International Virtual Training Course on „Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation“

October 19, 2020 to November 6, 2020

INTRODUCTION

- The GFZ is Germany’s national research center for the solid Earth sciences. Our mission is to deepen the knowledge of the dynamics of the solid Earth, and to develop solutions for grand challenges facing society. These challenges include anticipating the hazards arising from the Earth’s dynamic systems and mitigating the associated risks to society.

- The GFZ carries out annual training courses on "Seismology and Seismic Hazard Assessment". These courses are part of the educational and training program of the UNESCO in the field of geosciences and disaster mitigation. The courses are supported by the German Federal Foreign Office (German humanitarian assistance). The program is particularly useful for seismological station and network operators, data interpreters and those concerned with seismic zoning and seismic hazard assessment.

GUIDELINES

- The virtual workshop, in the form of a series of lectures, will be held via BigBlueButton/Zoom,
- The participants are requested to download and install Zoom in their desktop or laptop computers.
- The participants are expected to mute and disable their audio during lecture by the speakers and suitably turn the same on only if direct interaction during the exercises/ Q&A session is attempted
- A certificate shall be provided to participants upon request, however, with at least 80% overall attendance in the virtual training course.

Moderator/Contact:

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Week ‚0‘
October 19, 2020 to October 23, 2020

Week 0

- Instruction how the course is being organised and what is expected
- Establishing a common knowledge basis (digital data analysis, Python programming, amplitude spectra, etc.)
- Try to solve computer problems, internet connection problems, etc.
- Download of virtual machine (VM) image and software
- Introduction to Python programming.
- Introduction to GEOFON, and InSAR

Week 0 Slot	**Monday** **Day 1 - 19.10.2020**	**Tuesday** **Day 2 - 20.10.2020**	**Wednesday** **Day 3 - 21.10.2020**	**Thursday** **Day 4 - 22.10.2020**	**Friday** **Day 5 - 23.10.2020**
8:30 - 9:00	**Welcome**	Questions / Answers	Questions / Answers	Questions / Answers	Questions / Answers
9:00 - 9:30	C. MILKEREIT Aims of the Training Course 2020	C. MILKEREIT Introduction Digital Signal Processing	Programming in Python and Jupyter notebooks	A. STROLLO The GEOFON Program	T. WALTER / N. Richter Introduction to InSAR
9:30 - 10:00	Introduction of Course participants	D. BINDI Stong Motion Data Base	Pablo Iturrieta	Introduction to SeisComp	
10:00-10:30	"Coffee break"	"Coffee break"	"Coffee break"	"Coffee break"	
10:30 - 11:00	ALL Introduction of Course Lecturers	M. PILZ Fourier Transform	F. Cotton The normal and log normal distributions	Getting familar with SeisComp	
11:00 - 11:30	C. MILKEREIT Organisation of the course 2020			Working and testing SeisComp	Self Study
11:30 - 12:00		C. MILKEREIT Seismometers and Metadata	G. Weatherill The Poisson model	Getting data and metadata into SeisComp	Prepare Questions (NMSOP or literature)
12:00-13:30	"Lunch break"	"Lunch break"	"Lunch break"	"Lunch break"	
13:30 - 16:30	Test of Computer connection ALL Test of Software installation	Test of Computer connection ALL Test of Software installation	Programming in Python and Jupyter Notebooks P. Iturrieta / M. Isken	Exploring probability density functions using Jupyter notebooks Greame Weatherill	
16:30 - 17:00	Discussion /Wrap-up	Discussion /Wrap-up	Discussion /Wrap-up	Discussion /Wrap-up	

Week 1
October 26, 2020 to October 30, 2020

Week 1
- Seismology, wave propagation, earthquake location
- Earthquake magnitudes, earthquake statistics
- Moment tensor analysis and array seismology
- Array Seismology
- ‘cultural event’

Lecturer:

GFZ German Research Centre for Geosciences, Geophysics Department

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EMSC

Remy Bossu Remy.BOSSU@CEA.FR

Week 1 26.-30. Oct Slot	Seismology **Monday** **Day 1 - 26.10.2020**	Seismology **Tuesday** **Day 2 - 27.10.2020**	Seismology **Wednesday** **Day 3 - 28.10.2020**	Seismology **Thursday** **Day 4 - 29.10.2020**	Seismology **Friday** **Day 5 - 30.10.2020**
8:30 - 9:00	Opening	Questions / Answers	Questions / Answers	Questions / Answers	Questions / Answers
9:00 - 9:30	F. TILMANN Seismology (Chapter 2)	F. TILMANN/A. STROLLO Earthquake Location (Chapter IS11.1)	S. HAINZL Frequency-Magnitude distribution	T. DAHM Moment Tensor Inversion	M. OHRNBERGER Array Seismology
9:30 - 10:00	F. TILMANN Exercise with SC Wave propagation	F. TILMANN/ A. STROLLO Seismic Sensors (Chapter 5)			M. OHRNBERGER **Exercise** Array Seismology
10:00-10:30	"Coffee Break"	"Coffee Break"	"Coffee Break"	"Coffee Break"	"Coffee Break"
10:30 - 11:00	F. TILMANN Seismology (Chapter 3)	F. TILMANN/A. STROLLO Magnitude(s) (Chapter 3)	S. HAINZL Clustering and De-clustering	S. CESCA / S. HEIMANN **Exercise** on Moment Tensor Inversion	Project: Array Seismology and/or "grond"
11:00 - 11:30	A. STROLLO/F. TILMANN **Exercise** SC Phases and picking	F. TILMANN/A. STROLLO Magnitude(s) (Chapter 3)			
11:30 - 12:00	A. STROLLO/F. TILMANN **Exercise** Seismology	F TILMANN/ A. STROLLO Polarity reading and FPS	T. DAHM Induced Seismicity		
12:00-13:30	"Lunch Break"	"Lunch Break"	"Lunch Break"	"Lunch Break"	"Lunch Break"
13:30 - 16:00	Project: Travel time curve	Project: Earthquake location and earthquake magnitude(s)	Project: Calculate the "a" and "b" values for the Balkan region	Project: "grond"	Social Event Video or ppt from the Home Institute (3-5 Min each)
16:00 - 16:30		Guest Lecture R. BOSSU / EMSC Citizen Seismology			
16:30 - 17:00	Discussion / Wrap Up	Discussion / Wrap Up	Discussion / Wrap Up	Discussion / Wrap Up	Discussion / Wrap Up

Week 2
November 2, 2020 to November 6, 2020

Week 2
- Seismic hazard assessment, strong motion seismology
- GMPEs, ground shaking prediction
- Instrumental micro-zonation
- Ground deformation monitoring with InSAR

Lecturer:

GFZ German Research Centre for Geosciences, Geophysics Department

Fabrice Cotton	fabrice.cotton@gfz-potsdam.de
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Week 2		Hazard		Hazard		Hazard		Hazard		InSAR
2. - 6. Nov		**Monday**		**Tuesday**		**Wednesday**		**Thursday**		**Friday**
Slot		**Day 1 - 02.11.2020**		**Day 2 - 03.11.2020**		**Day 3 - 04.11.2020**		**Day 4 - 05.11.2020**		**Day 5 - 06.11.2020**
8:30 - 9:00		Welcome		Questions / Answers		Questions / Answers		Questions / Answers		Questions / Answers
9:00 - 9:30		F. COTTON Key challenges of seismic hazard evaluation		D. BINDI Source, attenuation and site effects contribution to ground shaking		M. PILZ What are site effects?		G. WEATHERILL What is probabilistic seismic hazard analysis?		T. WALTER Introduction to InSAR
9:30 - 10:00		F. COTTON The seismic Risk Chain		D. BINDI Ground-Shaking prediction		M. PILZ How to take site effects into account?		G. WEATHERILL What is probabilistic seismic hazard analysis?- **Exercise**		T. WALTER / N. Richter How to download software and data
10:00-10:30		"Coffee Break"		"Coffee Break"		"Coffee Break"		"Coffee Break"		"Coffee Break"
10:30 - 11:00		D. BINDI How we characterize strong motion recordings?		D. BINDI/G. WEATHERILL **Exercise** Ground shaking prediction		M. PILZ How to take site effects into account?		G. WEATHERILL Where? How likely? How large? Seismic source models and recurrence.		T. WALTER / N. RICHTER **Exercise** InSAR
11:00 - 11:30		D. BINDI How we process strong motion recordings?				M. PILZ **Exercise** Site effects		Project: Seismic Hazard of Cities in the Balkan Region		
11:30 - 12:00		D. BINDI **Exercise** Strong Motion Seismology (data download and processing)								
12:00-13:30		"Lunch Break"		"Lunch Break"		"Lunch Break"		"Lunch Break"		"Lunch Break"
13:30 - 16:00		Project: Strong motion data processing and characterization		Project: Ground-shaking prediction for a single earthquake		Project: Measuring site effects		F. COTTON From seismic hazard evaluation to building codes and decision making		T. WALTER / M. ISKEN / N. RICHTER **Exercise** on InSAR
16:00 - 16:30		A seismic risk scenario for the city of Cologne (C. NIEVAS)		Lecture Seismic Hazard Modelling in Europe (F. COTTON/ G. WEATHERILL)						Closing of the Training Course 2020
16:30 - 17:00		Discussion / Wrap Up		Discussion / Wrap Up		Discussion / Wrap Up		Discussion / Wrap Up		Feedback welcome