

NEWSLETTER OF THE GEOPHYSICAL INSTITUTE

Issue 1, June 2012

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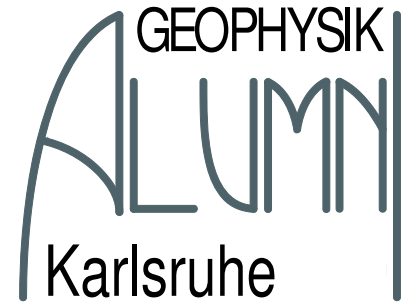
DEAR GPI ALUMNI,

It has been a long time since the first and so far only GPI alumni meeting took place in 2010. At that time we did not only invent this mailing list but also promised to keep it alive by sending you from time to time interesting KIT and GPI news.

I sincerely apologize that it took us so long to create this first newsletter. As you probably all know, ongoing commitments and projects and new challenges sometimes seem overwhelming although these should not be used as excuses to postpone other important tasks.

Therefore, I am really happy to be able to finally present you our first GPI-alumni newsletter which we will publish twice a year from now on. In this first issue we have tried to include a variety of different topics which are all somehow related to the GPI in Karlsruhe. We hope you will find them interesting. However, we are very well aware that our point of view should not be the primary focus of such a newsletter. Therefore, we would really like to hear your opinion and get your feedback and we encourage you to send us comments and suggestions regarding topics that should be covered in future issues of this newsletter.

Best regards, Ines Veile



AT THE GPI ...

... there are currently three major working groups which are active in different fields of geophysics. In this first GPI-alumni newsletter we introduce these three working groups, their field of study and the main in which they are involved. In future newsletters, we will keep you updated on any major new developments.

APPLIED GEOPHYSICS

(PROF. BOHLEN)

The "Applied Geophysics" Group investigates and develops seismic imaging techniques and their application on diverse seismic/geophysical problems at different spatial scales. Topics include borehole and tunnel exploration and imaging, environmental and engineering geophysics (ground and groundwater related), and hydrocarbon exploration. Currently, the working group is focusing its efforts on the massive-parallelized simulation and inversion of full acoustic and elastic wave fields in 2D and 3D, and the improvement of near surface seismic measurements. Scientific work related to these topics is conducted as a part of industry cooperations, national and international research programs, and the Wave-Inversion Technology consortium (WIT).

The main projects are:

- Full Waveform Tomography of acoustic and elastic reflected wave fields
- Seismic imaging around the borehole
- Seismic Observation for Underground Development (SOUND)
- Toolbox for Applied Seismic Tomography (TOAST)

For detailed information about all of our projects please go to our website www.gpi.kit.edu/AngewandteGeophysik.php.

NATURAL HAZARDS & RISKS

(PROF. WENZEL)

The research area focuses on geological / geophysical natural hazards, quantification of their impacts, their prognosis, and early warning. For earthquakes in particular, we are developing deterministic and probabilistic risk analysis as well as methods to analyze and estimate associated damages and other risks from buildings and infrastructural facilities. Apart from the large devastating earthquakes expected for the megacity of Istanbul, for instance, we are studying earthquakes induced or triggered by mining activities, geothermal energy production, CO₂ sequestration, and other processes.

Work is carried out by the Center for Disaster Management and Risk Reduction Technology (CEDIM) and KIT Climate and Environment Center.

The main projects are:

- REAKT (www.reaktproject.eu) aims at earthquake early warning
- MATRIX (www.matrix.gpi.kit.edu/) on multi hazard and risk assessment
- NERA (www.nera-eu.org/) earthquake hazard & risk assessment
- SYNER-G (www.vce.at/SYNER-G/) on lifeline vulnerability
- Global Earthquake Model Private Public Partnership (www.globalquakemodel.org/)

SEISMOLOGY (PD DR. RITTER)

The Seismology Group explores the Earth's interior at different scales and is involved in seismic monitoring. New concepts for experimental seismology are developed. We are running two major facilities: Thomas Forbriger is based at the Black Forest Observatory (www.gpi.kit.edu/BFO.php) and Joachim Ritter is responsible for the Broadband Array (www.gpi.kit.edu/KABBA.php).

The main projects are:

- TopoScandiaDeep in Norway (www.mn.uio.no/geo/english/research/projects/toposcandiadeep/)
- PERMIT in California (www.gpi.kit.edu/PERMIT.php)
- MAGS in the Upper Rhine Graben (www.mags-projekt.de)
- LuxBB in Luxembourg (www.ecgs.lu/luxbb-temporary-deployment-of-six-broadband-seismic-stations-in-luxembourg/)
- TIMO2 in the Upper Rhine Graben (www.gpi.kit.edu/TIMO2.php)

Since February the first KABBA borehole seismometer is running. It is installed in the vicinity of Landau, the name of the station is TMO64. The data can be obtained freely (in quasi realtime) via seedlink on our web site <http://gpikabba.gpi.kit.edu/>

We are currently co-organising a workshop on induced seismicity (www.geophys.uni-stuttgart.de/ags/ags-workshop).

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THE KIT

50 years after the foundation of Forschungszentrum Karlsruhe and 181 years after the foundation of Universität Karlsruhe, both institutions were successful in the Excellence Initiative of the Federal Republic of Germany and the Federal States 2006. The concept for the future envisaged the unique merger of both institutions into Karlsruhe Institute of Technology (KIT). Hence, on October 1, 2009, KIT was founded by a merger of Forschungszentrum Karlsruhe and Universität Karlsruhe. From the historical perspective, this pioneer achievement is only logical, as both institutions look back on a long tradition of research and education with many parallels in terms of contents and organization.

Today, with roundabout 9000 employees, 22500 students and an annual budget of about EUR 730 million, KIT is one of the largest research and teaching institutions worldwide.

MISCELLANEOUS

In 2014 the Geophysical Institute will celebrate its 50th anniversary. This occasion will most likely form the framework for the second GPI alumni meeting. As a matter of course, all relevant information will be distributed in time via the mailing list gpi-alumni, in the newsletter and published in the alumni area of the GPI web site.

AWARDS

Michael Grund (MSc student, Seismology) received the KIT Research Student Award (RSA). The award and the connected grant allow him to do his own research in the field of induced seismicity. The KIT-RSA is financed by the Initiative of Excellence II.

Sven Heider (PhD student, Applied Geophysics) has been honoured for his presentation during the 72th Annual Meeting of the German Geophysical Society (DGG). He was awarded for the best oral presentation of young scientists for his talk "Zur Anwendbarkeit der Inversion elastischer Wellenfelder für ein Durschallungsexperiment an einem Gneisblock untertage".

RECENT PUBLICATIONS

In this section we would like to inform those of you who are still active in Geophysics about recently published peer-reviewed journal papers authored by current members of the GPI:

Barth, A., Wenzel, F. & Langenbruch, C., 2011., Probability of earthquake occurrence and magnitude estimation in the post shut-in phase of geothermal projects, *J. Seismology*. DOI 10.1007/s10950-011-9260-9, Springer

Groos, J.C., Bussat, S. and Ritter, J.R.R., 2012., Performance of different processing schemes in seismic noise cross-correlations, *Geophys. J. Int.*, 188, 498-512.

Jetschny, S., Bohlen, T. & A. Kurzmann, 2011., Seismic prediction of geological structures ahead of the tunnel using tunnel surface waves, *Geophysical Prospecting Journal*, 59, No. 5, 934-946, doi: 10.1111/j.1365-2478.2011.00958.x

Kirschner, S., Ritter, J.R.R. and Wawerzinek, B., 2011., Teleseismic wave front field anomalies at a continental rift: no mantle anomaly below the Central Upper Rhine Graben, *Geophys. J. Int.*, 186, 447-461.

Schweitzer, J. und Ritter J.R.R., 2012., Emil Wiechert (1861-1928), *Mitt. Deut. Geophys. Gesell.*, 1/2012, 27-31.

Shahsavani, H., Mann, J., Piruz, I. & P. Hubral, 2011., A model-based approach to the Common-Diffraction-Surface stack - theory and synthetic case study, *J. Seis. Expl.*, 20(3):289-308

Sokolov, V. & Wenzel, F., 2011., Influence of ground-motion correlation on probabilistic assessments of seismic hazard and loss sensitivity analysis, *Bull. Earthquake, Engineering*, 9, 5, 1339-1360.

AT THE BFO (DR. THOMAS FORBRIGER)

Since September 2009 the superconducting gravimeter SG056 is operating at the Black Forest Observatory (BFO). Superconducting gravimeters (SGs) make use of magnetic levitation of superconducting probe masses. This way they are of extraordinary stability and sensitivity for long period signals (gravity signal of Chandler Wobble e.g.). The exceptional conditions at BFO for long period observations will be used to drive further improvements of the design of this type of instrument. This is done in cooperation with the manufacturer (GWR). First analysis of the available recordings prove that the sensors of SG056 have a remarkably low drift. Signals in the yearly period band can be clearly resolved. SG056 has two sensors with different probe mass and that with the heavier mass is the most sensitive for long period normal modes ($f < 1$ mHz) within the network of SGs in the Global Geodynamics Project (GGP).

www.geophys.uni-stuttgart.de/~widmer/SG056-Poster_DGG_2012.pdf

ACADEMIC AFFAIRS

In the last years there have been a lot of changes in academic programs: the new Bachelor degree program (BSc) was launched in WS 2008/09 and the new Master degree program (MSc) has started last October. Conceiving these programmes great importance was attached to keep a strong mathematical and physical basis for geophysics students from Karlsruhe while implementing new concepts in form and content. If you are interested in further information concerning the new programs please refer to www.gpi.kit.edu/Studiengaenge.php.

At the time of writing this newsletter, there are 82 students enrolled in Geophysics at the KIT: 20 diploma students, 12 MSc students, and 50 BSc students.

Since spring 2010 the GPI offers one field excursion per semester, organised by Dr. Ellen Gottschämmer. These field excursions are meant to show our students interesting work environments where Geophysicists are active and offer great insight into different aspects of geophysics. In July 2011 the field excursion lead to volcanic Eifel and in November 2011 it lead to the Landeserdbebendienst in Freiburg. For impressions please go to www.gpi.kit.edu/1222.php.

SPECIAL EVENTS

On the occasion of the 80th birthday of Prof. em. Karl Fuchs, the GPI presents a testimonial lecture on Fri, 15th June, 5:15 pm at Gaede Lecture Hall on KIT Campus South: "Quake Prediction: Fact, Fiction, and the Future of Seismic Forecasting" by Prof. Dr. Thomas Jordan, University of Southern California. You are cordially invited and we would be very delighted to see you.