

# GeoNeurale

announces

## *THE ADVANCED SEISMIC ATTRIBUTES ANALYSIS*

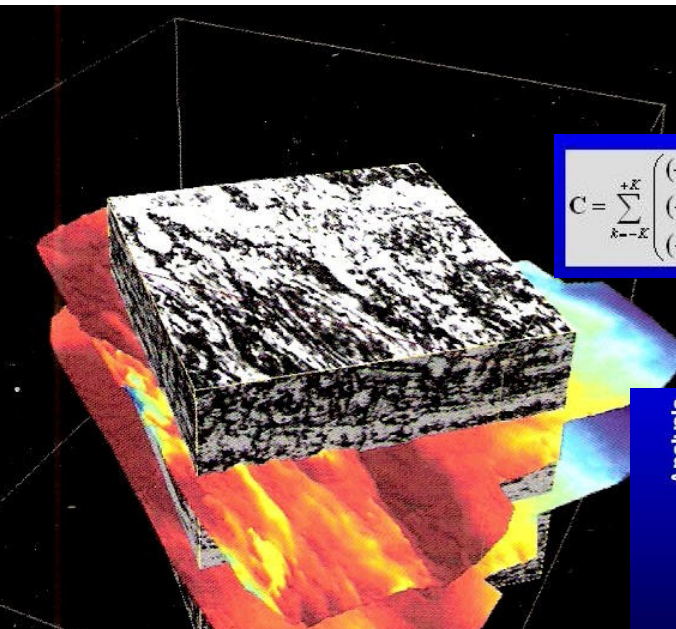
*3D Seismic Attributes*

*for*

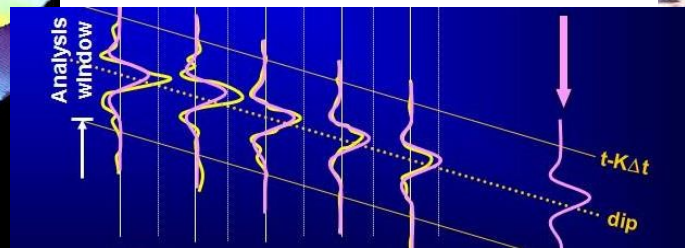
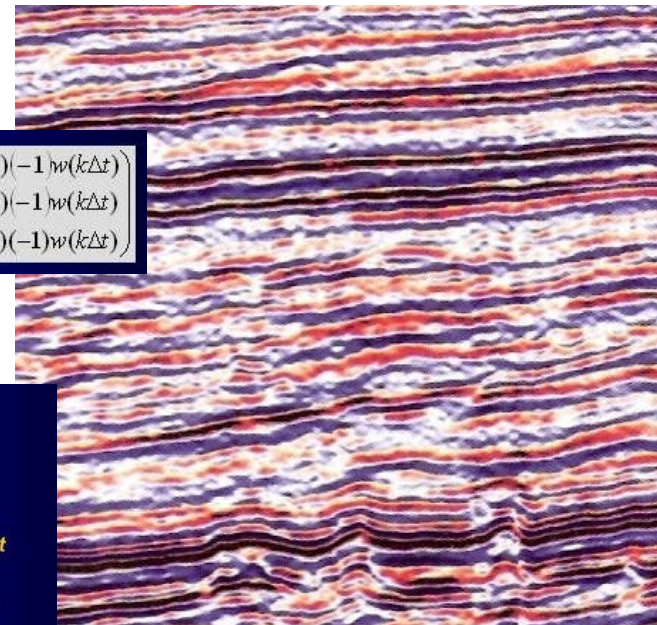
*Prospect Identification and Reservoir Characterization*

**2 – 4 August 2010**

**Munich - Germany**



$$C = \sum_{k=-K}^{+K} \begin{pmatrix} (+2)w(k\Delta t) & (+2)w(k\Delta t) & (+2)w(k\Delta t) & (+2)w(k\Delta t)(+1)w(k\Delta t) & (+2)w(k\Delta t)(-1)w(k\Delta t) \\ (+1)w(k\Delta t) & (+1)w(k\Delta t) & (+1)w(k\Delta t) & (+1)w(k\Delta t)(+1)w(k\Delta t) & (+1)w(k\Delta t)(-1)w(k\Delta t) \\ (-1)w(k\Delta t) & (-1)w(k\Delta t) & (-1)w(k\Delta t) & (-1)w(k\Delta t)(+1)w(k\Delta t) & (-1)w(k\Delta t)(-1)w(k\Delta t) \end{pmatrix}$$



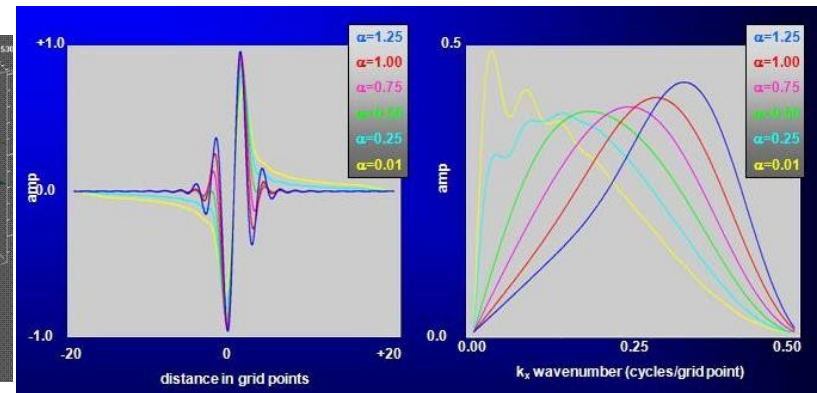
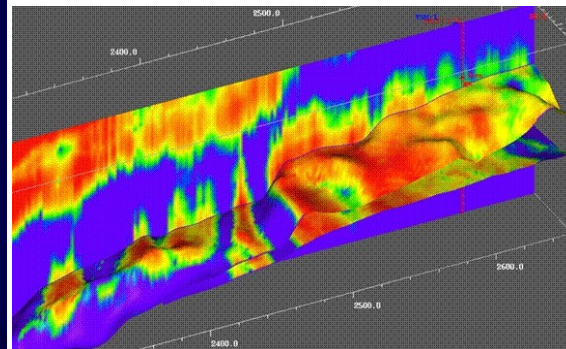
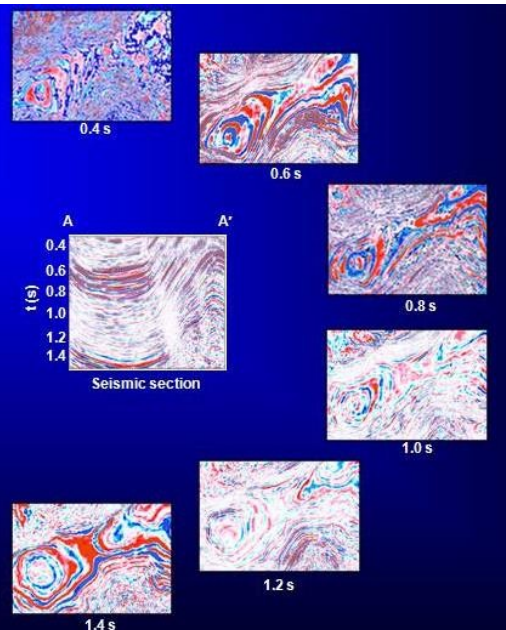
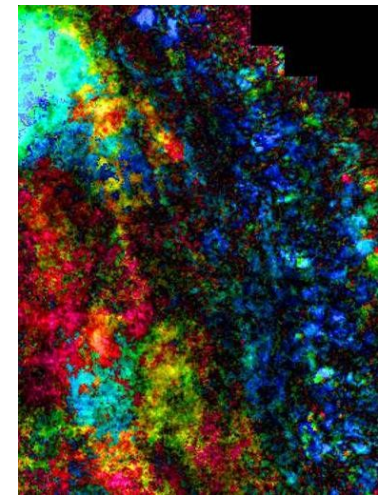
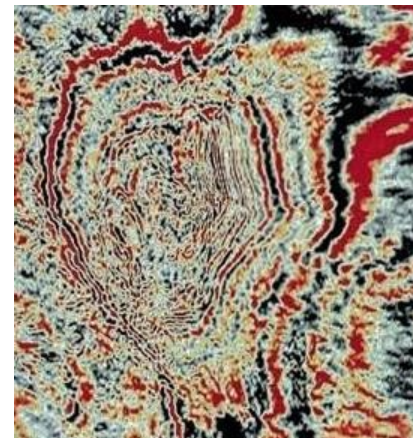
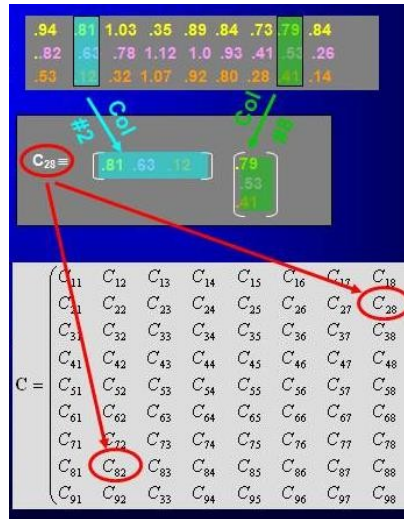
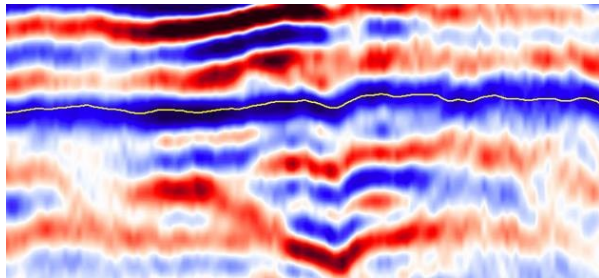
# 3D Seismic Attributes for Prospect Identification and Reservoir Characterization

Dr Kurt Marfurt

Dr Kurt Marfurt drives us to a journey into the future of the Seismic Attributes Analysis showing the still open huge potential of these interpretation's methodologies.

Starting from a physical classification of the attributes, their derivation and their main applications, Kurt illustrates with lucidity and a systematic approach, practical interpretation examples and the future developments of this seismic analysis.

In the end the instructor illustrates all related processing methods which are still in full development showing a perspective of their unlimited scientific evolution: Geostatistical Analysis, Multivariate Statistical Applications, Discriminant Analysis and Neural Networks Applications.



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# *3D Seismic Attributes*

*for*

# *Prospect Identification and Reservoir Characterization*

MUNICH

*GATE – Garching Technologie und Gründerzentrum Munich-Garching*

2 – 4 August 2010

3 DAYS COURSE

INSTRUCTORS: Dr. Kurt Marfurt

**Professor in the Department of Geosciences at the Houston University and Director of the Center for Applied Geosciences and Energy**

AUDIENCE: Seismologists, Geophysicists Research Geoscientists, Modeling Specialists, Petrophysicists, Team Leaders, Managers, Scientists involved in Reservoir Characterization and Interpretation Systems.

COURSE FEES: 2300 Euro + VAT (19%)

REGISTRATION DEADLINE: 9 July 2010

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

# gate

## GeoNeurale Office and Training Center at the Munich-Garching Research Center



Campus Garching

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

B11

gate

Lichtenbergstr.

Chemie

Mensa

Am Coulombwall

Physik

James-Franck Str.

Neutronenquelle

Freisinger Landstr.

Maschinenbau

Walther-Meißner-Str.

A9

Zur Autobahn A9, Ausfahrt  
"Garching Nord" ca. 800m

ZIMT

Mathematik und  
Informatik

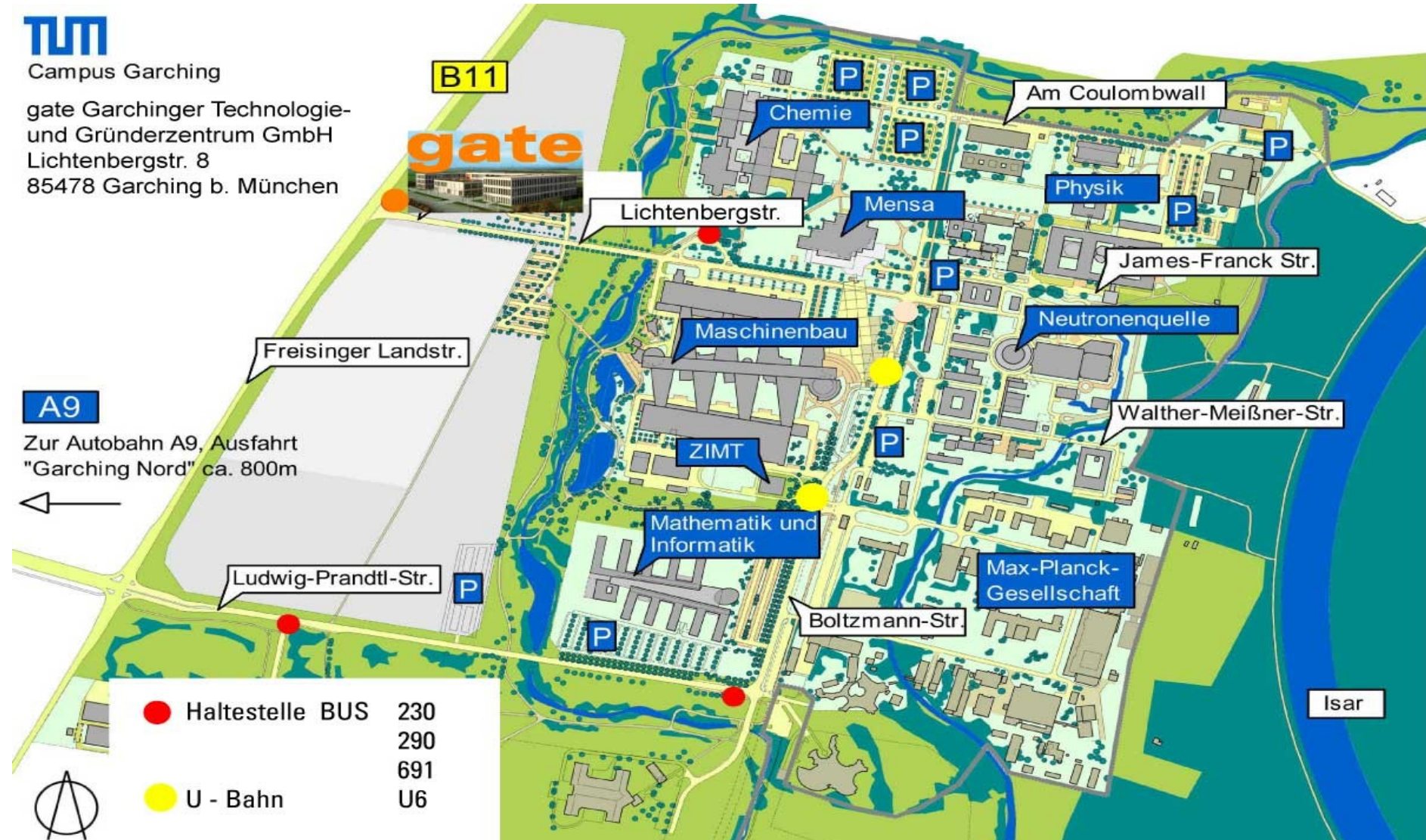
Max-Planck-  
Gesellschaft

Ludwig-Prandtl-Str.

Boltzmann-Str.

Isar

- Haltestelle BUS 230  
290  
691  
U6
- U - Bahn



# *3D Seismic Attributes for*

## *Prospect Identification and Reservoir Characterization*

**A seismic attribute is any measure of seismic data that helps us better visualize or quantify features of interpretation interest. Seismic attributes fall into two broad categories – those that help us quantify the morphological component of seismic data and those that help us quantify the reflectivity component of seismic data. The morphological attributes help us extract information on reflector dip, azimuth, and terminations, which can in turn be related to faults, channels, fractures, diapirs, and carbonate buildups. The reflectivity attributes help us extract information on reflector amplitude, waveform, and variation with illumination angle, which can in turn be related to lithology, reservoir thickness, and the presence of hydrocarbons.**

**In the reconnaissance mode, 3D seismic attributes help us to rapidly identify structural features and depositional environments. In the reservoir characterization mode, 3D seismic attributes are calibrated against real and simulated well data to identify hydrocarbon accumulations and reservoir compartmentalization.**

**In this course, we will gain an intuitive understanding of the kinds of seismic features that can be identified by 3D seismic attributes, the sensitivity of seismic attributes to seismic acquisition and processing, and of how ‘independent’ seismic attributes can be coupled through geology. We will also discuss alternative workflows using seismic attributes for reservoir characterization as implemented by modern commercial software and practiced by interpretation service companies. Participants are invited to bring case studies from their workplace that demonstrate either the success or failure of seismic attributes to stimulate class discussion.**

# Course Outline

- 1) Introduction
- 2) Complex trace attributes
- 3) Horizon and formation attributes
- 4) Color display and 3D visualization
- 5) Spectral decomposition and thin bed tuning
- 6) Geometric attributes
  - a) volumetric dip and azimuth
  - b) coherence
  - c) volumetric curvature
  - d) Sobel filter edge detection and amplitude gradients

7) Attribute expression of structure and stratigraphy

a) tectonic deformation

b) clastic depositional environments

c) carbonate deposition environments

d) shallow stratigraphy and drilling hazards

e) reservoir heterogeneity

8) Impact of data quality on seismic attributes

a) Velocities and statics

b) Acquisition footprint

c) Seismic migration

- 9) Attributes applied to offset- and azimuth-limited volumes
- 10) Structure-oriented filtering and image enhancement
- 11) Inversion for acoustic impedance
- 12) Multiattribute analysis tools
- 13) Reservoir characterization workflows
- 14) 3D texture analysis

# Instructor s Biography

## Kurt Marfurt

**Kurt J. Marfurt** joined the University of Oklahoma in 2007 where he serves as the Frank and Henrietta Schultz Professor of Geophysics within the ConocoPhillips School of Geology and Geophysics. Marfurt's primary research interest is in the development and calibration of new seismic attributes to aid in seismic processing, seismic interpretation, and reservoir characterization. Recent work has focused on applying coherence, spectral decomposition, structure-oriented filtering, and volumetric curvature to mapping fractures and karst as well as attributed-assisted processing. Marfurt earned a Ph.D. in applied geophysics at Columbia University's Henry Krumb School of Mines in New York in 1978. He worked 20 years in a wide range of research projects at Amoco's Tulsa Research Center after which he joined the University of Houston for 8 years as a Professor of Geophysics and the Director of the Center for Applied Geosciences and Energy (CAGE). He has received best paper (for coherence) best presentation (for seismic modeling) and as a coauthor best poster (for curvature) awards from the SEG and served as the EAGE/SEG Distinguished Short Course Instructor for 2006 (on seismic attributes). In addition to teaching and research duties at OU, Marfurt leads short courses on attributes for the SEG and AAPG.

# Registration Details

- Course fee: 2300 Euro + VAT (19%)
- Registration deadline : 9 July 2010

## 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: "3D Seismic Attributes course fee".

[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 travel costs and living expenses of the participant.

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

### **Cancellations by Participant:**

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

Before booking any flight or hotel, please wait the written course confirmation on our website. GeoNeurale can not be responsible for any penalties incurred for cancellation or change of flights 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 parties 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](mailto:Courses@GeoNeurale.com)

### *3D Seismic Attributes for Prospect Identification and Reservoir Characterization*

Munich, 2-4 August 2010

Course Fee: 2300 Euro + VAT 19%

Registration Deadline: 9 July 2010

Name:

Company:

Address:

Job Title:

Phone:

Fax:

Email:

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

# 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/13020800001/14269/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>

