



Universidad Nacional  
de San Luis



Universidad Nacional de San Juan



International Training Course on  
**Seismology, Seismic Data Analysis,  
Hazard Assessment  
and Risk Mitigation**

October 19 to November 13, 2020  
San Luis and San Juan, Argentina

Organised and sponsored by

Helmholtz Centre Potsdam  
GFZ German Research Centre for Geosciences

and

Universidad Nacional San Luis and  
Universidad Nacional San Juan  
Argentina

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",**  
19 October to 13 November, 2020; San Luis and San Juan, Argentina

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## Scientific Programme

### International Training Course on

## Seismology, Seismic Data Analysis, Hazard Assessment and Risk Mitigation

San Luis (1-2) and San Juan (3-4), Argentina, 19 October to 13 November, 2020

<b>1. Opening Day</b>		
<b>Monday, Oct. 19      Opening of the Training Course 2020</b>		
08:30 – 9:00		<i>Representative of the Universidad Nacional de San Luis (to be confirmed) UNSL rector</i>
		<i>Representative of the German Embassy (to be confirmed)</i>
09:00 – 09:30		<i>Carlos Costa</i> Neotectonics of Argentina and Implications for Seismic Hazard
09:30 – 10:00		<i>Prof. Dr. Torsten Dahm</i> Human-induced and triggered seismicity: it's role in hazard programs
10:00 – 10:30		<i>Patricia Alvarado (tbc)</i> Report about seismic monitoring in Argentina
10:30 – 11:00		<i>Break for a welcome drink - Group Photo</i>
11:30 – 12:00		<i>Laura Giambiagi</i> Seismo-Tectonics of Argentina. State of the art
12:00 – 12:30		<i>Dr. Claus Milkereit</i> Introduction – International Training Course 2020
12:30 – 13:30		<i>Lunch Break</i>
<b>2. Fundamentals of Seismology, Instrumentation, Earthquake Source Parameter and computer-assisted Seismogram Analysis</b>		
13:30 – 15:00	2.1	T. DAHM Seismic sources and source parameters
15:30 – 17:00	2.2	T. DAHM Theory of wave propagation: Basics of numerical methods
<b>Evening</b> 19:30 – 21:00		Informal get-together of participants and lecturers

<b>Tuesday, Oct. 20</b>		
08:30 – 10:00	2.3	T. DAHM Event Location and Magnitudes
10:30 – 12:00	2.4	S. HAINZL Earthquake Statistics: Frequency-Magnitude distribution
13:30 – 15:00	2.5	L. OTTEMØLLER <b>Introduction to SEISAN</b> and <b>Exercise</b> on phase picking and localization of local events based on network records
15:30 – 17:00	2.6	L. OTTEMØLLER <b>Exercise</b> on phase picking and localization of tele-seismic events based on network records
<b>Wednesday, Oct. 21</b>		
08:30 – 10:00	2.7	T. DAHM Seismic waves in the real Earth, required seismic records and derived Earth models
10:30 – 12:00	2.8	S. HAINZL <b>Exercise:</b> Earthquake Statistics
13:30 – 15:00	2.9	L. OTTEMØLLER <b>Exercise</b> on amplitude picking and magnitude determination
15:30 – 17:00	2.10	L. OTTEMØLLER <b>Exercise</b> on spectral source parameter determination
<b>Thursday, Oct. 22</b>		
08:30 – 10:00	2.11	S. HAINZL Earthquake Clustering (and De-Clustering)
10:30 – 12:00	2.12	C. MILKEREIT Seismic Sensors, their calibration and installation
13:30 – 15:00	2.13	L. OTTEMØLLER <b>Exercise</b> on Response File
15:30 – 17:00	2.14	L. OTTEMØLLER <b>Exercise</b> on Magnitudes

<b>Friday, Oct. 23</b>		
08:30 – 10:00	2.15	C. MILKEREIT Fault Plane Solution from polarity readings
10:30 – 12:00	2.16	C. MILKEREIT Manual <b>exercise</b> on fault-plane solution
13:30 – 15:00	2.17	L. OTTEMØLLER <b>Exercise</b> on determination of fault-plane solutions
15:30 – 17:00		Scientific presentations of the participants (1-6)
<b>Evening</b> 19:30 – 21:00		<i>Cultural presentations (1-6)</i>
<b>Saturday, Oct. 24</b> Visit the EL MORRO (volcanic caldera)		
<b>Sunday, Oct. 25</b> Visit - LA FLORIDA, and Sierras de SAN LUIS		
<b>Monday, Oct. 26</b>		
08:30 – 10:00	2.18	S. CESCO Moment Tensor Inversion Theory
10:30 – 12:00	2.19	S. HEIMANN Earthquake Data Agencies and Formats
13:30 – 15:00	2.20	S. HEIMANN, S. CESCO Green's Functions
15:30 – 17:00	2.21	S. HEIMANN, S. CESCO Synthetic Seismograms
<b>Tuesday, Oct. 27</b>		
08:30 – 10:00	2.22	S. CESCO, S. HEIMANN <b>Exercise</b> on Moment Tensor Inversion: Case Study Strike Slip Earthquake
10:30 – 12:00	2.23	S. CESCO, S. HEIMANN <b>Exercise</b> on Moment Tensor Inversion: Case Study Subduction Earthquake
13:30 – 15:00	2.24	S. CESCO, S. HEIMANN <b>Exercise</b> on Moment Tensor Inversion
15:30 – 17:00	2.25	S. CESCO, S. HEIMANN Moment Tensor Inversion with RAPIDINV

<b>Wednesday, Oct. 28</b>		
08:30 – 10:00	2.26	S. CESCO, S. HEIMANN <b>Exercise</b> on Moment Tensor Inversion
10:30 – 12:00	2.27	S. CESCO, S. HEIMANN Moment Tensor Inversion with RAPIDINV
<b>3. Engineering Seismology</b>		
13:30 – 15:00	3.1	M. PILZ Engineering Seismology I
15:30 – 17:00	3.2	M. PILZ Engineering Seismology II
<b>Thursday, Oct. 29</b>		
08:30 – 10:00	3.3	M. PILZ Engineering Seismology III – Array Installation
10:30 – 12:00	3.4	M. PILZ Engineering Seismology IV
13:30 – 15:00	3.5	M. PILZ Engineering Seismology V
15:30 – 17:00	3.6	M. PILZ Engineering Seismology VI
<b>Evening</b> 19:30 – 21:00		<i>Cultural presentations (7-12)</i>
<b>Friday, Oct. 30</b>		
08:30 – 10:00	3.7	M. PILZ Engineering Seismology VII
10:30 – 12:00	3.8	M. PILZ Engineering Seismology VIII
13:30 – 15:00	3.9	M. PILZ Engineering Seismology IX
15:30 – 17:00		Scientific presentations of the participants (7-12)
<b>Saturday, Oct. 31</b>		Excursion - LAS QUIJADAS (move from San Luis to San Juan)
<b>Sunday, Nov. 1</b>		Excursion - Visit INPRES and SAN JUAN center

<b>4. <u>Strong Ground Motion and Hazard Assessment</u></b>		
<b>Monday, Nov. 2</b>		
08:30 – 10:00	4.1	D. BINDI Introduction to Strong Motion Seismology
10:30 – 12:00	4.2	D. BINDI Strong Motion data processing
13:30 – 15:00	4.3	G. WEATHERILL Introduction to Seismic Hazard Assessment
15:30 – 17:00	4.4	G. WEATHERILL Basic Principles of Probabilistic Seismic Hazard Analysis (PSHA)
<b>Tuesday, Nov. 3</b>		
08:30 – 10:00	4.5	G. WEATHERILL Earthquake Catalogues and Recurrence
10:30 – 12:00	4.6	G. WEATHERILL Seismogenic Sources, Active Faulting and Earthquake Recurrence from Geology
13:30 – 15:00	4.7	D. BINDI Introduction to Ground Motion Prediction Equations (GMPE)
15:30 – 17:00	4.8	D. BINDI <b>Exercise</b> on Ground Motion Prediction Equations
<b>Wednesday, Nov. 4</b>		
08:30 – 10:00	4.9	G. WEATHERILL Epistemic and Aleatory Uncertainties in Probabilistic Seismic Hazard Analysis
10:30 – 12:00	4.10	G. WEATHERILL Overview of OpenQuake: Calculators and Example Application
13:30 – 15:00	4.11	G. WEATHERILL Site Specific PSHA and Considerations for Critical Facilities
15:30 – 17:00	4.12	G. WEATHERILL <b>Exercises</b> on PSHA

<b>Thursday, Nov. 5</b>		
08:30 – 09:30	4.13	C. NIEVAS Introduction to Seismic Risk Assessment
09:30 – 10:30	4.14	C. NIEVAS Ingredients for Seismic Risk Assessment
11:00 – 12:00	4.15	C. NIEVAS Physical vulnerability of buildings
13:30 – 15:00	4.16	C. NIEVAS, G. WEATHERILL <b>Exercises</b> on Seismic Risk Analysis
15:30 – 17:00	4.17	C. NIEVAS, G. WEATHERILL <b>Exercises</b> on Seismic Risk Analysis
<b>Friday, Nov. 6</b>		
08:30 – 10:00	4.18	C. NIEVAS Applications for Engineering Purposes
10:30 – 12:00	4.19	L. PERUCCA Potential of Seismogenic Zones in San Juan
13:30 – 15:00	4.20	D. COMTE Lessons Learned from the Last Great Earthquakes Occurred in Chile
15:30 – 17:00		Scientific presentations of the participants (13-18)
<b>Evening</b> 19:30 – 21:00		<i>Cultural presentations (13-18)</i>
<b>Saturday, Nov. 7</b> Visit to cordillera de los ANDES		
<b>Sunday, Nov. 8</b> <i>Leisure Time</i>		
<b>5. <u>InSAR and Remote Sensing in Monitoring Geological Changes</u></b>		
<b>Monday, Nov. 9</b>		
08:30 – 10:00	5.1	T. WALTER Introduction to InSAR
10:30 – 12:00	5.2	T. WALTER Remote sensing of Volcano- and seismo-tectonic processes

13:30 – 15:00	5.3	T. WALTER Examples of Remote sensing of Volcano- and seismo-tectonic processes
15:30 – 17:00	5.4	T. WALTER <b>Exercise</b> on Remote sensing of Volcano- and seismo-tectonic processes

**Tuesday, Nov. 10**

08:30 – 10:00	5.5	T. WALTER Examples of Remote sensing of Volcano- and seismo-tectonic processes
10:30 – 12:00	5.6	T. WALTER <b>Exercise</b> on InSAR
13:30 – 15:00	5.7	T. WALTER, C. MILKEREIT Modelling of observed Deformation
15:30 – 17:00	5.8	T. WALTER, C. MILKEREIT <b>Exercise</b> modelling of observed Deformation

**6. GEOFON and seismic data analysis with SeisComp3**

**Wednesday, Nov. 11**

08:30 – 10:00	6.1	A. STROLLO The GEOFON Project and SeisComp3
10:30 – 12:00	6.2	A. STROLLO, NN Seismic station integration into SeisComp3
13:30 – 15:00	6.3	A. STROLLO, NN Waveform analysis with SeisComp3
15:30 – 17:00	6.4	A. STROLLO, NN Waveform analysis with SeisComp3 – Tips and Tricks
<b>Evening</b> 19:30 – 21:00		<i>Cultural presentations (19-24)</i>

**Thursday, Nov. 12**

08:30 – 10:00	6.5	A. NACIF Institutional regional network implemented on SeisComp3
10:30 – 12:00	6.6	A. STROLLO Waveform analysis with SeisComp3

13:30 – 15:00	6.7	A. STROLLO Waveform analysis with SeisComp3
15:30 – 17:00		Scientific presentations of the participants (19-24)

**Friday, Nov. 13**

08:30 – 10:00	6.8	A. STROLLO, NN Waveform analysis with SeisComp3
10:30 – 12:00	6.9	A. STROLLO, NN Waveform analysis with SeisComp3
13:30 – 15:00	6.10	A. STROLLO, NN Waveform analysis with SeisComp3
15:30 – 16:00		Final Discussion
<b>Evening</b> 19:30 -		<b>Closing of the Training Course 2020</b> Handing out of the course certificates

**Saturday, Nov. 14** Departure of Participants