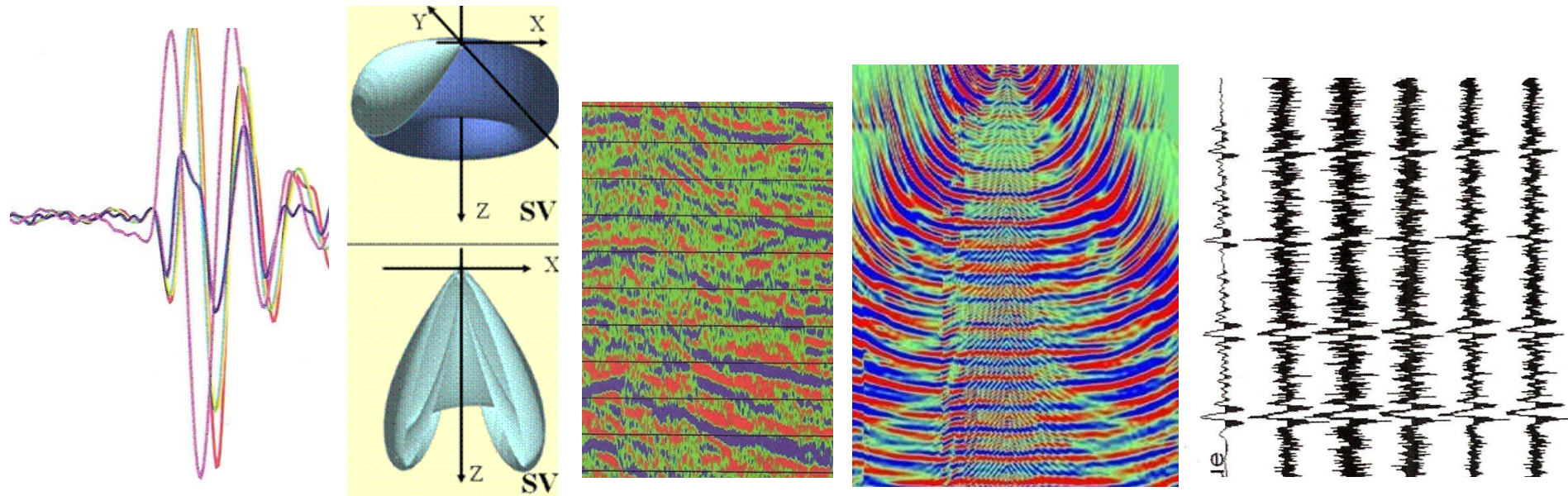


# GeoNeurale

announces

## ***Multi-Component Seismic Principles and Applications***

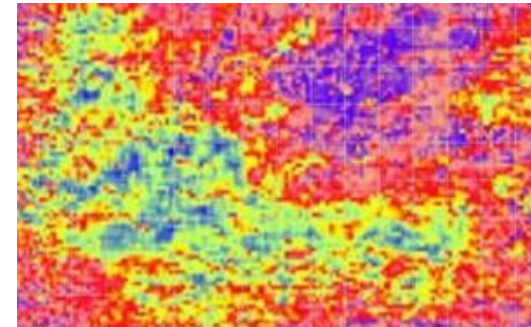
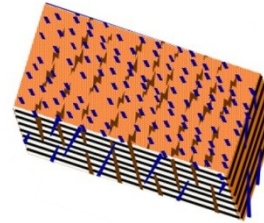
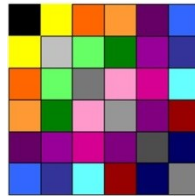
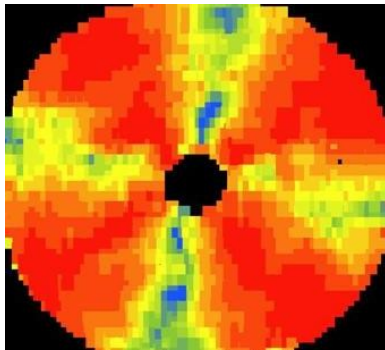
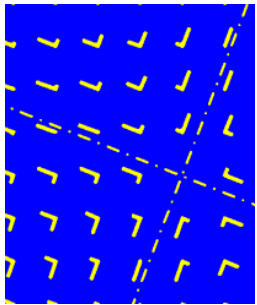
Munich



# Multi-Component Seismic Principles and Applications

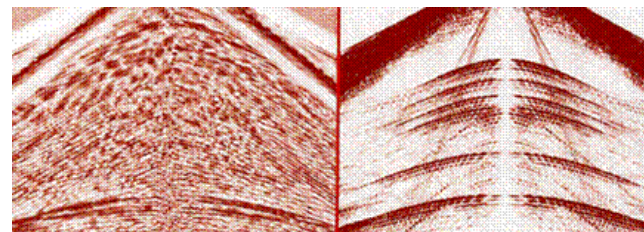
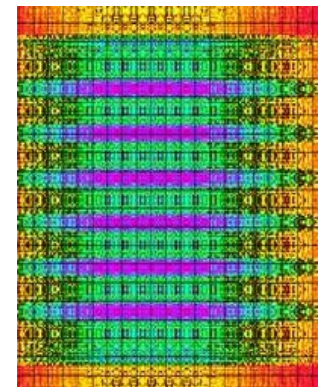
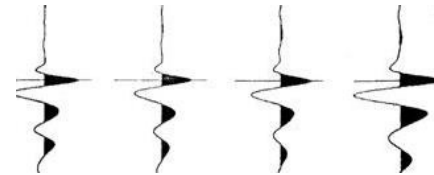
Dr Robert Garotta

Robert Garotta, one of the fathers of the Seismic Multi-Components methods, developed this course that summarizes his more than 30 years experience by some of the major seismic companies and research institutions worldwide. The course represents an important goal for all seismologists who are interested to advanced *P* and Shear waves measurements, processing and interpretation.



21 elastic constants  
1 symmetry center

$$t_c = \sqrt{\frac{t_{c0}^2}{(1+\gamma_0)^2} + \frac{x_p^2}{v_{p2}^2} - 2\eta_e \Delta t_p^2} + \sqrt{\frac{t_{c0}^2 \gamma_0^2}{(1+\gamma_0)^2} + \frac{(x-x_p)^2}{v_{s2}^2} + 2\zeta_e \Delta t_s^2}$$



# ***Multi-Component Seismic Principles and Applications*** ( New Program )

GeoNeurale - MUNICH

at the

*GATE – Garching Technologie und Gründerzentrum*

3 DAYS COURSE

INSTRUCTOR: Dr Robert Garotta

LEVEL: Advanced

AUDIENCE: Intermediate and advanced level geologists, geophysicists, seismic processors, independent explorationists, and team leaders/mid level management

COURSE FEES: 2300 Euro + 19% VAT (VAT Tax is 100% refunded from the German Finance Ministry)

REGISTRATION DEADLINE :

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

# gate



Campus Garching

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

## GeoNeurale

Office  
and

## Training Location



# ***Multi-Component Seismic Principles and Applications***

Participants will expand their understanding of significant techniques and developments in exploration geophysics, and gain a greater appreciation of the use of the attributes derived from multi-component seismic in interpretation.

**This course is designed for:**

- Geologically based seismic interpreters who wish to expand their understanding of significant techniques and developments in exploration geophysics.**
- Processing geophysicists wishing to handle multi-component data and to derive the most significant attributes.**
- The course topics, listed below, are presented by means of lectures, examples and particular developments about advanced techniques.**
- Enrollment in this course is limited to 25.**

# PROGRAM

The first two days of the course will be devoted to the presentation of the basic theory of elastic propagation and its consequences about the acquisition and the processing of multi-component data, then to the presentation of 2D and 3D examples of results.

During the third day more details will be given to particular topics:

- shear mode static corrections,
- derivation and use of the  $V_p/V_s$  ratios,
- simultaneous combined PP and PS mode inversion,
- detection and compensation of azimuthal anisotropy.

-

## **Section 1 Historical overview**

- Scientists
- Earthquake seismologists
- Civil engineers
- Exploration geophysicists

## **Section 2 Why use shear waves**

- 
- When compressional mode fails
- When lithological information is required
- When fluid content is important
- When confirmation is needed
- When shallow to medium depth resolution is required

### **Section 3 Theoretical basis**

- 
- Elastic wave propagation in homogeneous media
- Reflection, transmission and conversion of elastic waves
- Boundary and surface waves
- Wave attenuation
- Modelling

### **Section 4 Shear wave acquisition**

- 
- Shear wave sources
- Land multi-component receivers
- Shear wave land acquisition
- PS mode land acquisition specifics
- Shear wave marine and shallow water acquisition

## **Section 5 Processing of shear wave data**

- 
- Generalities about Shear mode processing in VTI environment
- Static corrections
- Normal moveout corrections
- Generalities about PSv mode processing in VTI environment
- Processing sequence of PSv mode in VTI environment
- Particulars of marine processing
- S and PSV mode processing in an orthorhombic environment
- Correlation of P and S data

## **Section 6 Results of shear waves surveys**

- Poisson's ratio derivation from P and SH surveys
- Poisson's ratio derivation from P and PSV surveys
- Example of gas detection
- Wave mode comparisons
- Improving the seismic image
- 3Dx3C and 2Dx3C azimuthal anisotropy surveys

## **Conclusions**

## Robert Garotta

### BIOGRAPHY

Robert Garotta, graduated of the Faculté des Sciences in Paris (DES), began his career at the geophysical department of the French National Centre of Scientific Research (CNRS).

He joined CGG as a field geophysicist, first in the gravity method then as a seismologist.

He was involved in various fields of research and development such as vibroseismic, velocity analysis, static corrections, 3D survey design, shear wave experimentation and processing.

He concluded his career at CGG as Senior Vice President of the Geophysical methods.

Robert is still advising the CGGVeritas group in the area of Multi-Component seismic.

#### Awards:

- Conrad Schlumberger Award from EAEG 1965
- Prix Charles Bihoreau 1975
- SEG Distinguished Instructor 2000
- SEG Honorary Member 2001

# Registration Details

- Course fee: 2300 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

Lichtenbergstrasse 8

D-85748 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: "Multi-Component Seismic 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 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 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).

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 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

# *Multi-Component Seismic*

Munich,

Course Fee: 2300 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>

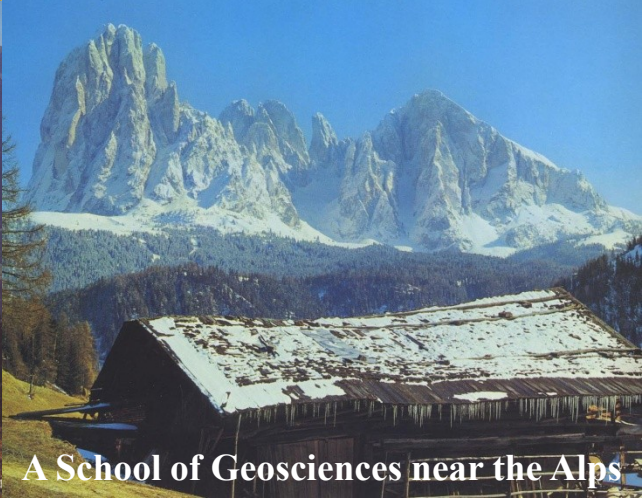
## HOTELS NEAR GeoNeurale

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

## BAVARIA INFO

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

- Munich, the capital of Bavaria with a population of 1.5 million is the third largest city in Germany. Headquarters to industrial giants like BMW, Siemens, MAN, EADS, Eurocopter, Infineon and Epcos it also hosts two of the most important universities in Germany: the "Technische Universitaet Muenchen" and the "Ludwig Maximilian Universitaet" , with international research centers such as the "Max Plank Institut" and the "Fraunhofer Gesellschaft" .
- Geologically important is the presence of carbonate formations in the subsoil that are very favourable for low enthalpy geothermal exploitation, which requires the solution of complex petrophysical problems, similar to Oil Exploration.
- Petrophysic-Consultants, headquartered in Munich, has the expertise and focus that allows them to apply oil exploration technology to complex geothermal exploration.
- GeoNeurale, the society for the Geosciences applications of Geostatistics and Neural Networks promotes the development of modern interpretation methods for reservoir analysis.



A School of Geosciences near the Alps