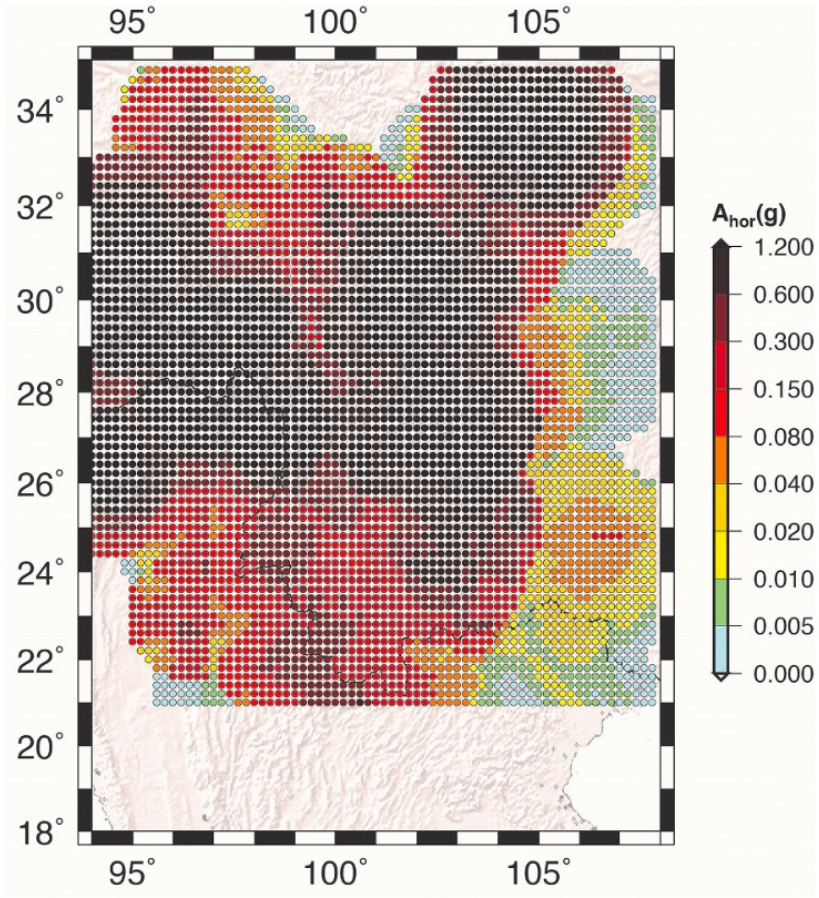
- NDSHA implementation in Asia and Africa, and comparative studies
- Towards an interactive toolbox for NDSHA
- Towards a unified regional/global NDSHA map
- Towards integration of NDSHA in standard procedures of seismic risk assessment (Hazard x Vulnerability x Exposure)
- Communication with end users such as insurance companies and governmental agencies
- Towards international standards for engineering and emergency management
- Research on the fundamental data problems associated with NDSHA, as a road map towards possible improvements

NDSHA implementation in Asia and Africa, and comparative studies – some examples (updated to 2022)







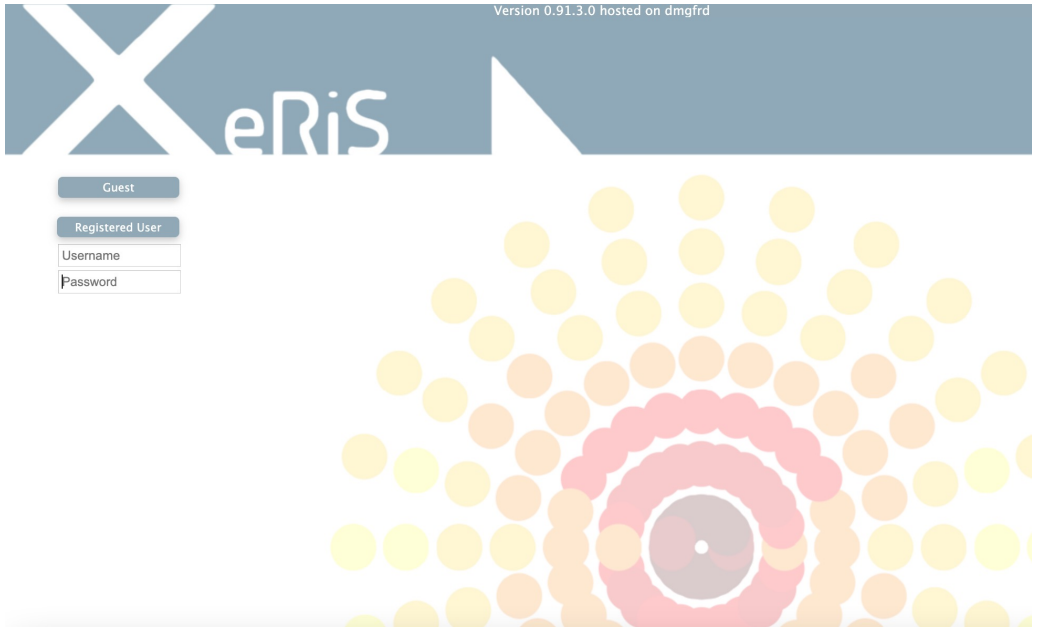


2021-CSES

XeRiS: Cloud platform for NDSHA seismic hazard assessment.

Towards an interactive toolbox for NDSHA

XeRiS: an online web application for a user-friendly approach to NDSHA computations.
For more information, please contact Dr. Franco Vaccari (franco.vaccari@exact-lab.it)



(Scan the QR code for visiting XeRiS)

Saved Hazard Scenarios: ac, ar1, ar2, arnar, arna, ar

Download Delete

ar2 | 1 Hz

Check Run Kill

Maps

Input Data Uploader

Upload

Structural Regions: z1d

Download Delete

N. | Label | Structure

Available Structures: Ahq

Assign

Site Sets: few, five

Download Delete

Earthquake Catalogues: alba, cro, ita, slo, test

Download Delete

Catalogue Regions: cro, ita, slo, z1d

Download Delete

Morph. Nodes: gvishiani, italy

Download Delete

Seismogenic Zones: z1d

Download Delete

Focal Mechanisms: a, b, ita, test

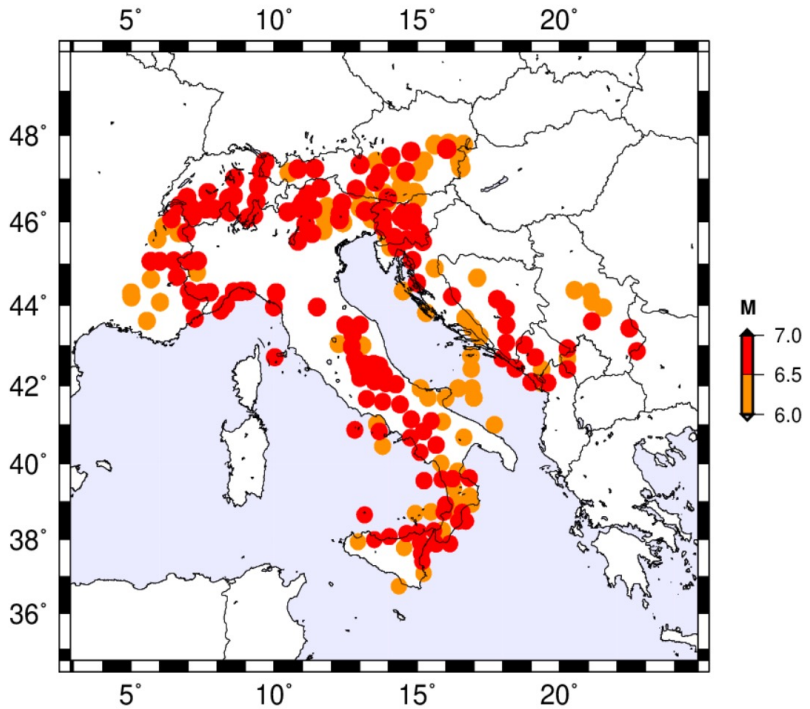
Download Delete

CN Regions: nord

Download Delete

M8 Regions: m55, m60, m65

Download Delete



Configuration: Basic | Advanced

Region Limits

Min and max longitude (°):	12	14
Min and max latitude (°):	45.5	47.8

Path Constraints

Min length (km):	Auto	0
Max length (km):	Auto	0
Short paths:	Auto	

Earthquake Catalogue Events Selection

Min and max magnitude:	0	10
Min and max depth (km):	0	50
First and last year:	-2000	3000

Magnitude Discretization and Smoothing

Cell size (°):	0.2
Smoothing radius (cells):	3
Min number of events:	0
Min magnitude for SZ:	6

Source Properties

Depth (km):	Auto	
Scaling:	Size	

Input Dataset Summary

Structural regions:	z1d
Site sets:	five
Earthquake catalogue:	ita
Catalogue region:	ita
Seismogenic zones:	.pos
Focal mechanisms:	.fps
Morphostructural nodes:	italy
Alerted area:	m55
Recurrence:	.pog

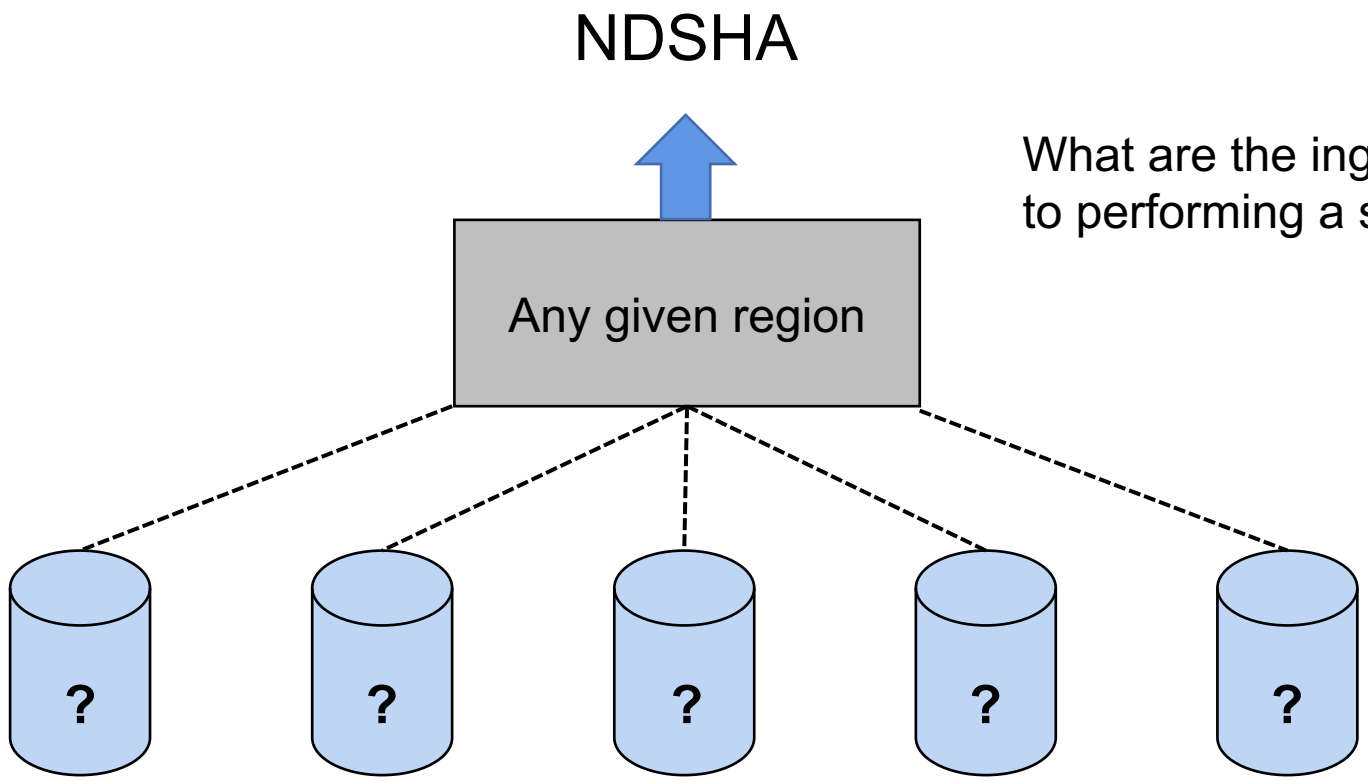
Time series

Comp. technique:	MS	
Interpolation (MS):	Auto	1
Interpolation (DWN):	Auto	

Contents of the website v 1.0

- Who we are
- Publications
- Webinar and symposium materials
- Digital files of NDSHA maps
- Sharing of codes and data
- News and views
- Miscellaneous

Research on the fundamental problems associated with NDSHA, as a road map towards possible improvements



What are the ingredients - input data - in any given region, to performing a standard NDSHA estimate computation?

Earthquake catalogue

Focal mechanisms

Seismogenic zones

Seismogenic nodes

Anelastic mechanical causal structural models

Activities planned

- Specialized training courses (Webinars)
- Symposia, sessions, business meetings: IUGG/IASPEI, AfSC/ASC/ESC/LCSC, AGU/EGU/AOGS
- Applications for Joint research projects
- Special issues in peer reviewed journals
- Specialized Website
- Database of publications and scientific products
- Platform for software application and updates, if duly funded

Financial issues

- Application for small seminal budget for training and meetings from IUGG and IASPEI, through ASC and AfSC
- Application for international cooperative projects from national funding agencies (such as the National natural Science Foundation of China, NSFC, and the Ministry of Science and Technology of China, MOST) and international funding agencies (such as IGCP)
- Application for fundings from governmental, public, and private sectors, based on bilateral or multilateral agreements

Organization and governance

- Advisory board, and ASC and AfSC representatives
- Members from different countries, volunteer and by invitation
- Group of group leaders, secretary, and discussion-based decision making
- Reporting to ASC and AfSC: annual and biennial
- Turning of operational terms in accordance with ASC and AfSC
- Participating in the activities of the BRI

Proposed Scientific/Technical Advisory Board v 1.0

- M. El Gabry
- V. G. Kossobokov
- L. Li
- M. Meghraoui
- G. F. Panza
- A. Peresan
- F. Romanelli
- F. Vaccari
- Z. Wu

Proposed Members v 1.0

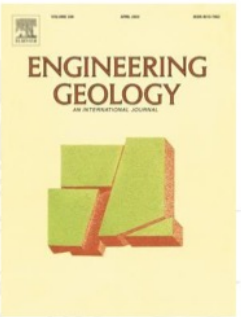
- Algeria: Djillali Benouar, Amel Benali
- Bangladesh: Tahmeed M. Al-Hussaini
- China: Y. Zhang
- Congo: DR Georges Tuluka Mavonga
- Egypt: Hany Hassan
- Ethiopia: Atalay Ayele
- Ghana: Paulina Amponsah
- India: Imtiyaz Parvez, Pallabee Choudury, Sima Gosh
- Indonesia: Irwandi Nurdin
- Iran: M. Rastgoo, Medhi Zare
- Morocco: Mimoun Chourak
- Pakistan: Farhana Sarwar
- Sudan: Salwan M/ Nada Ahmed
- Tunisia: Ahmed Ksentini
- Vietnam: N. H. Phuong / C. D. Trieu

Summary

- Scope and Long-term Goal of the JWG
- Activities planned for the JWG
- Financial issues of the JWG
- Organization and governance of the JWG

Thank you

Your comments and suggestions are welcome



Engineering Geology

2023 Best Paper Award

Is hereby awarded to:

Panza G.F., Bela J.

For the paper entitled:

NDSHA: A new paradigm for reliable seismic hazard assessment

This paper was published in:

Volume 275, September 2020, 105403

Hsein Juang	Vicki Moon	Janusz Wasowski	Wenping Gong
Co Editor-in-Chief	Co Editor-in-Chief	Co Editor-in-Chief	Co Editor-in-Chief

June 2023