Scientific Programme

International Training Course on

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

October 27 to November 28, 2008, Heredia, Costa Rica

Opening Day

Monday, Oct. 27

09.30 - 10.00	Opening of the Training Course 2008
10.00 - 10.15	Representative German Embassy Representative of UNA
10.15 - 10.45	*Break for a welcome drink and snack*
10.45 - 11.30	*Dr. M. Protti* Very Broad Monitoring of a Seismic Gap in a Subduction Zone: The case of the Nicoya Peninsula, Costa Rica
11.15 - 12.00	*Dr. F. Martini* Multiple Scattering in volcanic structures: applications to reflection and volcano seismology
11.45 - 12.15	*Prof. Dr. J. Zschau* Earthquake Science and its Contribution to Society
12.15 - 13.45	*Lunch Break*
13.45	Group Photo
14.00 - 15.30	*Dr. G. Alvarado* Volcanic activity and hazard in Arenal , Costa Rica *Dr. J. Pacheco* Early tsunami warning
15.30 - 17.00	Visiting Program University
Evening:	
19.00 - 20.00	*Dinner*
20.15 - 21.30	*Dr. C. Milkereit, Dr. R. Quintero* *Informal get-together of participants and lecturers*

1. Seismology in the Central America: State of the Art

Tuesday, Oct. 28

08.30 - 09.30	1.1	*Dr. Javier Pacheco* Seismology in Costa Rica: State of the Art
09.30 - 10.00	1.2	*Dr. Wilfried Strauch* Seismology in Nicaragua: State of the Art
10.30 - 11.00	1.3	*Dr. Eduardo Camacho* Seismology in Panama: State of the Art
11.30 - 12.00	1.4	*Dr. Hector Rendon* Seismolgy in Venezuela: State of the Art
13.30 - 14.00	1.5	*Dr. Carlos Valdes* Seismology in Mexico: State of the Art
14.00 - 14.30	1.6	*NN* Cuba
14.30 - 15.00	1.7	*Dr. Griselda Marroquin* Seismology in El Salvador: State of the Art
15.30 - 16.00	1.8	*Maria Luisa Bermudes* Seismology in Colombia: State of the Art
16.00 - 16.30	1.9	*Victor Huerfano* Seismology in the Caribbean: (MIDAS)
16.30 - 17.00	1.10	*Claus Milkereit* Summary Discussion

2. Fundamentals of seismology, data acquisition and exchange

Wednesday, Oct. 29

08.30 - 09.20	2.1	E. WIELANDT Design of Seismic Sensors I
09:30 - 10.00	2.2	E. WIELANDT Design of Seismic Sensors II
10.30 - 12.00	2.3	E. WIELANDT Installation and Shielding

13.30 - 14.20		E. WIELANDT
	2.4	Fundamentals of Signal Processing I (Complex Notation, The Transfer Function, Demo FFT)
14.30 - 15.20		E. WIELANDT
	2.5	Demonstration of shielding and installation (to be prepared)
15.30 - 17.00		E. WIELANDT
	2.6	Fundamentals of Signal Processing II (Pathways of Signal Processing)

Thursday, Oct. 30

08.30 - 09.20		E. WIELANDT
	2.7	IIR filters, inverse filtration, FILTDEMO
09.30 - 10.20		E. WIELANDT
	2.8	Poles and Zeros, SEED Headers (IGORDEMO)
10.30 - 12.00		E. WIELANDT
	2.9	**Exercise** I (calculate poles and formulate transfer function)
13.30 - 14.20		E. WIELANDT
	2.10	Calibration
14.30 - 15.20		E. WIELANDT
	2.11	Demo Calibration (to be prepared)
15.30 - 17.00		E. WIELANDT
	2.12	**Exercise:** Evaluate Calibration

Friday, Oct. 31

08.30 - 09.20		E. WIELANDT
	2.13	**Exercise** II (Analyze SEED Headers)
09.30 - 10.20		E. WIELANDT
	2.14	Measuring Noise (Demo NOISECON)
10.30 - 12.00		E. WIELANDT
	2.15	Coherency testing, orientation
13.30 - 14.20		E. WIELANDT
	2.16	Introduction to A/D converter

14.30 - 15.20		C. MILKEREIT, R. QUINTERO, E. WIELANDT
	2.17	Demonstration of different Seismic Systems
15.30 - 17.00		C. MILKEREIT, R. QUINTERO, E. WIELANDT
	2.18	Demonstration of different Seismic Systems

Saturday, Nov. 1 *Visit Heredia and San Jose*

Sunday, Nov. 2 *Visit Irazu Vulcano*

Monday, Nov. 3

08.30 - 10.00		P. BORMANN
	2.19	Aims and fundamentals of seismology. Part I: Seismic sources and source parameters
10.30 - 12.00		P. BORMANN
	2.20	Aims and fundamentals of seismology. Part II: Wave propagation, Earth's models and seismic recordings
13.30 - 15.00		C. MILKEREIT
	2.21	Getting the right seismic equipment
15.30 - 17.00		P. BORMANN
	2.22	Site selection, and optimal configuration of seismic networks

Evening:

19.30 - 21.00		P. BORMANN
		History of Seismology

3. Seismogram analysis, event location, magnitude estimation, determination of earthquake source parameters and fault-plane solutions

Tuesday, Nov. 4

08.30 - 10.00		P. BORMANN
	3.1	Phase interpretation and methods of event location by using local network data
10.30 - 12.00		P. BORMANN, S. WENDT
	3.2	Teleseismic phase interpretation and 3-component event location; animation of seismic ray propagation

13.30 - 15.00		S. PAROLAI, D. BINDI
	3.3	Source, Path and Site Effects I
15.30 - 17.00		S. PAROLAI, D. BINDI
	3.4	**Exercise** on Source, Path and Site Effects I

Wednesday, Nov. 5

08.30 - 10.00		P. BORMANN
	3.5	Earthquake magnitudes and energy estimates
10.30 - 12.00		P. BORMANN, S. WENDT
	3.6	**Manual exercise** on magnitude determination
13.30 - 15.00		S. PAROLAI, D. BINDI
	3.7	Source, Path and Site Effects II
15.30 - 17.00		S. PAROLAI, D. BINDI
	3.8	**Exercise** on Source, Path and Site Effects II

Evening:
19.00 - 21.00 *Cultural Presentation*

Thursday, Nov. 6

08.30 - 10.00		S. PAROLAI, D. BINDI
	3.9	Analysis of Strong Motion Recording
10.30 - 12.00		S. PAROLAI, D. BINDI
	3.10	**Exercise** on Analysis of Strong Motion Recording
13.30 - 15.00		Scientific Presentation of Participants I
15.30 - 17.00		Scientific Presentation of Participants II

Friday, Nov. 7

08.30 - 10.00		P. BORMANN, S. WENDT
	3.11	Introduction to and beginning of **exercise** on determination of fault plane solutions
10.30 - 12.00		P. BORMANN, S. WENDT
	3.12	**Exercise** on fault plane solution
13.30 - 15.00		Scientific Presentation of Participants III
15.30 - 17.00		Scientific Presentation of Participants IV

Saturday, Nov. 8	*Main Excursion to Arenal and*
Sunday, Nov. 9	*Puntarenas, Visit JTS Seismic Station (Iris, CTBTO)*

4. Computer-assisted seismogram analysis, source parameter determination

Monday, Nov. 10

		L. OTTEMÖLLER
08.30 - 10.00	4.1	Types of seismic data and formats; overview of seismic processing systems
10.30 - 12.00		L. OTTEMÖLLER, R. QUINTERO
	4.2	Introduction to SEISAN and **exercise** on the installation of SEISAN
13.30 - 15.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.3	**Exercise** on data base manipulation, on the use of parameter data from internal and external sources and on the presentation of results
15.30 - 17.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.4	**Exercise** on phase picking and location of local seismic events based on 3-component and network records

Tuesday, Nov. 11

08.30 - 10.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.5	**Exercise** on phase picking and localization of local seismic events based on network records
10.30 - 12.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.6	**Exercise** on phase picking and localization of teleseismic events based on network records
13.30 - 15.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.7	**Exercise** on amplitude picking and magnitude determination

15.30 - 17.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.8	**Exercise** on amplitude spectra calculation and moment magnitude determination

Evening:
19.30 - 21.00 Cultural Presentations

Wednesday, Nov. 12

08.30 - 10.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.9	**Exercise** on determination of fault-plane solutions
10.30 - 12.00		L. OTTEMÖLLER, R. QUINTERO, C. MILKEREIT, S. WENDT
	4.10	**Exercise** on spectral source parameter determination
13.30 - 15.00		R. QUINTERO, L. OTTEMÖLLER, S. WENDT
	4.11	**Exercise** on HypoDD
15.30 - 17.00		R. QUINTERO, L. OTTEMÖLLER, S. WENDT
	4.12	**Exercise** on VELEST

Thursday, Nov. 13

08.30 - 10.00		K. KLINGE
	4.13	Seismological routine data processing and communication
10.30 - 12.00		K. KLINGE
	4.14	Data processing at single stations, networks and arrays
13.30 - 15.00		K. KLINGE
	4.15	Localization using networks and arrays
15.30 - 17.00		K. KLINGE
	4.16	Identification of depth phases and “later phases”

Evening:
19.00 - 21.00 *Cultural Presentation*

Friday, Nov. 14

08.30 - 10.00		K. KLINGE
	4.17	**Exercise**: Magnitude determination
10.30 - 12.00		K. KLINGE
	4.18	**Exercise:** Analysis of recent events
13.30 - 15.00		K. KLINGE
	4.19	**Exercise**: Analysis of recent events
15.30 - 17.00		J. SAUL
	4.20	SeisComp3 and Demonstration

Saturday, Nov. 15 Excursion to Poas Vulcano

Sunday, Nov. 16 Leisure Time

Monday, Nov. 17 **Expert Day**

On this day small groups will visit working groups. Participants can choose according to their interest and availability.

- SeisComp3 (J. Saul)
- SHM Seismic Hander Motiv (K. Klinge)
- Earthworm

5. Microzonation and Site Effects

Tuesday, Nov. 18

08.30 - 09.30		F. MARTINI
	4.21	Volcano Seismology
09.45 - 10.45		M. MORA
	4.22	Volcano Seismology
11.00 - 12.00		R. DEL POTRO
	4.23	Mobility, runout and inundation zone analyses of hazardous gravity-driven volcanic phenomena: preliminary results from Turrialba volcano, Costa Rica
13.30 - 15.00		J. SAUL
	4.24	Tsunami Seismology

15.30 - 17.00		A. RODRIGUEZ, C. GARITA
	4.25	Earthworm

Evening:

19.30 - 21.00		E. D. GONZALEZ
		Volcanic Monitorino in Costa Rica

Wednesday, Nov. 19

08.30 - 10.00		P.-Y. BARD
	5.1	Ground shaking site effects. Introduction: Effects of surface topography
10.30 - 12.00		P.-Y. BARD
	5.2	Effects of soft surface layers
13.30 - 15.00.		P.-Y. BARD
	5.3	**Manual exercise:** Computation of fundamental frequencies for different sites
15.30 - 17.00		P.-Y. BARD
	5.4	**Computer exercise:**

Thursday, Nov. 20

08.30 - 10.00		P.-Y. BARD
	5.5	**Exercise:** Noise Measurements
10.30 - 12.00		P.-Y. BARD
	5.6	**Exercise:** Determination of the fundamentals resonance frequency from noise measurements
13.30 - 15.00		P.-Y. BARD
	5.7	Estimation of site effects: Instrumental, numerical, empirical
15.30 - 17.00		P.-Y. BARD
	5.8	Use of microtremor recordings for estimating site effects

Friday, Nov. 21

08.30 - 10.00		P.-Y. BARD
	5.9	Slope instabilities: Basic physics and estimation techniques
10.30 - 12.00		P.-Y. BARD
	5.10	**Manual exercise** on slope instabilities

13.30 - 15.00		Scientific Presentation of Participants V
15.30 - 17.00		Scientific Presentation of Participants VI
Saturday, Nov. 22		Leisure Time
Sunday, Nov. 23		Excursion to Cartago

6. Earthquake Hazard Assessment

Monday, Nov. 24

08.30 - 10.00		R. WAHLSTRÖM
	6.1	Lecture on macroseismic and strong-motion parameters
10.30 - 12.00	6.1	**- continuation -**
13.30 - 15.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.2	**Exercise** on assigning seismic intensity based on questionnaire data and on damage pattern
15.30 - 17.00	6.2	**- continuation -**

Evening:
19.00 - 21.00 *Cultural Presentation*

Tuesday, Nov. 25

08.30 - 10.00		R. WAHLSTRÖM
	6.3	Lecture on fundamentals of statistics and probability theory
10.30 - 12.00		R. WAHLSTRÖM
	6.4	Lecture on earthquake statistics and occurrence probability
13.30 - 15.00		R. WAHLSTRÖM
	6.5	Lecture on methodology of seismic hazard assessment I
15.30 - 17.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.6	**Manual exercise** on the validity of the Poisson distribution

Wednesday, Nov. 26

08.30 - 10.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.7	**Manual and computer exercise** on assessing catalogue completeness with time
10.30 - 12.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.8	**Manual exercise** on determination of the parameters of the Gutenberg-Richter relation
13.30 - 15.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.9	**Computer exercise:** Assigning catalogue completeness with time and its influence on the Gutenberg-Richter parameters
15.30 - 17.00		R. WAHLSTRÖM, M. SÖRENSEN
	6.10	**Computer exercise:** Influence of fore- and aftershocks on the parameters of the Gutenberg-Richter parameters

7. Risk Assessment

Thursday, Nov. 27

08.30 - 10.00		D. LANG
	7.1	Introduction into seismic risk and loss assessment methods: Empirical (intensity-based) approach versus analytical (spectral displacement) approach, Capacity spectrum methods (ATC-40, FEMA 440), Classification of physical building damage
10.30 - 12.00		D. LANG
	7.2	The seismic risk and loss assessment tool SELENA: Theoretical background, Comparison with HAZUS-MH (Part I)
13.30 - 15.00		D. LANG
	7.3	The seismic risk and loss assessment tool SELENA: Theoretical background, Comparison with HAZUS-MH (Part II)
15.30 - 17.00		D. LANG
	7.4	**Computer exercise:** SELENA handling and generation of input and inventory files Building classification, Site and subsoil classification (international earthquake codes), Provision of seismic demand (scenario events and design spectra), Compilation of a logic tree computation scheme

Friday, Nov. 28

08.30 - 10.00		D. LANG
	7.5	**Computer exercise:** Risk and loss assessment based on realistic earthquake scenarios for selected Central American cities (Part I)
10.30 - 12.00		D. LANG
	7.6	**Computer exercise:** Risk and loss assessment based on realistic earthquake scenarios for selected Central American cities (Part II)
13.30 - 15.00		D. LANG
	7.7	**Computer exercise:** Risk and loss assessment based on realistic earthquake scenarios for selected Central American cities (Part III)
15.30 - 17.00		D. LANG
	7.8	**Computer exercise:** Risk and loss assessment based on realistic earthquake scenarios for selected Central American cities (Part IV), Illustration of risk results using the Google Earth-based software tool, RISe (Risk Illustrator for SELENA)

Evening:

19.30 -	**Farewell party** and handing out of the course certificates