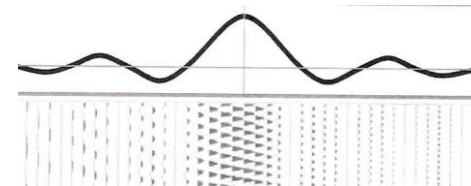
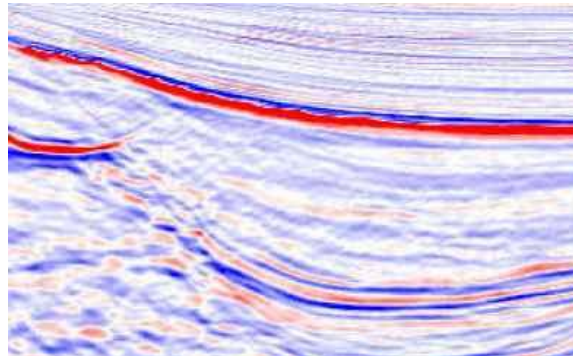
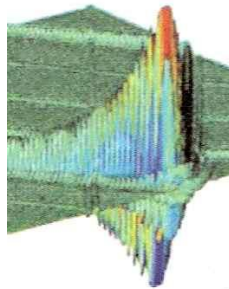
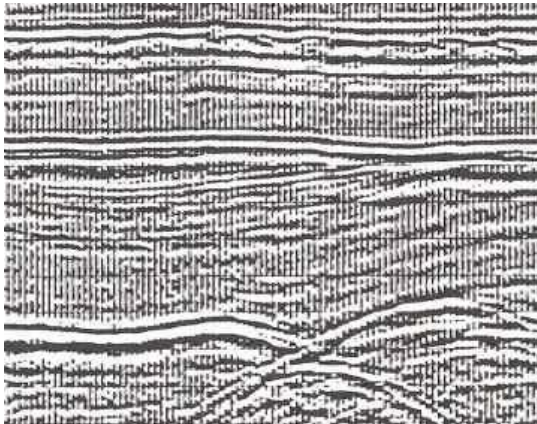


# GeoNeurale

announces

## ***Seismic Data Processing***

Munich



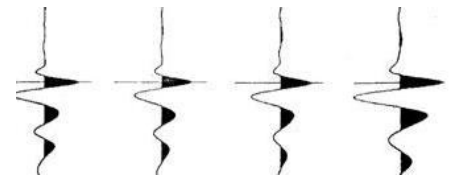
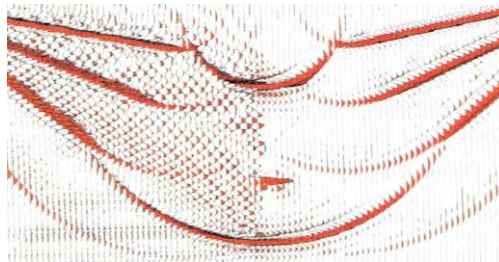
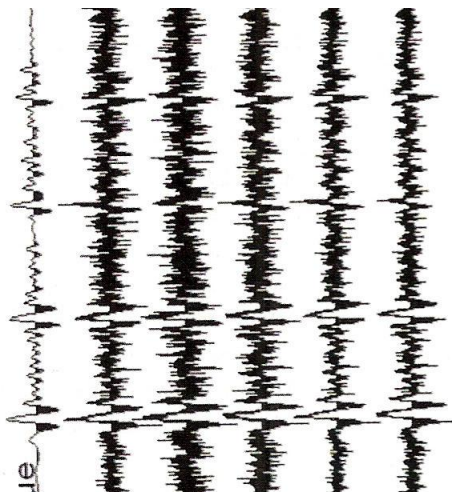
# Seismic Data Processing

**Dr Steve Hill**

**Steve Hill is the ex President of the S.E.G. , the Society of Exploration Geophysicists with more than 33000 members worldwide. Steve received many awards and acknowledgments of outstanding performances and merits for the advancement of the seismic science.**

**In this course Steve outlines the main concepts of Seismic Processing and concentrate his presentation on some critical aspects in order to capture the interdisciplinarity of the subject also for scientists of bordering disciplines, seismic acquisition planners, seismic interpreters, geologists.**

**The presented chapters will be concentrated to answer the following questions: what are reflections and how deep they are, poststack and prestack depth migration, Kirchhoff and reverse-time depth migration methods, before-stack migration and its predecessor, normal moveout and stack, time migration versus depth migration, improving signal-to-noise through multiple attenuation and statics determination, frequency filtering and coherency enhancement, seismic amplitude correction processes, resolution improvement through deterministic and statistical deconvolution, typical seismic processing sequences.**



# ***Seismic Data Processing***

( New Program )

GeoNeurale - MUNICH

at the

*GATE – Garching Technologie und Gründerzentrum*

3 DAYS COURSE

INSTRUCTOR: Dr Steve Hill

LEVEL: Intermediate

AUDIENCE: geophysicists, seismic processing specialists, explorationists, seismic planning specialists, geologists

COURSE FEES: 2950 Euro + 19% VAT (VAT Tax is 100% refunded from the German Finance Ministry)

REGISTRATION DEADLINE : (Please subscribe the waiting list by sending an email to: [courses@geoneurale.com](mailto:courses@geoneurale.com))

ONLINE REGISTRATION: [www.GeoNeurale.com](http://www.GeoNeurale.com)



# gate



Campus Garching

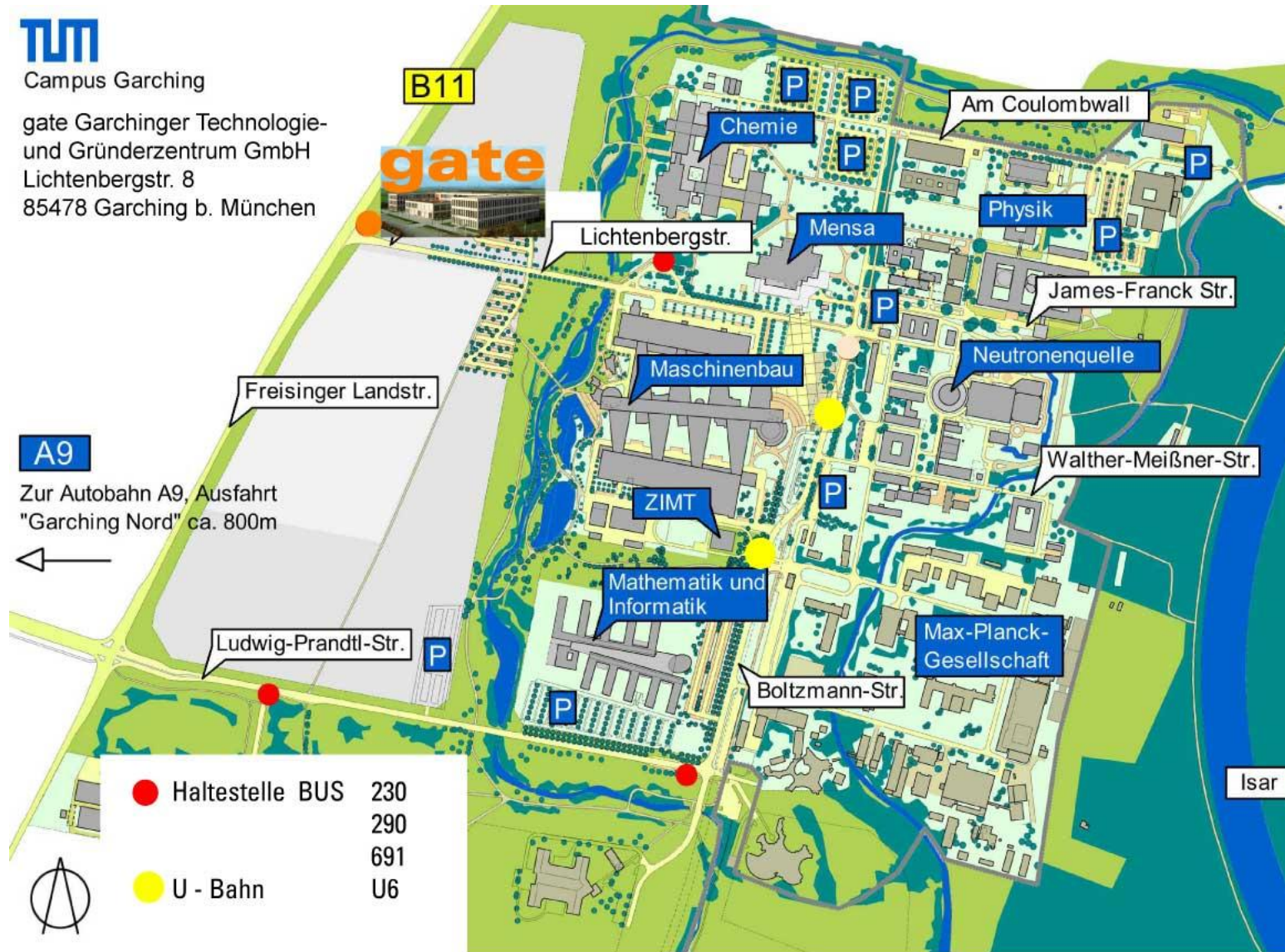
GeoNeurale

Office

and

Training Location

gate Garchinger Technologie-  
und Gründerzentrum GmbH  
Lichtenbergstr. 8  
85478 Garching b. München



# ***Seismic Data Processing***

The “Introduction to Seismic Processing” course is just that; it is an introductory course designed for individuals who work with seismic data by explaining “how things work.” Knowing that we must keep our customer’s needs in mind, the course highlights interpretation ramifications of processing decisions.

In addition to processing geophysicists, the course is also of value for seismic acquisition specialists who desire to understand the constraints that seismic processing places on acquisition design.

# PROGRAM

The following is the course outline and the table of contents for the course's accompanying text.

- 1 Introduction to Geophysical Imaging
- 2 Creating Depth Images from Seismic Records
- 3 Zero-offset Migration
- 4 Migrating imperfect data
- 5 Migration velocities
- 6 Zero-offset migration algorithms
- 7 NMO and stack
- 8 Stacking velocity estimation
- 9 Stack & Signal-to-noise improvements
- 10 NMO & stack failures
- 11 Kirchhoff before-stack migration
- 12 Imaging conditions and pre-stack wave-equation depth migration
- 13 Velocity analysis for depth migration
- 14 Time migration
- 15 Multiples and their attenuation
- 16 Dipping Multiples

- 17 Statics
- 18 Amplitude corrections
- 19 Filtering and coherence enhancement
- 20 Improving temporal resolution: Setting the stage
- 21 Improving temporal resolution: common solutions  
(deconvolution)
- 22 Surface-related multiple attenuation
- 23 Fresnel zone
- 24 Improving resolution: Spatial resolution
- 25 Improving resolution: Model resolution
- 26 Seismic acquisition
- 27 Sample seismic processing sequences
- 28 Processing summary
- 29 Processing ramifications

#### Appendix: correlation & frequency domain

This outline is almost the inverse of the order of the processing steps. Because each processing step has its own input requirements, understanding those requirements provides the motivation for understanding the each preceding processing step. Quantitative, mathematical procedures inherently comprise seismic processing. By contrast, this course uses cartoons and real data examples to provide an intuitive understanding of the seismic processing procedures. Course participants will receive a course book that will contain the contents of all overheads, with the exception of examples shown from the Oz Yilmaz classic seismic processing text.

# BIOGRAPHY

## *Stephen J. Hill* S.E.G. President 2010

Physical Address: 9358 Ute Drive, Golden, CO 80403-8316

Mailing Address: P. O. Box 659, Golden, CO 80403

(303) 642-8142

[stevejhill@earthlink.net](mailto:stevejhill@earthlink.net)

### **Professional Experience**

#### **Independent Consultant, Golden, CO**

**2002 – Present**

- Providing seismic geophysical education to the industry.

#### **Adjunct Professor, Colorado School of Mines, Golden, CO**

**2004 - Present**

- Taught senior/graduate seismic processing course.
- Serve on M. S. thesis committee.

#### **Senior Technical Advisor, Seismic Imaging Technology Center, Conoco, Ponca City 1997-2002**

- Foresaw time-lapse seismic potential for improving reservoir efficiency and persuaded Conoco to implement.
- Organized, developed, created textbook and taught one-week, seismic analysis course that provides interpreters with tools to use their seismic data for quantitative reservoir characterization. Rated “excellent” by all participants.

#### **Group Leader, Seismic Imaging Technology Center, Conoco, Ponca City 1993-1997**

- Guided, mentored, QC'd 35 employees who provided all of Conoco's internal seismic processing. Interpreters deemed our timely processing most suitable in 95% of comparisons. Persuaded Conoco not to eliminate this internal processing organization.
- Organized, developed, created textbook and taught one-week seismic processing course that significantly enhanced interpreter's understanding of the potential and limitations of their seismic data. In addition to employees and interns, provided course to Duke University graduate students. Rated “excellent” by all participants.



**Team Lead, Global Excellence Initiative, Conoco, Houston & London 1992-1993**

- Selected as leader of team to design a more competitive geoscience technical services and research organizations.

**Manager, Seismic Processing, Exploration Research and Services, Conoco, Ponca City 1990-1992**

- Guided, mentored, QC'd 85 employees in providing all of Conoco's internal seismic processing. Interpreters deemed our timely processing most suitable in 95% of comparisons. Persuaded Conoco not to eliminate the internal organization.

**Group Leader/Director, Exploration Research & Services, Conoco, Ponca City 1987-1990**

- Guided, mentored, QC'd 33 employees in providing half of Conoco's internal seismic processing. From 95% of comparisons our processing deemed most suitable.

**Director, Computer Systems Division, North American Exploration, Conoco, Ponca City 1986-1987**

- Responsible for development of Conoco's well-log analysis program that provided a competitive advantage in partner disputes.
- Responsible for development and maintenance of Exploration's worldwide net of interactive computer hardware and centralized scientific software used for geophysical modeling and mapping.

**Assistant to Chief Geophysicist, North American Exploration, Conoco, Houston 1986**

- Selected for unique training assignment as North American Exploration Chief's assistant.
- Analyzed, systematized time-dependence and distribution of industry drilling success in U. S. onshore basins. This analysis influenced future exploration strategy.
- Disproved the theoretical underpinnings of a published statistical field-discovery method that was foundation of Conoco's heritage system. Introduction of well-founded skepticism influence exploration strategy.

**Assistant to Chief Geophysicist, International Exploration, Conoco, Houston 1986**

- Selected for unique training assignment as International Exploration Chief's assistant.
- Created acquisition and processing plan for Egyptian Western Desert that served as a template for future activities.

**Geophysical Interpreter, North American Exploration, Conoco, Oklahoma City & Houston 1984-1985**

- Selected for unique, extended training assignment as interpreter.
- Interpreted marine seismic data with the recommendation to relinquish Gulf of Mexico lease. Recommendation accepted. Designed and developed software to map-migrate 2-D seismic data to understand placement of critical faults with increased accuracy.
- Created an interpretation strategy for prospecting in presence of overwhelming residual statics problems. Demonstrated applicability on Oklahoma seismic data.
- Designed and created rudimentary geological interpretation workstation to improve ease of producing geological cross-sections, flattened to any horizon in order to understand geologic development in a prospective area.

- Assistant Director, Seismic Processing Division, North American Exploration, Conoco, Ponca City 1981-1984**
- Guided, mentored, QC'd 15 employees in providing all of Conoco's internal seismic processing. Interpreters deemed our timely processing most suitable in 95% of comparisons.
  - Developed and taught a three-week course in seismic processing attended by the majority of Conoco exploration personnel.
  - Developed a method of imaging flanks of salt domes. Well confirmed methodology and found few million barrels of oil.
  - Specified and QC'd programming of new seismic processing algorithms for amplitude control and statics determination. All programs are in active use in 2002.
- Seismic Processing Geophysicist, Seismic Processing Division, Conoco, Ponca City 1978-1981**
- Processed marine and land seismic data to complete satisfaction of interpreters.
  - Selected for special-project group to handle stubborn processing problems.
  - Co-developed two-day introductory seismic processing course to inform quickly a multitude of new hires about the potential of their seismic data.
- Associate Professor, Dept. of Astronomy & Astrophysics, Michigan State University. (Tenured 1977) 1971-1978**
- Created and taught the most popular introductory astronomy course to a graduate course in stellar atmospheres and radiative transfer.
  - Developed all software for world's first fully automated telescope, driven by a 30,000-line, assembly language program. This computer-based method increased observational data-taking by a factor of five.
  - Created program that modeled the hydrodynamics and radiative transfer of explosive stars. This work determined how the intermediate mass elements made their way into second-generation stars such as our sun.
  - Courageously addressed pseudo-science through numerous public interviews.
  - Created underground course in the application of mini-computers to real-time control operations. By providing this course to "terminal M. S." physics & astrophysics students, greatly increased their employability.
- Instructor and Programmer, Walker Engineering. (Summers): 1974 – 78**
- Instructed others and assisted in the creation of mini-computer-based programs to test catalytic systems for FORD Motor Co. automobiles, hence allowing FORD to market its Pinto MPG according to its desired schedule.

## **EDUCATION**

Ph.D., Physics & Astrophysics, University of Colorado, Joint Institute for Laboratory Astrophysics (1971)

B.S., Physics, Iowa State University (1965)

## **AWARDS & HONORS**

Conoco Special Compensation Award – Creation of new Seismic Processing & Seismic Analysis Courses - 2002

Society of Exploration Geophysics Special Commendation Award –Service to SEG - 2000

Nominated, Secretary/Treasurer, Society of Exploration Geophysics. – 1999 & 2003

Society of Exploration Geophysics – Certificate of Appreciation – Service to SEG - (1998)

Conoco North American Exploration Recognition Award - Creation of the Seismic Processing School. 1981

Michigan State University Teacher-Scholar Award – 1977 - Top faculty member based on research, teaching, and public service.

## ***Steve Hill***

### **PROFESSIONAL ACTIVITIES**

**President – Society of Exploration Geophysicists (2009 – 2010)**

**President-elect – Society of Exploration Geophysicists (SEG) (2008-9)**

**Secretary/Treasurer – Society of Exploration Geophysicists (2003-4)**

**Chairman – Conoco Geophysical Symposium (2000)**

**Society of Exploration Geophysicists Election Procedures Committee (1998 - 2000); Society of Exploration Geophysicists Tellers Committee (1998 – 1999); Stanford Exploration Project Steering Committee (Stanford University) (1997-8); Geophysical Society of Tulsa Spring Symposium (A One-day national symposium on computer workstations) (1989), Society of Exploration Geophysicists Finance Committee (2004 – 2005)**

**Adjunct Professor, Department of Computer Science, Oklahoma State University (1988 - 1990) Responsible for a graduate thesis student.**

**President - Geophysical Society of Tulsa (1998 - 1999)**

**Member - Iowa State University Physics Counsel Advisory Board (1989 – 2002); SEG Student Section/Academic Liaison Committee (1998 – 2000); SEG Seismic Interpretation Pitfalls Subcommittee (1997 – 2000); SEG Finance Committee (2003 – 2006); SEG Foundation Investment Committee (2005); SEG Meetings Committee (2005 – Present)**

**SEG Editor - Society of Exploration Geophysics Book Series (1998 – 2009)**

**SEG Associate Editor – GEOPHYSICS Journal (2004 – 2009)**

**SEG Editorial Board Member – The Leading Edge magazine (2005 – 2009)**

**SEG Author – Bi-monthly column, GEOPHYSICS Bright Spots, The Leading Edge (2005 – 2009)**

**Editor-elect & Editor – Geophysical Society of Tulsa (1996 - 1998)**

**Publicity Chairman – Society of Exploration Geophysics Midwest Meeting & Exposition (1991)**

*Steve Hill*

## **PUBLICATIONS & INVITED PRESENTATIONS**

**Hill, Stephen J.; Temperature Reversal in a LTE Atmosphere: P.A.S.P., 84, 669**

**Hill, Stephen J.; Hydrodynamics and Radiative Transfer Effects on an RR Lyrae Atmosphere: Astrophysical Journal, 178, 793, 1972**

**Hutchinson, James L.; Hill, Stephen J.; Lillie, Charles F.; Interpretation of OAO-2 Ultraviolet Light Curves of Beta Doradus: Astronomical Journal, 80, 1044, 1975**

**Hill, Stephen J.; Wilson, L. A.; Proceedings of the Solar and Stellar Pulsation Conference (Los Alamos Scientific Laboratory), 279, 1976**

**Hutchinson, James L.; Hill, Stephen J.; Lillie, Charles F.; Ultraviolet Photometry from the Orbiting Astronomical Observatory XXVII: Interpretation of the Light Curve of RR Lyrae: Astrophysical Journal, 211, 207, 1977**

**Wilson, L.A.; Hill, Stephen J.; Shock Wave Interpretation of Emission Lines in Long Period Variable Stars II: Periodicity and Mass Loss: Astrophysical Journal 228, 854, 1979**

**Hill, Stephen J., Wilson, L. A.; Theoretical Velocity Structure of Long Period Variable Star Photospheres: Astrophysical Journal 229, 1029, 1979**

**Hill, Stephen J., Workstations: Problems they solve and problems they create: The Leading Edge, 9, 1990**

**Hill, S. J., 1998, Geophysicists, their migration and recruiting: The Leading Edge, 17, no. 08, 1089-1091.**

**Hill, Stephen J., Dragoset, B., Weglein, A: The New World of multiple attenuation: The Leading Edge, 18, 1999**

**Hill, Stephen J., Insights into the Origin of the Acquisition Footprint, Invited Presentation, University of Tulsa, April 1999.**

**Hill, Stephen J., Addressing the Issues, Keynote Presentation, SEG Development & Production Forum: Time-Lapse Measurements in Reservoir Management, July 1999.**

**Hill, Stephen J., Acquisition Footprint, Poster Presentation, SEG Development & Production Forum: Time-Lapse Measurements in Reservoir Management, July 1999.**

**Hill, Stephen J., Two-week Seismic Processing School, Duke University Course, August 1999.**

**Hill, Stephen J., Geometric Explanation of Data Mapping, Introduction to Time-lapse Seismology, Time-lapse Processing Issues and Seismic Data Acquisition Footprint, Presentations, Duke University, August 1999.**

**Hill, Stephen J., 1999, Noise into signal – seismic processing alchemy?: The Leading Edge, 18, No. 10, 1214.**

**Hill, Stephen J., Shultz, Mike and Brewer, Joel, 1999, Acquisition footprint and fold-of-stack plots: The Leading Edge, 18, no. 6, 686.**

**Hill, Stephen J., Stolt, Robert and Chiu, Steve, 2001, Altering offsets and azimuths: The Leading Edge, 20, no. 01, 210-213.**

**Hill, Stephen J, 2005, Inversion-based thickness determination: The Leading Edge, 24, 477.**

**Hill, Stephen J, Marfurt, Kurt and Chopra, Satinder, Search for similarity in a slab of seismic data: The Leading Edge, 25, no. 02, 168.**

**Hill, Stephen J, GEOPHYSICS Bright Spots: The Leading Edge, bi-monthly column, 2005 – 2008.**

**Save, Paul and Hill, Stephen J. Overview and classification of wavefield seismic imaging methods, The Leading Edge, 28, 170, 2009.**



# Registration Details

- Course fee: 2950 Euro + 19% VAT
- Registration deadline :

## Payment and Registration

Tuition fees are due and payable in Euro upon enrollment in the course by bank transfer to the bank account given below unless another payment form is agreed

Unless otherwise indicated, the payment should be received before the date specified in the invoice as payment term to make the enrollment effective.

To register to the course please fill in the [registration form](#) and fax or email it along with the confirmation of your bank transfer to:

GeoNeurale

Am Nymphenbad 8

81245 Munich

T +49 89 8969 1118

F +49 89 8969 1117

ONLINE REGISTRATION: [www.GeoNeurale.com](http://www.GeoNeurale.com)

**Bank Information:** Genossenschaftsbank EG Muenchen

Bank Account N. 519618

BIC – Code : GENODEF 1M07

BLZ 701 694 64

IBAN : DE19 7016 9464 0000 5196 18

Please indicate your name and the purpose: "SEISMIC DATA PROCESSING".

[www.GeoNeurale.com](http://www.GeoNeurale.com)

## Provisions

Tuition fees are due and payable in Euro upon enrollment in the course. Unless otherwise indicated, fees do not include student travel costs and living expenses.

Payments are also accepted via personal or company check, traveler's check, credit card, and Company Purchase Orders.

### Cancellations by Participant:

All cancellation are subject to a 100 Euro non-refundable cancellation fee.

Cancellation have to be notified to our office, at least 30 days prior to the course start date to receive a refund (less the 100 Euro cancellation fee).

If the participants are unable to cancel prior to the 32 days notification date, they may substitute another person at their place in a course by notifying us prior to the course start date.

### Course Cancellations:

GeoNeurale reserves the right to cancel the courses if necessary. The decision to cancel a course is made at least two weeks prior to the course start date. If a course is cancelled, the participant will receive a full reimbursement of the tuition fees ( but not of the plane ticket or hotel expenses or any other costs), or will be enrolled in another course upon his decision ( the cost of the original course will be applied to the cost of the replacement course ).

GeoNeurale can not be responsible for any penalties incurred for cancellation or change of airline or hotel reservations .

### Refunds:

GeoNeurale will promptly remit all refunds of tuition fees due to cancellations or annulment (less any appropriate non-refundable cancellation fee) within 30 days of the course cancellation.

### Force Majeure:

GeoNeurale can not be responsible for cancellations due to “force majeure” events : airplane or airport strikes, emergency situations, natural catastrophes and all situations and incidents independent or outside the human control that can delay or cancel the course. In case of such events related cancellations the course tuition fees will be refunded to the client .

Geoneurale is not responsible for any delay or absence caused by the training instructor or training instructor company for reasons which are independent or out of the control of GeoNeurale’s decisions.

AGREEMENT: Upon enrollment all parts accept the above mentioned provisions. The above specified provisions shall regulate the agreement between GeoNeurale and the participant and the participant company and will enter into force upon enrollment.

# REGISTRATION FORM

Please fill out this form and Fax to +49 89 8969 1117

or Email to Courses@GeoNeurale.com

## ***Seismic Data Processing***

Munich \_\_\_\_\_

Course Fee: 2950 Euro + 19 % VAT (VAT Tax is 100% refunded from the German Finance Ministry)

Name:

Company:

Address:

Job Title:

Phone:

Fax:

Email:

SIGNATURE: \_\_\_\_\_

[www.GeoNeurale.com](http://www.GeoNeurale.com)

# INFORMATIONS, HOTELS, MAPS, LINKS

## TRAINING LOCATION – RESEARCH CENTER

<http://www.geoneurale.com/documents/GATE-Y7.pdf>

## GATE GARCHING

<http://www.geoneurale.com/documents/GATE-Y6.pdf>

## MAP MUNICH-GARCHING

<http://www.muenchen.city-map.de/city/db/130208000001/14269/Garching.html>

## MUNICH INFO and MAP MUNICH CENTRAL

<http://www.muenchen.de/home/60093/Homepage.html>

## MAP MUNICH UNDERGROUND

<http://www.mvv-muenchen.de/web4archiv/objects/download/3/netz1207englisch.pdf>

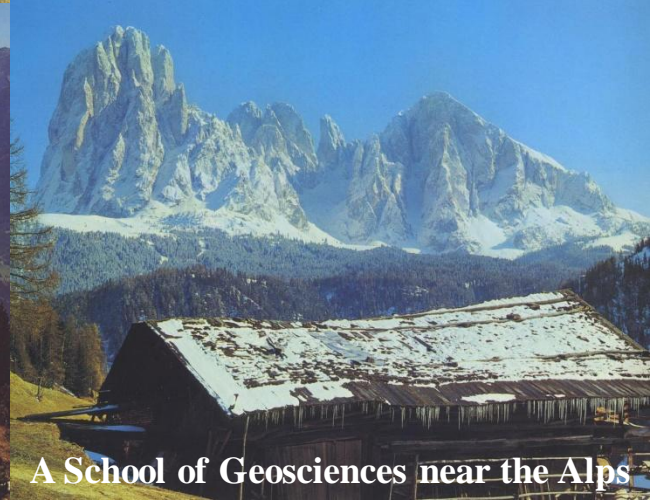
## HOTELS NEAR GeoNeurale

<http://www.geoneurale.com/documents/HOTELS-GARCHING.pdf>

## BAVARIA INFO

<http://www.geoneurale.com/documents/Around-Munich-Info.pdf>





A School of Geosciences near the Alps