# Circular & Programme

International Training Course on

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

August 20 to September 23, 2006 Bishkek, Kyrgyzstan

Organised and sponsored by

GeoForschungsZentrum Potsdam (GFZ), Central Asian Institute for Applied Geo-Sciences (CAIAG), Bishkek

Co-sponsored by

AA (Berlin), UNESCO (Paris) SDC (Berne), InWEnt (Berlin), CTBTO (Vienna)

### 1. OBJECTIVES AND PROGRAMME OF THE TRAINING COURSE

The disastrous consequences of destructive earthquakes place a heavy burden on many societies and their economies, particularly in developing countries. In order to avoid, or at least to mitigate, the negative effects of such events, a thorough scientific knowledge of their geological and geophysical causes, their structural, kinematic and dynamic characteristics and their destructive effects, as well as a developed capability to monitor and to analyse them, is indispensable. The vulnerability of human societies and related human and economic losses due to earthquakes is steadily growing as a consequence of rapid population growth and urbanisation. Furthermore, earthquakes and landslides induced by human activities such as excessive underground or open-cast mining, or by the impoundment of water in large dams, may be associated with significant risks for nearby industrial facilities and areas of settlement. Accordingly, improved risk assessment and effective disaster mitigation measures are a prerequisite for ensuring countries. sustainable development in earthquake-prone Consequently. the GeoForschungsZentrum Potsdam (GFZ) has been running an annual five-week international training course in seismology and seismic hazard assessment. These courses constitute one of the well-established German contributions to the International Decade for Natural Disaster Reduction (IDNDR, 1990-1999) and now, also, a follow-up activity in the framework of the International Strategy for Disaster Reduction (ISDR). In addition, the courses form part of related programmes of UNESCO and the Sub-Committee on Training of the International Association of Seismology and Physics of the Earth's Interior (IASPEI), which are aimed at promoting training and transfer of knowledge, in particular to nationals of developing countries.

The Council of CAIAG offered an invitation to the GeoForschungsZentrum Potsdam (GFZ), to host the course for the year 2006, entitled

#### "SEISMOLOGY, SEISMIC DATA ANALYSIS, HAZARD ASSESSMENT AND RISK MITIGATION",

as a training course for the benefit of participants from Asia and Central Asia. The course has been scheduled for the period August 20 to September 23, 2006.

The course will be sponsored by the GeoForschungsZentrum Potsdam, the Foreign Office of the Federal Republic of Germany (AA, Berlin), the United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), the United Nations Office for the Coordination of Humanitarian Affairs (OCHA, Geneva), the Comprehensive Test Ban Treaty Organisation (CTBTO, Vienna), and CAIAG Institute, Bishkek. The team of German lecturers from the GFZ (6) will be complemented by colleagues from Germany (3), France, Norway and the United States of America, (one each; see under point 4 below: List of lecturers).

Up to 2005, 633 participants from 97 countries, including young graduate students, university lecturers and senior staff and directors of reputable research institutes, have attended the Potsdam seismology training courses. Since the foundation of the GFZ in 1992 these courses have been held alternately in Potsdam and in a host country of Asia, Africa or Latin America – the so-called regional courses. The course topics of the regional courses are specifically tailored to the needs and potentials of those regions and draw in a good number of local lecturers, thus yielding an international team of instructors.

The first regional course of this nature was held in 1993 at the Department of Earthquake Engineering of the University of Roorkee, India, for participants from Asia and the Near East. It contained a relatively large portion related to engineering seismology and earthquake engineering. The second regional course was held in 1995 at the Instituto Nicaragüense de Estudios Territoriales (INETER) in Managua, Nicaragua. Besides the standard topics of seismology, viz. seismological data acquisition and analysis, wave

propagation and structure of the lithosphere, seismic source parameters and processes, seismicity, seismic zoning, earthquake statistics and hazard assessment, strong motion effects and microzonation, it also covered the topics of monitoring and warning in the case of volcanoes and tsunamis. The regional course of 1997 in Kenya placed emphases on a significant upgrading of seismic monitoring, on data analysis and on seismic hazard assessment in Africa. The regional course in China in 1999 included, besides the standard training modules as in former Potsdam courses, also the topics of earthquake vulnerability and risk assessment, and it highlighted the crucial role of proper disaster reduction strategies and management in ensuring sustainable development. The 2001 course in Chile combined special aspects of both the Nicaragua and China courses, i.e. it covered, besides earthquake monitoring and seismic hazard assessment, also volcano and tsunami monitoring as well as the associated complex of hazard, vulnerability and risk assessments, and disaster management and planning. The training course of 2003 in South Africa included some new aspects: reservoir induced seismicity and mining induced seismic events together with their associated seismic hazard and risk, and a contribution from the CTBTO on the International Monitoring System. The courses 2004 and 2005 were held in Potsdam, so the next regional course 2006 is planned in cooperation with the newly founded CAIAG Institute in Bishkek, Kyrgyzstan.

In keeping with the steadily growing demand by participants in former courses for mainly practice-orientated training and workshop discussions related to case studies, the recent course programmes have been revised accordingly. Introductory lectures to the various subjects are followed by extensive practical exercises and workshop discussions, and are complemented by state-of-the-art review lectures and scientific field excursions. The excursions in 2006 will include visits to seismic stations, and unique tectonic entities in the territory of Kyrgyzstan.

The detailed preliminary scientific program of the course is annexed to this circular. After each major topic, time will be reserved for workshop discussions based on short oral introductions and specified questions as well as suitable data material and/or case studies presented by participants. Throughout the course the completion of exercises by the participants as well as their contributions to workshop sessions and topical discussions will be evaluated.

# Successful participation in the course will be acknowledged by a course certificate.

All participants are kindly invited to give, at the social evening get-togethers, slide shows or any other presentation suitable for conveying to their fellow participants impressions of the geography, culture, customs, music and daily life in their own home countries.

### 2. APPLICATION AND ADMISSION

### 2.1 Conditions for application and admission

The course in 2006 is arranged for the benefit of participants from countries of Asia. In the interest of effective training, the number of participants has to be limited to a maximum of 25 scientists, technicians and post-graduate students or lecturers from Kyrgyzstan and Central Asia. Preference will be given to young candidates engaged in seismology, seismic monitoring and zonation, earthquake analysis and hazard assessment. They should have an active interest and responsibilities in these fields. However applicants with background and duties in earthquake engineering or disaster management wanting to deepen their understanding of seismological phenomena, methods and data products, will also be considered. The same applies to senior researchers or university lecturers in geosciences who may act as multipliers of the knowledge acquired in the course – which, in their case, becomes 'training for trainers'.

Applicants must have a scientific degree (BSc. or MSc.) or diploma or higher in geosciences, physics or engineering of a recognised university. Preferably they should have several years of professional experience in subjects covered by the course. Applicants must also have a thorough knowledge of **English** which **will be the only working language of the course**. It is also **mandatory** for the admission to the course that applicants are able and willing to present a short paper (about 20 minutes) on their own research or operational work and/or to specify a problem or case study they wish to discuss with their instructors and fellow participants. In the latter case they should bring along relevant data, documents and/or computer programmes for demonstration and analysis.

**Fellowships** to cover course fees (including cost of bed and boarding) as well as some **travel grants** will be made available to selected participants from countries of the region. Preferably, applicants are accepted, who are able to cover the cost for travel and/or attendance from institutional or development-aid project funds marked for training. **The course fee is 2500,- EUR.** 

**Note:** Fellowship and travel funds are limited and have to be economized in the interest of all applicants in need of support. Tickets bought in applicants home countries at national airline offices are often substantially cheaper than tickets bought in Germany and deposited at the airports of departure. Therefore, applicants are urged to inquire about the cheapest two-way economy fare connection between their national airport and Bishkek and to **state the ticket price in their application form** (in US\$ equivalent). This information will be taken into account in the selection procedure. If the applicant's ticket option is less costly than a ticket arrangement from Germany, participants may be accepted under the condition that they make their own travel arrangements locally. They will then be refunded fully or partially for their ticket expenditures after arrival in Kyrgyzstan, however, only up to the amount stated in their application form.

### Applications will be considered only when

- the attached application form is duly filled-in and submitted in time;
- the application form is accompanied by two letters of recommendation;
- Applicants give the title/topic of their presentation in the application form.

Those who intend to present and discuss additionally in a special workshop session data, methods used or case studies from their country should indicate this separately in the registration form and submit an abstract giving details about the subject, method applied, kind of data available as well as of the open questions they want to thresh out.

# Without such specifications and accompanying documents applications will not be considered!

In the selection of participants **preference will be given to those applicants, who** (as confirmed in the application forms and accompanying letters):

- are most in need of training in the subjects covered by the course;
- are concerned with the operation of and data analysis at seismic stations or network centers;
- are working in the field of seismic hazard assessment or microzonation;
- are involved in vulnerability and risk assessment, engineering seismology, and/or disaster management and mitigation projects;
- can serve as multipliers in spreading the knowledge and skills acquired;
- can make an active contribution to the workshop sessions and discussions;

- had applied already earlier for the course, been found eligible/qualified but could not be accepted due to the limited number of fellowships available for each course;
- can pay for their travel and/or course fee.

The application forms and accompanying candidates' files will be carefully screened by the Academic Board and Selection Committee of the course. The Academic Board is headed by Prof. Dr. J. Zschau, Director of the Department 2 "Physics of the Earth" at the GFZ. Members of the **Academic Board** are prominent geoscientists of the GFZ Potsdam, Prof. Reigber of CAIAG and a representative of the German Federal Foreign Office as the main sponsor of the course. After the list of selected participants has been approved by the local hosting institution applicants will be informed about the decision of the Selection Committee.

### 2.2 Application formalities

Applications should include the following information:

- (1) Filled-in application form;
- (2) List of scientific publications;
- (3) Two letters of recommendation or reference which give details on the applicants personality, duties and performance in seismic station operation, data analysis or other specified applied or research projects;
- (4) Confirmation of appropriate command of English;
- (5) **Title and one page abstract** of the proposed topic or case study to be presented or discussed in a special workshop session;
- (6) Title and kind of intended cultural presentation.

**One copy each** of the application documents should be air-mailed or faxed or sent by email as scanned documents to one of the addresses given below and reach them **before May 30, 2006**:

GeoForschungsZentrum Potsdam (GFZ) Dr. C. Milkereit Telegrafenberg **D-14473 Potsdam, Germany** 

Phone: (++49 331) 288 1201 Fax: (++49 331) 288 1204 E-mail: course-un@gfz-potsdam.de CAIAG Dr. B. Moldobekov Timur Frunze Str. 73/2 **720027 Bishkek, Kyrghyz Republic** 

Phone: (++996 312) 555 111 Fax: (++996 312) 555 222 E-mail: caiag@caiag.kg

**Candidates will be informed of the decision by the Academic Board by June 15, 2006** and receive further instructions by the GFZ and/or the CAIAG Institute. Any additional questions or pieces of information may be directed to the addresses above.

### 2.3 Services provided to selected participants

Fellowships granted to participants entitle them to the following services:

- Accommodation, meals and tea-break refreshments within the facilities and arrangements provided by the local organisers;
- Tuition, printed course materials, scientific and cultural excursions;
- Collection of scientific text books and software which participants can take home;

- A small amount of pocket money to cover incidental expenses;
- Local transport in connection with the official programme, field excursions and pick-up arrangements for meeting participants arriving at and departing from the international airport in Kyrgyzstan;

Travel grants to cover the cost of international air travel might be available for only some of the selected participants. Therefore, every applicant is urged to look into all available possibilities to cover travel expenses on his own with the support of his nominating or sponsoring institution and to make an explicit statement to this effect in his application form.

### 2.4 Cost borne by participants or nominating agencies

Participants or their governments/nominating agencies are required to bear the following:

- Cost of personal travel, accident, live and medical **insurance**;
- All expenses in the home country for travel abroad, including passports, medical examinations, inoculations, any other internal travel to and from the international airport of departure and arrival in the home country;
- Salary and related allowance for participants during the period of their participation in training course;
- Any expenses other than the travel grants for selected participants and the living and accommodation expenses at the seminar place (see 2.3.) including subsistence and incidental expenses during travel, any expenses incurred during stop-over en route and any additional costs for travel by other route than the one originally provided with the ticket;
- Any cost for excess luggage.

Neither the GFZ nor any other co-organiser or sponsor of the course will assume responsibility for the following expenditures or services:

- Cost incurred by participants with respect to travel insurance, medical bills and hospital fees in connection with their attendance at the training course;
- Loss of or damage to property while attending the training course;
- Compensation in the event of death or disability of participants in connection with their attendance at the training course;
- Any claim towards expenses incurred by participants other than those mentioned in paragraph 2.3. above, e.g. for accommodation in hotels, food and drink orders or private trips of the participants own choice, shopping, excess luggage etc.;
- Re-routing tickets or making visa arrangements other than those required for entering or leaving Kyrgyzstan on the shortest possible way as required in connection with their attendance at the course.

Participants may exchange their own freely convertible currency into local currency to cover themselves the cost for any additional personal needs beyond what is provided under 2.3.

# With their signature under the application form all applicants and their nominating institutions accept these conditions irrevocably.

### 3. GENERAL INFORMATION

### 3.1 Location of the course, accommodation and pick-up arrangements

The training course will be held at the CAIAG Institute in Bishkek where also lunch will be served and refreshments will be offered during the tea breaks.

Accommodation will be arranged in one hotel in Bishkek. The CAIAG will arrange for daily transportation from the Hotel to the CAIAG and back. Participants will be accommodated in two-bed rooms with indoor WC and shower. Breakfast and dinner will be served also there while lunch and refreshments during tea breaks between course sessions will be provided at the premises of the CAIAG. Evening lectures, workshop sessions and cultural evenings will be held in suitable rooms in an additional conference room of the hotel.

CAIAG will provide pick-up service for arriving and departing participants from and to the airport in Bishkek. Selected participants and lecturers in the course should, therefore, inform the local course secretariat in Bishkek in due time of the particulars of their arrival at and departure from Bishkek (date, time, carrier, flight number).

### 3.2 Excursions and demonstrations

There will be 5 days of field excursions, two one-day excursion and a longer 3-day excursion. The first one-day excursion goes into the neighbouring of Bishkek and Shui-Region where seismic faults, neotectonic structures and the Ala-Artsha seismological Station will be visited. The second one-day excursion head for the Seismotectonic and neotectonic structure of the Issyk-Kul graben system and International Biosphere Reservat and protection of natural environment area east of Bishkek. The 3-day main excursion will head for South Kyrgyzstan (Susamir, Toktogul, Talas-Fergana-Fault, Southern landslide region (Maili-Suu and Dhallal-Abad).

In conjunction with the lectures and exercises on seismic sensors and data acquisition CTBTO will demonstrate hard- and software developed for seismic monitoring and data analysis of induced and tectonic local seismic events.

### 3.3 Climate and recommended dressing

August/September is late summer season in Kyrgyzstan and the temperature in Bishkek can be warm and pleasant. At lower elevations, spring and autumn are probably the best seasons to visit weather-wise - in particular September through October. Autumn is harvest time when the markets fill with fresh produce.

Summer is ferociously hot in the lowlands, but July and August are the best months to visit the mountains. Cold rains begin in November and snow soon closes mountain passes. The ski season at the Upper Ala-Archa Mountain Ski Base lasts from December to April.

### 3.4 Information about the GeoForschungsZentrum Potsdam

The GeoForschungsZentrum Potsdam (GFZ) is the national research center for geosciences of Germany and belongs to the Hermann von Helmholtz Association of German Research Centers (HGF).

Its five departments are:

- Geodesy and Remote Sensing;
- Physics of the Earth;
- Geodynamics;
- Chemistry of the Earth;
- Geoengineering.

Besides this, the GFZ:

- provides effective management for major joint geoscientific research projects;
- executes research drilling projects, runs observatories and provides extensive modern facilities, equipment and logistics for both large-scale field projects as well as laboratory measurements;
- provides, in close cooperation with universities and within the framework of international collaboration, training, expertise and equipment to other countries in need.
- Is responsible for the German contribution to the Tsunami Early Warning System in the Indian Ocean region.

The training courses on "**Seismology and Seismic Hazard Assessment**" are part of the activities of the Department "Physics of the Earth". Disaster related topics of the Department are research on earthquakes and volcanic eruptions, multidisciplinary task-force missions to be dispatched into areas which are struck by devastating geological events with the aim to collect first-hand data about damages, vulnerability, aftershocks or other post-event activity, local underground effects, seismotectonic conditions etc. Besides this, research and development is carried out in the field of early warning systems for earthquakes. Other main research projects of the Department deal with deep seismic and electromagnetic soundings and with seismology and seismic tomography. Seismology is mainly concerned with the installation and operation of a global digital broadband system for research, called GEOFON, with operational quick determinations of source parameters from strong regional and global earthquakes and with the investigation of deep seismic structures, material properties such as anisotropy, and of the nature of discontinuities in the Earth mantel and core.

The GFZ is situated on the famous Telegrafenberg (Telegraph Hill) near Potsdam in the "Science Park Albert Einstein" where world-famous scientific institutes for astrophysics, geodesy, geomagnetism and meteorology were already founded between 1876 and 1892. Seismology has a long tradition in Potsdam, too. In 1889 Rebeur v. Paschwitz recorded accidentally, with a tiltmeter installed at the Telegrafenberg, for the first time in the world a teleseismic event (Japan earthquake). In 1902 the Potsdam seismic station began to operate and in 1906 the famous San Francisco earthquake was recorded there with a Wiechert seismograph. In 1969 the Geodetic Institute and the Geomagnetic Institute at Potsdam were united with the Geodynamic Institute at Jena and the Tectonic Institute at Berlin to form the Central Institute for Physics of the Earth (CIPE) of the German Academy of Sciences. This institute initiated in 1980 the international UNESCO-sponsored training course on "Seismology and Seismic Hazard Assessment". After the unification of Germany, CIPE was dissolved in December 1991. Part of its former facilities are now incorporated in the GFZ but under a new scientific concept, a new statute, with a wider scope of national and international research activities and international cooperation.

More information is available from the GFZ web-page http://www.gfz-potsdam.de.

### 3.5 Information about the CAIAG

The Central Asian Institute for Applied Geosciences (CAIAG) was founded in 2002 on the basis of a cooperation agreement between the Government of Kyrgyzstan and the GeoForschungsZentrum Potsdam, Germany. Since 2004 it holds the legal status of an independent non-profit organization, founded by the Government of Kyrgyzstan and the GeoForschungsZentrum Potsdam, Germany. It is managed by a bilateral directorate (a Kyrgyz and a German Co-Director) and supervised by a board of trusties and an international scientific council.

The institute has the goal to develop and carry out geoscientific research projects in Central Asia in the field of geodynamics, geohazards, climate, water, environmental hazards and resource management. Spaceborne, airborne and ground observations and equipment will be used for these activities. In the frame of these projects Central Asian and international networks will develop aiming at scientific capacity building in the region. For this purpose the resources of the institute will also be used for education as well as for scientific and technical training programs.

In its final development the institute will host a total number of 85 scientist and technicians which will be mostly hired from Central Asian countries in the process of an international job advertisement which is just starting in spring 2006.

At present first research activities of the CAIAG in Central Asia are based on a close cooperation with the GFZ Potsdam. They aim at a better understanding of fundamental processes of landscape formation in this area of active mountain building which is frequently affected by natural hazards, such as earthquakes, mass movements, floods and avalanches. Under these conditions analysis of hazardous natural processes including their socio-economic effects form an important part of the geoscientific research in Central Asia. In this connection special emphasis is put on studying the potential of remote sensing technologies for effective process analysis and hazard assessment over large areas. One research project deals with satellite remote sensing and GPS based monitoring of the flow and mass change of the Inyltschyk glacier in Kyrgyzstan representing the largest glacier system of the Tienshan.

4. Preliminary list of institutions, lecturers and assistants contributing to the International Training Course on "Seismology, Hazard Assessment and Risk Mitigation", August 20 to September 23, 2006 in Bishkek, Kyrgyzstan

#### GeoForschungsZentrum Potsdam (GFZ), Germany

Prof. Dr. Wahlström, Mr. Christian Bosse Dr. Claus Milkereit Dr. H.-U. Wetzel Prof. Dr. Jochen Zschau Prof. Dr. Peter Bormann

CAIAG (to be specified by CAIAG)

Prof. Dr. Reigber Dr. Moldobekov

University of Leipzig, Geophysical Observatory Collm, Germany Dr. Siegfried Wendt

University of Stuttgart, Institute of Geophysics, Germany Prof. Dr. Erhard Wielandt

University of Karlsruhe, Institute of Reinforced Concrete Structures and Building Materials & Institute for Technology and Management in Construction Dr. S. Tyagunov

Laboratoire de Géophysique Interne et Tectonophysique, Grenoble, France Dr. Pierre-Yves Bard

University of Bergen, Norway Prof. Dr. Jens Havskov

**Comprehensive Test-Ban-Treaty Organization (CTBTO), Vienna** Dr. Haslinger, Mr. R. Phiri

**GeoHazard International, Palo Alto, California, USA** Dr. J. Rodgers

**Kyrgyzstan Scientific Institute for Earthquake Resistant Construction, Kyrgyzstan** Dr. B. U. Turdalievitsch

Institute of Seismology, National Academy of Sciences, Kyrgyzstan Dr. Andrey Korjenkov

# **Preliminary Scientific Programme**

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

August 20 to September 23, 2006 Bishkek, Kyrgyzstan

Sunday, Aug. 20	Arrival of participants
<b>Monday, Aug. 21</b> 09.30 -	Opening Ceremony of the CAIAG institute Inaugural addresses by: Prime minister of the Kyrgyz Republic, Mr. F. Sch. Kulov Scientific Executive board of the GFZ Potsdam, R. Emmermann Welcome in the institute garden
15.00 -	Opening of the International Training Course " Seismology and Seismic Hazard Assessment" J. ZSCHAU Earthquake Science and its Contribution to Society C. MILKEREIT Scope and didactic approach of the GFZ-UNESCO Seismology Training Courses
20.00 - 21.00	Informal meeting of participants and lecturers
1. Seismology in the Central Asia region: State of the Art	

### Tuesday, Aug. 22

08.30 - 09.00	1.1	P. BORMANN / Germany Earthquake Disaster: Scourge of Nature or Consequence of Human Ignorance?
09.00 - 09.30	1.2	K. Y. ABDRAKHMATOV / Kyrgyzstan Recent Tectonics and Geodynamics of Central Asia

09.30 - 10.00	1.3	E. MAMYROV / Kyrgyzstan Hazard Assessment of the natural catastrophes in the territory of Kyrgyzstan and border regions of Central Asians countries
10.00 - 10.30		Tea break
10.30 - 11.00	1.4	S. E. USUPAEV /Kyrgyzstan Presentation Ministry of Ecology and Emergency situations
11.00 - 11.30	1.5	M. RAKHYMBAEV / Kazakhstan Geophysical research for the seismic hazard assessment
11.30 - 12.00	1.6	M. USMANOVA / Uzbekistan Dynamics of seismicity of Central Asia for the estimation seismic, landslides hazards and seismic risk in Uzbekistan.
12.00 - 13.30		Lunch break
13.30 - 14.00	1.7	<ul> <li>A. ISCHUK / Tajikistan</li> <li>Seismic hazard of mountainous territories: problems and solutions</li> </ul>
14.00 - 14.30	1.8	L. P. VINNIK / Russia Seismology in Russia
14.30 - 15.00	1.9	SHEN JUN / China Seismic Tectonics in Western China and Seismic risk estimation in big cities
15.00 - 15.30		Tea break
15.30 - 16.00	1.10	C. ODONBAATAR / Mongolia Seismological studies and Hazard Assessment in Mongolia
16.00 - 16.30	1.11	A. B: BAKIROV / Kyrgyzstan Geodynamics of the Tien-Shan
16.30 - 17.00	1.12	C. REIGBER / Germany, MOLDOBEKOV / Kyrgyzstan Future of Geodesy and Seismology
	1 1 2	Final Discussion

1.13 Final Discussion

## 2. Fundamentals of seismology, data acquisition and exchange

## Wednesday, Aug. 23

08.30 - 10.00	2.1	P. BORMANN Aims and fundamentals of seismology. Part I: Seismic sources and source parameters
10.30 - 12.00	2.2	P. BORMANN Aims and fundamentals of seismology. Part II: Wave propagation, Earth's models and seismic recordings
13.30 - 15.00	2.3	E. WIELANDT Seismic sensors. Part I: Mechanical receivers, transducers, resolution and feedback
15.30 - 17.00	2.4	E. WIELANDT, C. MILKEREIT <b>Exercise</b> on the plotting of the seismograph response

## Thursday, Aug. 24

08.30 - 10.00	2.5	E. WIELANDT Fundamentals of analog signal processing and its mathematical and graphical representation. Part I: The special role of sine-waves, the Fourier transformation, transfer functions and logarithmic plots
10.30 - 12.00	2.6	E. WIELANDT, C. MILKEREIT <b>Exercise</b> on poles and zeros presentation of amplitude- frequency response curves
13.30 - 15.00	2.7	E. WIELANDT Fundamentals of analog signal processing and its mathematical and graphical presentation. Part II: Poles and zeros of the transfer function and inverse filters
15.30 - 17.00	2.8	E. WIELANDT Seismic sensors. Part II: Shielding against environmental influences
<i>Evening:</i> 20.00 - 21.30	2.9	E. WIELANDT Design and construction of good seismic broadband sensors

Friday, Aug. 25		
08.30 - 10.00	2.10	E. WIELANDT Calibration of seismic sensors (relative electrical and absolute mechanical calibration; methods employing sine-waves, step functions and arbitrary signals)
10.30 - 12.00	2.11	E. WIELANDT, C. MILKEREIT <b>Exercise</b> on seismograph calibration and parameter determination
13.30 - 15.00	2.11	- continuation -
15.30 - 17.00	2.12	E. WIELANDT Specification and measurement of instrumental and seismic noise and deconvolution in the presence of noise
Saturday, Aug. 26		Excursion to City of Bishkek
Sunday, Aug. 27		Leisure time
Evening: 20.00 - 21.30	2.13	P. BORMANN History of Earthquake Seismology
Monday, Aug. 28		
08.30 - 10.00	2.14	C. MILKEREIT Introduction into digital data acquisition
10.30 - 12.00	2.15	C. MILKEREIT <b>Demonstration</b> of different digital data acquisition systems together with seismometers for mobile and stationary use (short-period and broadband recordings and display of the collected data)
13.30 - 15.00	2.16	P. BORMANN, C. MILKEREIT Seismic noise: Origin, characteristics, measurements and avoidance
15.30 - 17.00	2.17	P. BORMANN, C. MILKEREIT Site selection and optimal configuration of seismic networks

Tuesday, Aug. 29		
08.30 - 10.00	2.18	P. BORMANN Introduction to <b>exercises</b> on noise power calculations in different kinematic units and conversion of noise power into RMS amplitudes
10.30 - 12.00	2.19	P. BORMANN, C. MILKEREIT Seismological networks and international exchange of parameter and waveform data
3. <u>Introduction t</u> estimation, de	<u>o seis</u> etermi	mogram analysis, event location, magnitude nation of earthquake source parameters and fault-plane
<u>3010110113</u>		
13.30 - 15.00	3.1	P. BORMANN Phase interpretation and event location by means of single station three-component recordings
15.30 - 17.00	3.2	P. BORMANN, S. WENDT Manual exercise on 3-component event location
Wednesday, Aug.	30	
08.30 - 10.00	3.3	P. BORMANN Graphical methods of event location by using local network data
10.30 - 12.00	3.4	P. BORMANN, S.WENDT Manual exercise on graphical event location
13.30 - 15.00	3.5	P. BORMANN Earthquake magnitudes and energy estimates
15.30 - 17.00	3.6	P. BORMANN, S. WENDT Manual exercise on magnitude determinations
Thursday, Aug. 31		
08.30 - 10.00	3.7	P. BORMANN Introduction to the determination of fault-plane solutions
10.30 - 12.00	3.8	P.BORMANN, S. WENDT, C. MILKEREIT Manual exercise on determination of fault-plane solutions
13.30 - 15.00	3.9	P. BORMANN Introduction to source parameters derived from seismic spectra

15.30 - 17.00	3.10	P.BORMANN, S. WENDT, C. MILKEREIT <b>Exercise</b> on the calculation of spectral source parameters
Friday, Sept. 01		СТВТО
08.30 - 10.00	3.11	F. HASLINGER, R. PHIRI a)The Comprehensive Nuclear-Test-Ban Treaty Organization - an Overview b) Current Status of the International Monitoring System
10.30 - 12.00	3.12	R. PHIRI The International Data Center of the CTBTO
13.30 - 15.00	3.13	R: PHIRI, F. HASLINGER Software for National Data Centers - overview and presentation
15.30 - 17.00	3.14	R. PHIRI, F. HASLINGER Software for National Data Centers - hands on
Evening: 20.00 - 21.30		Cultural evening
Saturday, Sept. 02		Excursion to Ala-Archa region
Sunday, Sept. 03		Excursion to Suusamyr, 1992 Epicentral area

# 4. <u>Computer-assisted Seismogram Analysis and Source Parameter</u> <u>Determination</u>

## Monday, Sept. 04

08.30 - 10.00	4.1	J. HAVSKOV Types of seismic data and formats; overview of seismic processing systems
10.30 - 12.00	4.2	J. HAVSKOV Introduction to SEISAN and <b>exercise</b> on the installation of SEISAN
13.30 - 15.00	4.3	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> 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	4.4	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on phase picking and location of local seismic events based on 3-component and network records
Tuesday, Sept. 05		
08.30 - 10.00	4.5	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on phase picking and location of teleseismic events based on 3-component and network records
10.30 - 12.00	4.6	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on amplitude picking and magnitude determination
13.30 - 15.00	4.7	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on amplitude spectra calculation and moment magnitude determination
15.30 - 17.00	4.8	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on the determination of fault-plane solutions
<i>Evening:</i> 20.00 - 21.30	4.9	Workshop presentations by participants related to Seismology

### Wednesday, Sept. 06

		Travel to Issyk-Kul lake region with visits of epicentral areas
Thursday, Sept. 07		Main Excursion to Lake-Issyk Kul area
15.30 - 17.00	4.12	- continuation -
13.30 - 15.00	4.12	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on Data Analysis from International Networks
10.30 - 12.00	4.11	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercises</b> on seismogram analysis based on digital data of course participants
08.30 - 10.00	4.10	J. HAVSKOV, S. WENDT, C. MILKEREIT <b>Exercise</b> on spectral source-parameter determination

Travel to Issyk-Kul lake region with visits of epicentral areas of historical and paleoearthquakes in eastern part of Chu and western part of Issyk-Kul depressions

Friday, Sept. 08	Trip along the northern flange of Issyk-Kul depression with visits of epicentral areas of historical and paleoearthquakes in northern part Issyk-Kul depressions
<i>Evening:</i> 20.00 - 21.30	Cultural evening
Saturday, Sept. 09	Trip along south-eastern flange of the Issyk-Kul depression with visits of seismites sections and geological monuments in mentioned part of the depression
Sunday, Sept. 10	Travel to Bishkek with visits of the seismites sections, Kyrgyz "Dead Sea" and getting acquainted with Quaternary tectonics of south-western part of the Issyk-Kul depressions

## 5. Earthquake Hazard Assessment

## Monday, Sept. 11

08.30 - 10.00	5.1	R. WAHLSTRÖM Macroseismic and strong-motion parameters
10.30 - 12.00	5.1	- continuation -
13.30 - 15.00	5.2	R. WAHLSTRÖM, CH. BOSSE <b>Exercise</b> on assigning seismic intensity based on questionnaire data and on damage pattern
15.30 - 17.00	5.2	- continuation -

## Tuesday, Sept. 12

08.30 - 10.00	5.3	R. WAHLSTRÖM Fundamentals of statistics and probability theory
10.30 - 12.00	5.4	R. WAHLSTRÖM Earthquake statistics and occurrence probability
13.30 - 15.00	5.5	R. WAHLSTRÖM Methodology of seismic hazard assessment
15.30 - 17.00 Evenina:	5.5	- continuation -
20.00 - 21.30	5.6	<b>Workshop</b> presentations by participants related to Hazard Assessment

### Wednesday, Sept. 13

08.30 - 10.00	5.7	R. WAHLSTRÖM, CH. BOSSE <b>Manual exercise</b> on the determination of the parameters of the Gutenberg-Richter relation
10.30 - 12.00	5.8	R. WAHLSTRÖM, CH. BOSSE Manual exercise on the validity of the Poisson distribution
13.30 - 15.00	5.9	R. WAHLSTRÖM, CH. BOSSE Computer exercise: Detection of dependent events
15.30 - 17.00	5.10	R. WAHLSTRÖM, CH. BOSSE <b>Computer exercise:</b> Influence of fore- and aftershocks on the parameters of the Gutenberg-Richter relationship
<i>Evening:</i> 20.00 - 21.30	5.11	<b>Workshop</b> presentations by participants related to Hazard Assessment

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### Thursday, Sept. 14

08.30 - 10.00	5.12	R. WAHLSTRÖM, CH. BOSSE Manual and computer exercise on assessing catalog completeness with time
10.30 - 12.00	5.12	-continuation-
13.30 - 15.00	5.13	R. WAHLSTRÖM, CH. BOSSE Manual Exercise on seismic hazard assessment: A simplified approach
15.30 - 17.00	5.13	-continuation-
<i>Evening:</i> 20.00 - 21.30		Cultural Evening

## 6. Effects of Strong Earthquake Ground Motions, Risk Assessment

### Friday, Sept. 15

08.30 - 10.00	6.1	PY. BARD Ground shaking site effects. Introduction: Effects of surface topography
10.30 - 12.00	6.2	PY. BARD Effects of soft surface layers

13.30 - 15.00	6.3	PY. BARD <b>Manual exercise:</b> Computation of fundamental frequencies for different sites
15.30 - 17.00	6.4	PY. BARD <b>Computer exercise:</b> Use of the PC-program psvsh1d.f for 1-D model calculations of local site effects
Saturday, Sept. 16	5	Leisure Time
Sunday, Sept. 17		
08.30 - 10.00	6.5	PY. BARD Estimation of site effects: Instrumental, numerical, empirical
10.30 - 12.00	6.6	PY. BARD Use of microtremor recordings for estimating site effects
13.30 - 15.00	6.7	PY. BARD <b>Computer exercise:</b> Use of the program hv-potsdam.f for processing microtremor data
15.30 - 17.00	6.7	- continuation -
Monday, Sept. 18		
08.30 - 10.00	6.8	PY. BARD Liquifaction: Basic physical phenomena and procedures for assessing the liquifaction potential
10.30 - 12.00	6.9	PY. BARD <b>Exercise</b> on estimation of liquifaction by hand and with simple PC program
13.30 - 15.00	6.10	PY. BARD Slope instabilities: Basic physics and estimation techniques
15.30 - 17.00	6.11	PY. BARD <b>Manual exercise</b> on slope instabilities
<i>Evening:</i> 20.00 - 21.30	6.12	<b>Workshop</b> presentations by participants related to microzonation and site effects

# 7. Earthquake Engineering and Risk Assessment

## Tuesday, Sept. 19

08.30 - 10.00	7.1	S. TYAGUNOV Vulnerability assessment and risk mitigation		
10.30 - 12.00	7.2	S. TYAGUNOV From seismic hazard and vulnerability to damage and risk		
13.30 - 15.00	7.3	S. TYAGUNOV Estimation of vulnerability of representative building classes in Bishkek		
15.30 - 17.00	7.3	- continuation -		
Wednesday, Sept	. 20			
08.30 - 10.00	7.4	J. RODGERS How earthquakes damage structures		
10.30 - 12.00	7.5	J. RODGERS Global earthquake risk		
13.30 - 15.00	7.6	J. RODGERS GHI Global Earthquake Safety Initiative method and analysis		
15.30 - 17.00	7.7	J. RODGERS GHI earthquake hazard mitigation approaches		
Thursday, Sept. 2	1			
08.30 - 10.00	7.8	J. RODGERS Seismic retrofit of buildings		
10.30 - 12.00	7.9	J. RODGERS Basic disaster awareness and mitigation of non-structural hazards		
13.30 - 15.00	7.10	B. U. TURDALIEVITSCH Earthquake resistent construction		
15.30 - 17.00	7.11	B. U. TURDALIEVITSCH Exercise on Earthquake resistant construction		

## Friday, Sept. 22

7.12	HU. WETZEL Remote sensing techniques in landslide determination
7.13	HU. WETZEL <b>Exercise</b> on Remote sensing techniques
7.13	- continuation -
	C. MILKEREIT, HU. WETZEL Course evaluation
	Farewell party and handing out the of the course certificates
	7.12 7.13 7.13

Saturday, Sept. 23Departure of participantsand Sunday, Sept. 24