International Training Course on

Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation

September 26 to October 21, 2016
Nay Pyi Taw, Myanmar

Organised and sponsored by

Helmholtz Centre Potsdam
GFZ German Research Centre for Geosciences

and

Department of Meteorology and Hydrology
Nay Pyi Taw, Myanmar

co-sponsored by

Federal Foreign Office (FFO), Berlin, Germany

List of institutions and lecturers contributing to the International Training Course on "Seismology, Hazard Assessment and Risk Mitigation",
September 26 to October 21, 2016 in Nay Pyi Taw, Myanmar

GFZ German Research Centre for Geosciences, Germany

Dr. Dino Bindi	dino.bindi@gfz-potsdam.de
Dr. Simone Cesca	simone.cesca@gfz-potsdam.de
Prof. Fabrice Cotton	fabrice.cotton@ujf-grenoble.fr
Prof. Dr. Torsten Dahm	torsten.dahm@gfz-potsdam.de
Dr. Peter Evans	peter.evans@gfz-potsdam.de
Dr. Sebastian Heimann	sebastian.heimann@gfz-potsdam.de
Dr. Andreas Höchner	andreas.hoechner@gfz-potsdam.de
Dr. Jörn Lauterjung	joern.lauterjung@gfz-potsdam.de
Dr. Claus Milkereit	claus.milkereit@gfz-potsdam.de
Prof. Dr. Stefano Parolai	stefano.parolai@gfz-potsdam.de
Dr. Eleonora Rivalta	eleonora.rivalta@gfz-potsdam.de
Dr. Angelo Strollo	angelo.strollo@gfz-potsdam.de

Department of Meteorology and Hydrology, Nay Pyi Taw, Myanmar

Dr. Hrin Nei Thiam	dg.dmh1@gmail.com
Daw Ye Ye Nyein	
Dr. Yin Myo Min Htwe	

Mandalay University, Geology Department, Myanmar

Dr. Myo Thant

University of Bergen, Norway

Prof. Dr. Lars Ottemøller	Lars.Ottemoller@uib.no

Scientific Programme

International Training Course on

Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation

Nay Pyi Taw, Myanmar, 26 September to 21 October, 2016

1. Opening Day

Monday, Sep. 26 **Opening of the Training Course 2016**

08:30 – 09:00	*Representative of the Department of Meteorology and Hydrology* *(to be confirmed)*
	Representative of the German Embassy *(to be confirmed)*
09:00 – 09:45	*Dr. Myo Thant* Geology and Seismo-Tectonics in Myanmar and SE Asia
09:45 – 10:30	*Dr. Jörn Lauterjung* Tsunami Early Warning in the Indian Ocean
10:30 – 11:00	*Daw Ye Ye Nyein* Disaster Risk Management: Monitoring and Assessment of Geohazards in Myanmar
11:00 – 11:30	*Break for a welcome drink - Group Photo*
11:30 – 12:00	*Prof. Dr. Torsten Dahm* Human-induced and triggered seismicity: it's role in hazard programs
12:00 – 12:30	*Dr. Claus Milkereit* The International Training Courses
12:30- 13:30	*Lunch Break*
13:30 – 15:00	T. DAHM Aims and fundamentals of seismology
15:30 – 16:00	L. OTTEMØLLER Introduction to SEISAN
16:00 – 17:00	L. OTTEMØLLER Installation of SEISAN

Evening

19:30 – 21:00	*Dr. C. Milkereit* Informal get-together of participants and lecturers

2. Fundamentals of Seismology, Instrumentation, Earthquake Source Parameter and computer-assisted Seismogram Analysis

Tuesday, Sep. 27

08:30 – 10:00		T. DAHM
	2.1	Seismic sources and source parameters
10:30 – 12:00		T. DAHM
	2.2	Theory of wave propagation: Basics of numerical methods
13:30 – 15:00		L. OTTEMØLLER
	2.3	**Exercise** on phase picking and localization of local events based on network records
15:30 – 17:00		L. OTTEMØLLER
	2.4	**Exercise** on phase picking and localization of teleseismic events based on network records

Wednesday, Sep. 28

08:30 – 10:00		T. DAHM
	2.5	Event Location and Magnitudes
10:30 – 12:00		T. DAHM
	2.6	Seismic waves in the real Earth, required seismic records and derived Earth models
13:30 – 15:00		L. OTTEMØLLER
	2.7	**Exercise** on amplitude picking and magnitude determination
15:30 – 17:00		L. OTTEMØLLER
	2.8	**Exercise** on spectral source parameter determination

Thursday, Sep. 29

08:30 – 10:00		C. MILKEREIT
	2.9	Seismic Sensors, their calibration and installation
10:30 – 12:00		C. MILKEREIT
	2.10	Demonstration/Exercise of fault plane solution
13:30 – 15:00		L. OTTEMØLLER
	2.11	**Exercise** on determination of fault-plane solutions
15:30 – 17:00		L. OTTEMØLLER
	2.12	**Exercise** on amplitude spectra calculation and moment magnitude determination

Friday, Sep. 30

08:30 – 10:00		S. CESCA
	2.13	Moment Tensor Inversion Theory
10:30 – 12:00		S. HEIMANN
	2.14	Earthquake Data Agencies and Formats
13:30 – 15:00		L. OTTEMØLLER
	2.15	**Exercises** on seismogram analysis based on digital data
15:30 – 17:00		Scientific presentations of the participants (1-6)

Evening

19:30 – 21:00 *Cultural presentations (1-7)*

Saturday, Oct. 1 *Visit the Department of Meteorology and Hydrology*

Sunday, Oct. 2 *Visit Nay Pyi Taw*

Monday, Oct. 3

08:30 – 10:00		S. HEIMANN, S. CESCA
	2.16	Data Access, Preparation and Visualization
10:30 – 12:00		S. HEIMANN, S. CESCA
	2.17	Green's Functions
13:30 – 15:00		S. HEIMANN, S. CESCA
	2.18	Synthetic Seismograms
15:30 – 17:00		S. CESCA, S. HEIMANN
	2.19	Moment Tensor Inversion with RAPIDINV

Tuesday, Oct. 4

08:30 – 10:00		S. CESCA, S. HEIMANN
	2.20	Exercise on Moment Tensor Inversion: Case Study Strike Slip Earthquake
10:30 – 12:00		S. CESCA, S. HEIMANN
	2.21	Exercise on Moment Tensor Inversion: Case Study Subduction Earthquake

3. Direct and induced effects of strong earthquake ground motion

13:30 – 15:00		S. PAROLAI
	3.1	Ground shaking site effects. Introduction: Effects of surface topography
15:30 – 17:00		S. PAROLAI
	3.2	Effects of soft surface layers

Wednesday, Oct. 5

08:30 – 10:00		S. PAROLAI
	3.3	Instrumental Microzonation: Surface waves based methods I
10:30 – 12:00		S. PAROLAI
	3.4	Instrumental Microzonation: Surface waves based methods II
13:30 – 15:00		S. PAROLAI
	3.5	Estimation of site effects: Instrumental, numerical, empirical
15:30 – 17:00		S. PAROLAI
	3.6	Use of microtremor recordings for estimating site effects

Thursday, Oct. 6

08:30 – 10:00		S. PAROLAI
	3.7	Surface wave data acquisition III
10:30 – 12:00		S. PAROLAI
	3.8	Surface wave data acquisition IV
13:30 – 15:00		D. BINDI
	3.9	Introduction to Strong Motion Seismology
15:30 – 17:00		D. BINDI
	3.10	Strong Motion data processing

Friday, Oct. 7

08:30 – 10:00		D. BINDI
	3.11	Exercise on Strong Motion data processing
10:30 – 12:00		D. BINDI
	3.12	Exercise on Strong Motion data processing
13:30 – 15:00		D. BINDI
	3.13	Introduction to Ground Motion Prediction Equation (GMPE)
15:30 – 17:00		Scientific presentations of the participants (7-12)

Evening
19:30 – 21:00 *Cultural presentations (8-14)*

Saturday, Oct. 8 Excursion

Sunday, Oct. 9 Excursion

4. Seismic Hazard Assessment

Monday, Oct. 10
08:30 – 10:00 F. COTTON
4.1 Introduction into Seismic Hazard Assessment

10:30 – 12:00 F. COTTON
4.2 Earthquake seismology primer for PSHA, earthquake-effects

13:30 – 15:00 F. COTTON
4.3 Earthquake seismology primer for PSHA, waves

15:30 – 17:00 F. COTTON
4.4 The basic principles of probability theory (PSHA)

Tuesday, Oct. 11
08:30 – 10:00 F. COTTON
4.5 The basic principles of probabilistic seismic hazard analysis (PSHA)

10:30 – 12:00 F. COTTON
4.6 The basic principles of probabilistic seismic hazard analysis (PSHA)

13:30 – 15:00 F. COTTON
4.7 Seismicity models for PSHA

15:30 – 17:00 F. COTTON, D. BINDI
4.8 Ground-motion models

Wednesday, Oct. 12
08:30 – 10:00 D. BINDI
4.9 Ground Motion Prediction Equation

10:30 – 12:00 F. COTTON
4.10 The hazard curve from different perspectives Epistemic and aleatory uncertainties

13:30 – 15:00 F. COTTON
4.11 GEM and OpenQuake

15:30 – 17:00 F. COTTON
4.12 Testing PSHA models

5. Geodynamic Modelling

Thursday, Oct. 13
08:30 – 10:00 E. RIVALTA
5.1 Introduction to Seismotectonics I

10:30 – 12:00 E. RIVALTA
5.2 Introduction to Seismotectonics II

13:30 – 15:00 E. RIVALTA
5.3 Seismotectonics III

15:30 – 17:00 E. RIVALTA
5.4 Seismotectonics IV

Friday, Oct. 14
08:30 – 10:00 E. RIVALTA
5.5 Seismotectonics V

10:30 – 12:00 E. RIVALTA
5.6 Seismotectonics VI

13:30 – 15:00 E. RIVALTA
5.7 Scientific publishing

15:30 – 17:00 Scientific presentations of the participants (13-19)

Evening
19:30 – 21:00 *Cultural presentations (15-21)*

Saturday, Oct. 15 Leisure Time

Sunday, Oct. 16 Leisure Time

6. Simulation of a Tsunami Early Warning Center

Monday, Oct. 17

08:30 – 10:00		A. HÖCHNER
	6.1	Tsunami Phenomenon: Physics and Numerics
10:30 – 12:00		A. HÖCHNER
	6.2	Tsunami Hazard Assessment and Early Warning
13:30 – 15:00		A. STROLLO
	6.3	The GEOFON programme and SeisComp3
15:30 – 17:00		A. STROLLO
	6.4	Seismic station integration into SeisComp3

Tuesday, Oct. 18

08:30 – 10:00		A. STROLLO, P. EVANS
	6.5	Exercises: Data Analysis with SeisComp3
10:30 – 12:00		A. STROLLO, P. EVANS
	6.6	Exercises: Data Analysis with SeisComp3
13:30 – 15:00		A. HÖCHNER
	6.7	Exercises: Tsunami Modelling with easyWave
15:30 – 17:00		A. HÖCHNER
	6.8	Exercises: Tsunami Modelling with easyWave

Wednesday, Oct. 19

08:30 – 10:00		A. HÖCHNER
	6.9	Exercises: Tsunami Modelling with easyWave
10:30 – 12:00		A. HÖCHNER
	6.10	Exercises: Tsunami Modelling with easyWave
13:30 – 15:00		A. STROLLO, P. EVANS
	6.11	Exercises: Data Analysis with SeisComp3
08:30 – 10:00		A. STROLLO, P. EVANS
	6.12	Exercises: Data Analysis with SeisComp3

Evening

19:30 – 21:00 *Cultural presentations (22-28)*

Thursday, Oct. 20

08:30 – 10:00		A. STROLLO, A. HÖCHNER, P. EVANS
	6.13	Exercises: SeisComp3 + easyWave
10:30 – 12:00		A. STROLLO, A. HÖCHNER, P. EVANS
	6.14	Exercises: SeisComp3 + easyWave
13:30 – 15:00		A. STROLLO, A. HÖCHNER, P. EVANS
	6.15	Exercises: SeisComp3 + easyWave
15:30 – 17:00		A. HÖCHNER
	6.16	Discussion: Uncertainties in Tsunami Forecasting

Friday, Oct. 21

08:30 – 10:00		Scientific Presentations of the Participants (20-28)
10:30 – 12:00		YIN MYO MIN HTWE
	6.17	Activities of Myanmar in the Indian Ocean Tsunami Warning System
13:30 – 15:00		A. STROLLO
	6.18	How to join the GEOFON programme
15:30 – 16:00		Final Discussion

Evening **Closing of the Training Course 2016**

19:30 - Handing out of the course certificates

Saturday, Oct. 22 Departure of Participants