International Training Course on

Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation

August 12 to September 6, 2019
Potsdam, Germany

———

Organised and sponsored by

Helmholtz Centre Potsdam
GFZ German Research Centre for Geosciences

co-sponsored by

Federal Foreign Office of Germany (Berlin)

List of institutions, lecturers and assistants contributing to the International Training Course on "Seismology, Hazard Assessment and Risk Mitigation",
August 12 to September 6, 2019 in Potsdam, Germany

GFZ German Research Centre for Geosciences, Germany

Dr. Andrey Babeyko	andrey.babeyko@gfz-potsdam.de
Jose Bayona	jose.bayona@gfz-potsdam.de
Dr. Dino Bindi	bindi@gfz-potsdam.de
Dr. Simone Cesca	simone.cesca@gfz-potsdam.de
Prof. Dr. Fabrice Cotton	fcotton@gfz-potsdam.de
Prof. Dr. Torsten Dahm	torsten.dahm@gfz-potsdam.de
Timothy Davis	timothy.davis@gfz-potsdam.de
Dr. Sebastian Hainzl	sebastian.hainzl@gfz-potsdam.de
Dr. Sebastian Heimann	sebastian.heimann@gfz-potsdam.de
Dipl. Phys. Karl-Heinz Jäckel	jaeckl@gfz.potsdam.de
Dr. Claus Milkereit	claus.milkereit@gfz-potsdam.de
Prof. Mahdi Motagh	mahdi.motagh@gfz-potsdam.de
Dr. Cecilia Nievas	cecilia.nievas@gfz-potsdam.de
Dr. Marco Pilz	marco.pilz@gfz-potsdam.de
Dr. Massimilano Pittore	massimiliano.pittore@gfz-potsdam.de
Dr. Javier Quinteros	javier.quinteros@gfz-potsdam.de
Dr. Eleonora Rivalta	eleonora.rivalta@gfz-potsdam.de
Dr. Joachim Saul	joachim.saul@gfz-potsdam.de
Dr. Angelo Strollo	angelo.strollo@gfz-potsdam.de
Dr. Thomas Walter	twalter@gfz-potsdam.de
Dr. Rongjiang Wang	wang@gfz-potsdam.de
Dr. Greame Weatherill	gweather@gfz-potsdam.de

Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, BBK, Bonn, Germany

Alexander Esser	alexander.esser@bbk.bund.de

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Oberpfaffenhofen, Germany

Dr. Christian Geiß	Christian.Geiss@dlr.de
Prof. Dr. Strunz	Guenter.Strunz@dlr.de

International Search and Rescue, I·S·A·R, Kleve, Germany

Dr. Steven Bayer	steven.bayer@isar-germany.de

Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, INOGS, Italy

Prof. Dr. Stefano Parolai	sparolai@inogs.it

University of Bergen, Norway

Dr. Lars Ottemøller	lars.ottemoller@geo.uib.no

Scientific Programme

International Training Course on

Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation

Potsdam, Germany, 12 August – 6 September, 2019

1. Opening Day

Monday, Aug. 12 **H, VR 2-3**

08:45 - 09:30 *Prof. Dr. R. Hüttl*
Opening of the Training Course 2019
Presentation of the Helmholtz-Centre Potsdam - GFZ German Research Centre for Geosciences

Dr. Alexander Rudloff, Secretary General of IUGG
IUGG - International Union of Geodesy and Geophysics: 100 years for the Benefit of Society

Prof. Torsten Dahm
Human-induced and triggered seismicity: it's role in hazard programs

09:30 - 10:00 *Break for a welcome drink - Group Photo*

10:00 - 10:30 *Dr. Andrey Babeyko*
Two unexpected damaging tsunamis in Indonesia triggered by the 2018 Sulawesi earthquake and the flank collapse of the Krakatau volcano

10:30 - 11.00 *Dr. Javier Quinteros, Dr. Angelo Strollo*
The GEOFON program and the SeisComp3 project

11.00 - 11:30 *Dr. Thomas Walter, Prof. Mahdi Motagh*
InSAR – Remote Monitoring of Natural Hazards

11:30 - 12:00 *Jose Bayona*
A global seismicity model based on geodetic strain rates, geomechanical information and earthquake-catalogue data

12:00 - 13:30 *Lunch Break*

13:30 - 14:00 *Dr. Claus Milkereit*
The International Training Courses

14:00 - 15:00 C. MILKEREIT
1.0 Introduction to Digital Signal Processing and Concepts

15:00 - 15:30 *Coffee break*

15:30 - 17:00 T. DAHM
1.1 Aims and fundamentals of seismology

Evening (Hotel)

18.30 - 19:30 Dinner participants + lecturers

19:30 - 21:00 Informal get-together of participants and lecturers

2. Seismology, Instrumentation, Seismogram Analysis, Earthquake Source Parameter and Wave Propagation

H, VR2-3

Tuesday, Aug. 13

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 C. MILKEREIT
2.3 Seismic Sensors and their calibration

15:30 - 17:00 A. STROLLO, J. SAUL
2.4 Event Location and Magnitudes I

Wednesday, Aug. 14

08:30 - 10:00 T. DAHM
2.5 Seismic waves in the real Earth, required seismic records and derived Earth models

10:30 - 12:00 A. STROLLO, J. SAUL
2.6 Event Location and Magnitudes II

13:30 - 15:00 A. STROLLO, J. SAUL
2.7 Event Location and Magnitudes III

15:30 - 17:00 C. MILKEREIT
2.8 Fault Plane Solution from First Motion Polarity Reading

Thursday, Aug. 15

08:30 - 10:00		S. HAINZL
	2.9	Earthquake Statistics I: Frequency-Magnitude distribution
10:30 - 12:00		S. HAINZL
	2.10	Exercise I: Frequency-Magnitude distribution
13:30 - 15:00		S. HAINZL
	2.11	Earthquake Statistics II: Aftershocks & Seismicity models
15:30 - 17:00		S. HAINZL
	2.12	Exercise II: Earthquake Clustering

Friday, Aug. 16

08:30 - 10:00		R. WANG, S. HEIMANN
	2.13	The seismic wave field in a layered half space I
10:30 - 12:00		R. WANG, S. HEIMANN
	2.14	The seismic wave field in a layered half space II
13:30 - 15:00		S. HEIMANN, R. WANG
	2.15	Exercise: The seismic wave field in a layered half space
15:30 - 17:15		Scientific Presentations of the Participants (1-7)

Evening:

19:30 - 21:00 *Cultural Presentation (1-6)*

Saturday, Aug. 17 *Cultural Walk through Potsdam*

Sunday, Aug. 18 *Cultural Walk through Berlin*

H, VR 2-3

Monday, Aug. 19

08:30 - 10:00		S. CESCA
	2.16	Moment Tensor Inversion Theory
10:30 - 12:00		S. HEIMANN
	2.17	Earthquake Data Agencies and Formats
13:30 - 15:00		S. HEIMANN, S. CESCA
	2.18	Data Access, Preparation and Visualization
15:30 - 17:00		S. HEIMANN, S. CESCA
	2.19	Green's Functions

Tuesday, Aug. 20

08:30 - 10:00		S. HEIMANN, S. CESCA
	2.20	Synthetic Seismograms
10:30 - 12:00		S. CESCA, S. HEIMANN
	2.21	Moment Tensor Inversion with RAPIDINV
13:30 - 15:00		S. CESCA, S. HEIMANN
	2.22	Moment Tensor Inversion Exercise I
15:30 - 17:00		S. CESCA, S. HEIMANN
	2.23	Moment Tensor Inversion Exercise II

Wednesday, Aug. 21

08:30 - 10:00		S. CESCA, S. HEIMANN
	2.24	Moment Tensor Inversion Exercise III
10:30 - 12:00		S. CESCA, S. HEIMANN
	2.25	Moment Tensor Inversion Exercise IV

3. Engineering Seismology

13:30 - 15:00		S. PAROLAI
	3.1	Ground shaking site effects. Introduction: Basic of signal analysis, basic of site amplification
15:30 - 17:00		S. PAROLAI
	3.2	Instrumental Site effect estimation: Direct methods

Thursday, Aug. 22

08:30 - 10:00		S. PAROLAI
	3.3	Ground shaking site effects. Indirect methods: Surface wave based methods
10:30 - 12:00		S. PAROLAI
	3.4	Use of micro tremor recordings for estimating site effects
13:30 - 15:00		M. PILZ, S. PAROLAI
	3.5	Instrumental Site effects: Single station and array passive data acquisition
15:30 - 17:00		Scientific Presentations of the Participants (8-13)

Evening:

19:30 - 21:00 *Cultural Presentation (7-13)*

Friday, Aug. 23

08:30 - 10:00 M. PILZ, S. PAROLAI
3.6 Instrumental Site effects: Data analysis. Dispersion curve calculation

10:00 - 11:30 M. PILZ, S. PAROLAI
3.7 Instrumental Site effects: Data analysis: S-wave velocity profile estimation

12:00 *Excursion Potsdam – Hamburg DESY*

Saturday, Aug. 24 *Excursion Hamburg – Bremerhaven AWI - Göttingen*

Sunday, Aug. 25 *Excursion Göttingen – Potsdam*

4. Strong Ground Motion, Hazard Assessment and Risk

H, VR 2-3

Monday, Aug. 26

08:30 - 10:00 F. COTTON
4.1 Earthquake seismology primer for PSHA

10:30 - 12:00 F. COTTON
4.2 Waves Primer for PSHA

13:30 - 15:00 D. BINDI
4.3 Introduction to Strong Motion Seismology

15:30 - 17:00 D. BINDI
4.4 **Exercise** on Strong Motion data processing

Tuesday, Aug. 27

08:30 - 10:00 F. COTTON
4.5 Seismic hazard: why do we need probabilities?

10:30 - 12:00 F. COTTON
4.6 Introduction to PSHA

13:30 - 15:00 G. WEATHERILL
4.7 Earthquake catalogs and seismicity models I

15:30 - 17:00 G. WEATHERILL
4.8 Earthquake catalogs and seismicity models II

Wednesday, Aug. 28

08:30 - 10:00 G. WEATHERILL, D. BINDI
4.9 Introduction to Ground Motion Modelling

10:30 - 12:00 G. WEATHERILL, D. BINDI
4.10 Exercise on Ground Motion Modelling

13:30 - 15:00 G. WEATHERILL
4.11 Introduction to OpenQuake

15:30 - 17:00 F. COTTON, G. WEATHERILL
4.12 Example of PSHA computation and discussions of uncertainties (logic tree)

Thursday, Aug. 29

08:30 - 10:00 M. PITTORE
4.13 Introduction to Seismic Risk Assessment

10:30 - 12:00 M. PITTORE
4.14 Ingredients for Risk assessment

13:30 - 15:00 M. PITTORE
4.15 Example of Probabilistic Risk computation

15:30 - 17:00 M. PITTORE
4.16 Early Warning and Rapid Response

Friday, Aug. 30

08:30 - 10:00 C. NIEVAS
4.17 Physical vulnerability of buildings

10:30 - 12:00 C. NIEVAS
4.18 Why buildings fail and how their behaviour can be improved

13:30 - 15:00 M. PITTORE
4.19 Which buildings will collapse in an earthquake scenario? Scenario-based Risk assessment and Impact estimation

15:30 - 17:15 Scientific Presentations of the Participants (14-20)

Evening:

19:30 - 21:00 *Cultural Presentation (14-20)*

Saturday, Aug. 31 *Leisure Time*

Sunday, Sept. 1 *Leisure Time*

5. Satellite Methods and Modelling

H, VR 2-3

Monday, Sept. 2

08:30 - 10:00		T. WALTER, M. MOTAGH
	5.1	Introduction to InSAR
10:30 - 12:00		T. WALTER, M. MOTAGH
	5.2	Examples of Remote sensing of Volcano- and seismo-tectonic processes
13:30 - 15:00		T. WALTER, M. MOTAGH
	5.3	Remote sensing of Volcano- and seismotectonic processes
15:30 - 17:00		T. WALTER, M. MOTAGH
	5.4	Remote sensing of Volcano- and seismotectonic processes

Tuesday, Sept. 3

08:30 - 10:00		E. RIVALTA
	5.5	Introduction to Seismotectonics I (Coulomb stresses)
10:30 - 12:00		E. RIVALTA, T. DAVIS
	5.6	Introduction to Seismotectonics II
13:30 - 15:00		E. RIVALTA, T. DAVIS
	5.7	Introduction to Seismotectonics III
15:30 - 17:00		Scientific Presentations of the Participants (21-26)

Evening:

19:30 - 21:00 *Cultural Presentation (21-26)*

6. Expert Days

Different Locations

Wednesday, Sept. 4

08:30 - 17:00 **Expert Day – 1**

During 2 days participants will form small working groups and will closely work together with an expert. The participants can choose according to their interest and availability. We also would like to encourage general discussions on seismology and seismic hazard. Please bring with you your own data or papers about research ideas or a list of questions. Some possible topics during the Expert Day are

- Seismic Moment Tensor Analysis
- The seismic wave field in a layered half space
- Strong Motion Data Analysis
- Ground Displacement Measured by INSAR
- Array techniques
- H/V methods
- Seismic station integration and SeisComp3
- Seismic Hazard Assessment (OpenQuake)
- Seismic Risk Assessment (OpenQuake)
- Noise Monitoring
- Earthquake Analysis with SEISAN
- Sensor Calibration
- Training on ocean bottom and amphibian experiment seismolgical data

Different Locations

Thursday, Sept. 5

08:30 - 17:00 **Expert Day – 2**

7. Disaster Preparedness and Rapid Crisis Reaction

H, VR 3

Friday, Sept. 6

08:30 - 16:00 **Workshop on**
7 **Disaster Preparedness and Disaster Management**

Evening: **Closing of the Training Course 2019**

17:00 – 21:00 Handing out of the course certificates

Saturday, Sept. 7 Departure of Participants

Sunday, Sept. 8 Departure of Participants