GeoNeurale

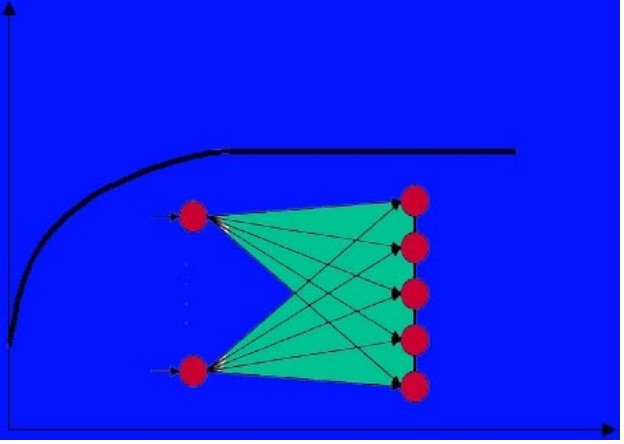
announces

Advanced Carbonate Petrophysics

GATE – Garchinger Technologie und Gründerzentrum

➔ 16 – 20 April 2012

Munich



GeoNeurale

Advanced Carbonate Petrophysics

MUNICH

at the

GATE – Garchinger Technologie und Gründerzentrum

16 – 20 April 2012

5 DAYS COURSE

Registration deadline: 25 March 2012

4000 PAGES PROGRAM

INSTRUCTOR: Dr. Robert E. Ballay

LEVEL: Advanced / Specialized

AUDIENCE: Petrophysicists, Reservoir Engineers, Geologists, Geophysicists, Team Leaders, Managers.

COURSE FEES: 2950 Euro plus 19% VAT

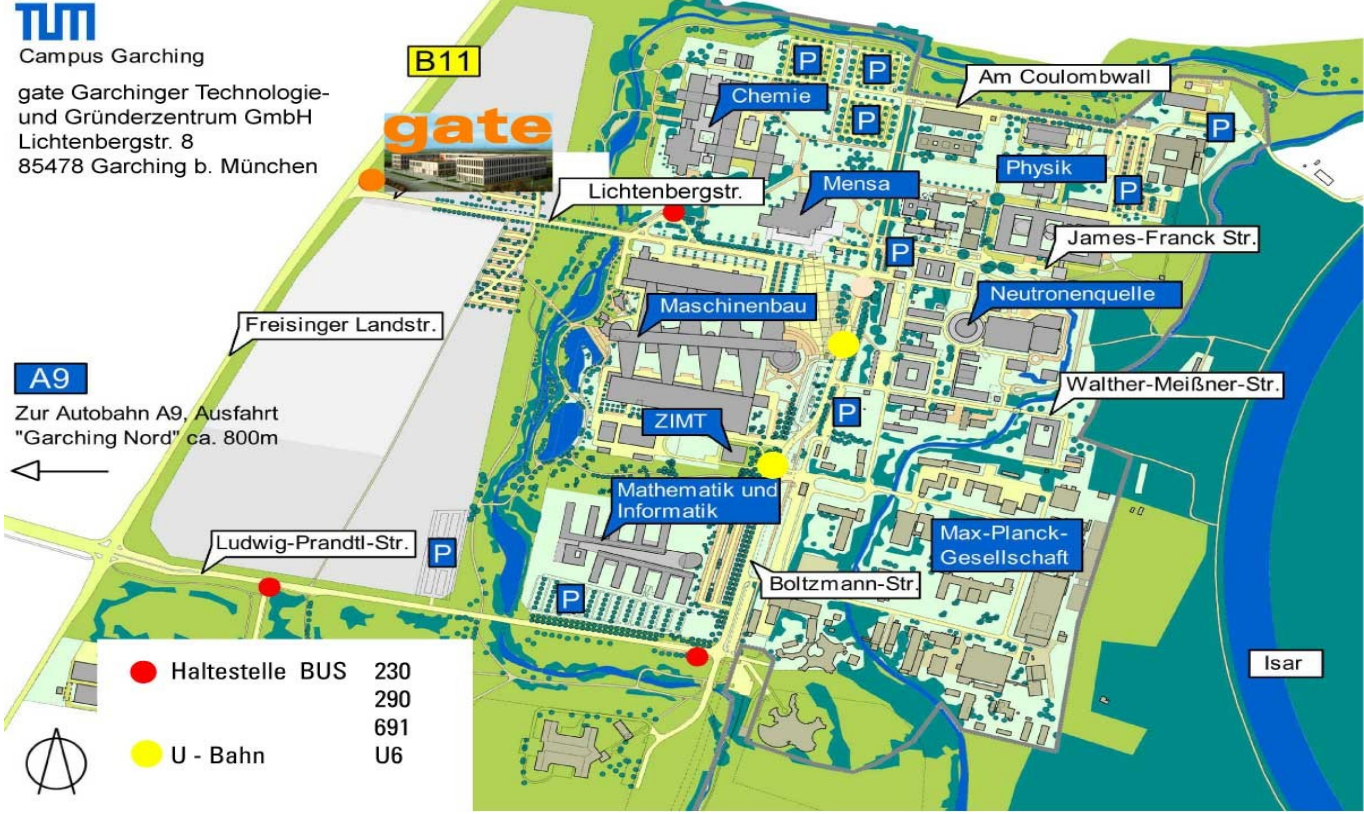
ONLINE REGISTRATION: www.GeoNeurale.com

New updates and expansion of the dielectric module for the multi-frequency tools

gate

GeoNeurale

Training Location



ADVANCED COURSE PREPARATION

Due to the advanced character of this course an online preparation program will start at least two weeks before the course to assist those delegates who would like to review the background theory necessary to face the course with solid concepts of Carbonate Petrophysics, and related Heterogeneity and Uncertainty issues.

COURSE OVERVIEW

This five-day course is for Engineers, Geologists and Team Leaders who require ***an understanding of the complexities of open-hole carbonate log analysis***. Participants will learn to ***characterize rock quality visually*** (thin sections, CT-scan, etc) ***and numerically*** (routine core analyses, capillary pressure, etc) and to then ***relate*** those results ***to both routine and specialty open-hole log responses***. The ***complementary nature of the various tools and techniques*** are discussed and ***illustrated with actual carbonate data.***

Carbonate Petrophysics — **Slide Count 3460**

- Continued Following Page -

ABOUT THE COURSE

Carbonate petrophysics begins with a ***contrast of carbonates and sandstones***, followed by ***reservoir classification*** according to the Lucia Petrophysical Classification methodology. Thin sections and CT-Scans are used for ***visualization*** while capillary pressure serves to ***quantify the differing properties***.

Individual ***logging tools*** (both ***routine and specialty***) are introduced; ***carbonate responses*** are ***illustrated with actual data***.

Archie's exponents are discussed within the context of both his original data sets, and carbonate specific measurements.

The ***complementary attributes of each tool and technique*** are used to identify and evaluate complex carbonate reservoirs, as illustrated with actual applications.

- Continued From Preceding Page -

YOU WILL LEARN HOW TO

Recognize the key distinctions between carbonates and sandstones, and understand the implications of those differences upon modern logging tool responses and formation evaluation methods

Perform both ***quick-look and detailed interpretations***, taking into account carbonate complexities

Design a ***cross-discipline formation evaluation program*** that will characterize the interpretational parameters associated with a specific reservoir, and facilitate complete analyses

Appendix

Advanced Carbonate Petrophysics

The Devil's Promenade, SW Missouri

www.GeoNeurale.com

Advanced Carbonate Petrophysics

Day 1

Start	Stop	Duration	Topic
830	915	45	Course Introduction
915	930	15	Carbonate vs Sandstone
930	945	15	Break
945	1000	15	Thin Sections
1000	1045	45	Lucia Petrophysical Classification
1045	1100	15	Break
1100	1200	60	Lucia Classification (+ Exercise)
1200	1300	60	Lunch
1300	1400	60	Capillary Pressure (+ Exercise)
1400	1415	15	Break
1415	1500	45	Rock Quality and Cutoffs
1500	1515	15	Break
1515	1545	30	CT Scan with Carb Examples
1545	1615	30	GR in Carbonate (+ Discussion Exmpl)
1615	1630	15	Review and Feedback

Day 2

Start	Stop	Duration	Topic
830	945	75	Sonic in Carbonate (+ Exercise)
945	1000	15	Break
1000	1100	60	Carb Rhob / Pef (+ Discussion Exmpls)
1100	1115	15	Break
1115	1145	30	Carb LWD Rhob / Pef
1145	1200	15	Carbonate Neutron
1200	1300	60	Lunch
1300	1345	45	Carb Neutron (+ Discussion Exmpl)
1345	1400	15	Break
1400	1500	60	Identification of Vuggy Porosity
1500	1515	15	Break
1515	1615	60	Specialty Sonic in Carbonate
1615	1630	15	Review and Feedback

Advanced Carbonate Petrophysics

Day 3

Start	Stop	Duration	Topic
830	915	45	Phi / Mineralogy from Core
915	945	30	XRD/XRF/etc Mineralogy
945	1000	15	Break
1000	1045	45	Resistivity Tools & Constraints
1045	1100	15	Archie's 'm' Exponent
1100	1115	15	Break
1115	1200	45	Archie's 'm' Exp (+ Discussion Exmpl)
1200	1300	60	Lunch
1300	1345	45	Cmnt Exp Variations & Pore Geometry
1345	1415	30	"m" Estimates From Vuggy Porosity Ratio
1415	1430	15	Break
1430	1500	30	"m" Estimates From Vuggy Porosity Ratio
1500	1530	30	Archie's "n" Exponent (+ Exercise)
1530	1545	15	Break
1545	1615	30	Low Resistivity Pay in Carbonates
1615	1630	15	Review and Feedback

Day 4

Start	Stop	Duration	Topic
830	900	30	Quick Look Techniques
900	930	30	Pickett Plot
930	945	15	Break
945	1030	45	Pickett Plot
1030	1045	15	Pulsed Neutron Log
1045	1100	15	Break
1100	1200	60	PNL (+ Discussion Exmpl)
1200	1300	60	Lunch
1300	1345	45	PNL Log-inject-log
1345	1400	15	Break
1400	1445	45	BH Gravity Meter
1445	1530	45	Pressure Profiles
1530	1545	15	Break
1545	1615	30	Linear Correlation
1615	1630	15	Review and Feedback

Day 5

Start	Stop	Duration	Topic
830	945	75	Image Log (+ Exercise)
945	1000	15	Break
1000	1030	30	Dielectric Log (+ Exercise)
1030	1045	15	Wireline "m" Estimates Compared to Core
1045	1100	15	Break
1100	1200	60	Basic NMR (+ Exercise)
1200	1300	60	Lunch
1300	1315	15	Basic NMR (Hydrocarbon Effects)
1315	1400	45	Carbonate NMR
1400	1415	15	Break
1415	1500	45	Carbonate NMR (+ Exercise)
1500	1530	30	Core Calibrated Wireline "m" Estimates
1530	1545	15	Break
1545	1600	15	Daily Review and Feedback
1600	1615	15	Jerry Lucia: Here is how it works
1615	1630	15	Course Summary

Advanced Carbonate Petrophysics

Lucia Petrophysical Classification

Petrophysical Classification of Carbonate for Reservoir Characterization

Cementation Exponent Variations & Pore Geometry

Focke & Munn's classic work

Cementation Exponent ranges from 2 => 5, dependant upon Vuggy / Total Porosity Ratio

Laboratory data interpreted within context of pore geometry illustrations

Carbonate NMR

E. Toumelin, C. Torres-Verdín, S. Chen, and D. M. Fischer

Reconciling NMR Measurements and Numerical Simulations: Temperature & Diffusive Coupling

E. Toumelin, C. Torres-Verdín and S. Chen

Modeling of Multiple Echo-Time NMR Measurements for Complex Pore Geometries

J. O. Parra, C. L. Hackert, H.A. Collier and M. Bennet

NMR and Acoustic Signatures in Vuggy Carbonate

C. L. Hackert and J. O. Parra

Simulating NMR Magnetization Diffusion in a Real Carbonate Pore System

Vuggy Porosity Techniques

Wang & Lucia's classic review, including theory and application to actual data

- Estimation of Vuggy Porosity Fraction
  - Secondary Porosity Index (Generalized, Sonic vs Total Porosity)
  - Nurmi's Model (Originally developed for oomoldic grainstones in the Smackover)
  - Quadratic Model (Combination of SPI & Nurmi)
  - Power Law (Combination of SPI & Nurmi)
- Estimation of Cementation Exponent
  - Lucia Model
  - Nugent Model
  - Asquith Model

Pickett Plot

PP linked to grids of BVW=Constant as lead-in to NMR

G R Pickett "A Review of Techniques for Water Saturation from Logs

Roberto Aguilera , Incorporating … and Winland r35 values on Pickett plots

www.spec2000.net/index.htm

www.kgs.ku.edu/Gemini

TRAINING MATERIAL: MANUALS NOTES AND INFORMATIONS

1) ACP-PRESENTATION-GeoNeurale

The sequence of the presentation Slides during the course

11 PDF Files , about 2800 Slides.

2) ACP-MANUAL-GeoNeurale

The full Manual containing the course theory and reference topics.

16 PDF Files , about 3500 Slides.

3) ACP-EXERCISES-GeoNeurale

The Exercises and explainations of the practical applications.

5 PDF Files , about 250 Slides

4) ACP-FRAC_FLOWCHART-GeoNeurale

Useful illustration for Fracture Classification and Interpretations

2 PDF Files

5) ACP-SOFTWARE-GeoNeurale

Excel Spreadsheet Programs for quick calculations of petrophysical properties.

16 Microsoft Excel Files

6) ACP-Appendix-GeoNeurale

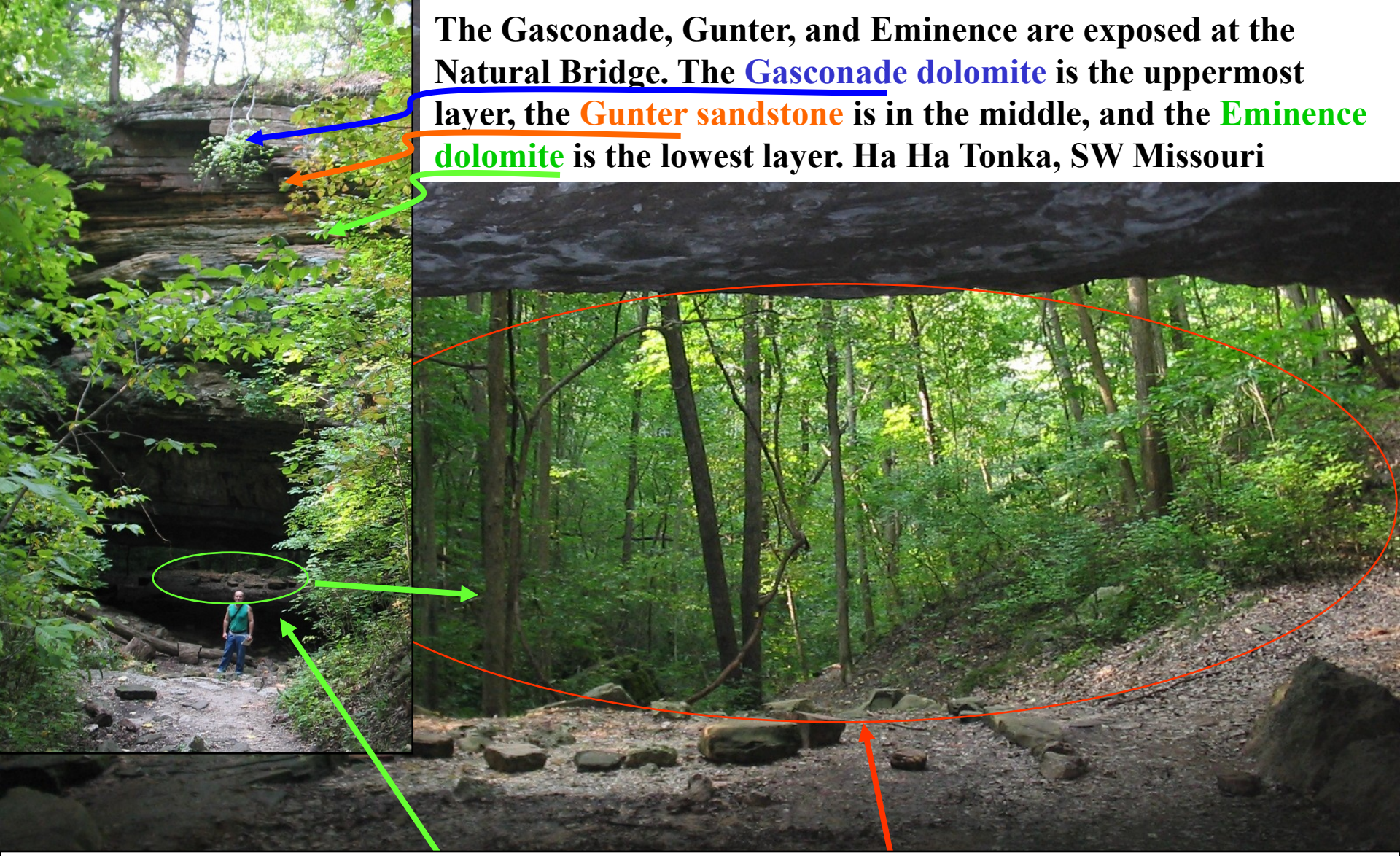
Reference Papers, useful literature and case studies.

7 PDF Files.

7) ACP-Video-GeoNeurale

A video illustrating various imaging features of borehole imaging interpretation. 1 Video File

We suggest to have Acrobat Reader already installed in your laptop. You will need no administration password to open the files. We also suggest to have Microsoft Excel already installed so that you will be able to run your spreadsheet programs if you wish to do it during the course. If you don t have Excel you can download any freeware software like OpenOffice of the Sun Microsystems platform: www.openoffice.org A video program will also be useful for the video clip. All terms are keyword searchable.



The Gasconade, Gunter, and Eminence are exposed at the Natural Bridge. The Gasconade dolomite is the uppermost layer, the Gunter sandstone is in the middle, and the Eminence dolomite is the lowest layer. Ha Ha Tonka, SW Missouri

- **Sandstone** - ***Diagenesis*** typically limited to ***compaction and cementation***
- **Carbonate** - ***Diagenesis*** includes ***cementation, compaction, dolomitization, and dissolution***

The Natural Bridge (from distance, see the light in the background) and then up close, looking 'under the bridge' into the sink hole beyond

R. E. (Gene) Ballay's 30 years in petrophysics include research and operations assignments in Houston (Shell Research), Texas; Anchorage (ARCO), Alaska; Dallas (Arco Research), Texas; Jakarta (Huffco), Indonesia; Bakersfield (ARCO), California; and Dhahran, Saudi Arabia. His carbonate experience ranges from individual Niagaran reefs in Michigan to the Lisburne in Alaska to Ghawar, Saudi Arabia (the largest oilfield in the world).

He holds a PhD in Theoretical Physics with double minors in Electrical Engineering & Mathematics, has taught physics in two universities, mentored Nationals in Indonesia and Saudi Arabia, published numerous technical articles and been designated co-inventor on both American and European patents.

At retirement from the Saudi Arabian Oil Company he was the senior technical petrophysicist in the Reservoir Description Division and had represented petrophysics in three multi-discipline teams bringing on-line three (one clastic, two carbonate) multi-billion barrel increments. Subsequent to retirement from Saudi Aramco he established Robert E Ballay LLC, which provides physics - petrophysics consulting services.

Registration Details

•Course fees: 2950 Euro

•Registration deadline : 25 March 2012

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 agreed, 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

Bank Information: Genossenschaftsbank EG Muenchen

Bank Account N. 519618 BIC – Code : GENODEF 1M07

BLZ 701 694 64 IBAN : DE19 7016 9464 0000 5196 18

www.GeoNeurale.com

Please indicate your name and the purpose: “ Advanced Carbonate Petrophysics ".

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 annullment (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

ADVANCED CARBONATE PETROPHYSICS

Munich, 16 – 20 April 2012

Course Fee: 2950 Euro plus 19% WAT

Name:

Company:

Address:

Job Title:

Phone:

Fax:

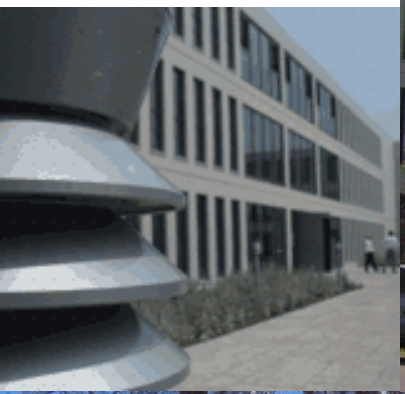
Email:

SIGNATURE: _____

Munich

and the

Gate

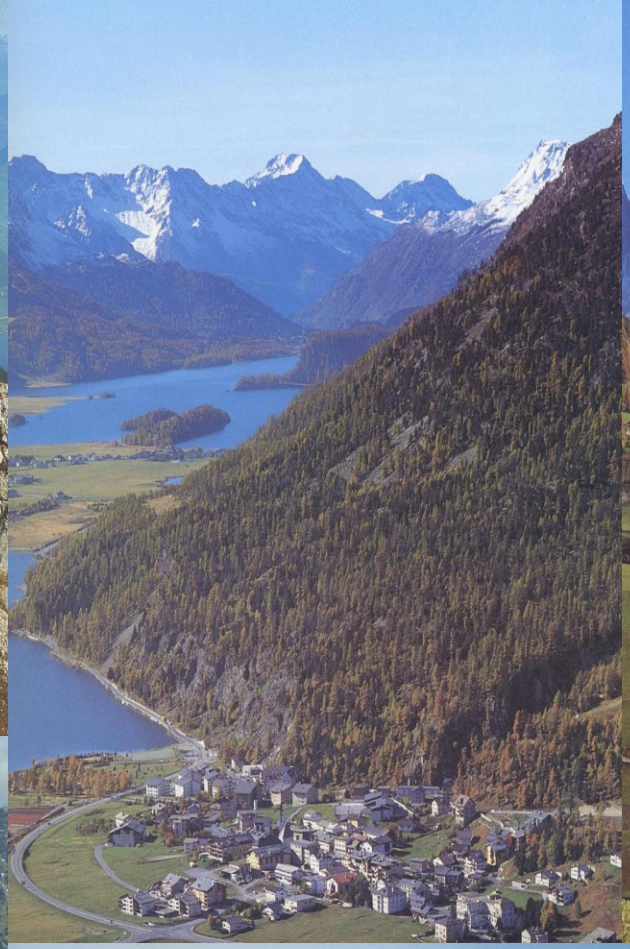


•Munich, the capital of Bavaria with a population of 1.5 million is the third largest city in Germany. Headquarters to industrial giants like BMW, Siemens, MAN, EADS, Eurocopter, Infineon and Epcos it also hosts two of the most important universities in Germany: the "Technische Universitaet Muenchen" and the " Ludwig Maximilian Universitaet" , with international research centers such as the "Max Plank Institut" and the " Fraunhofer Gesellschaft" .

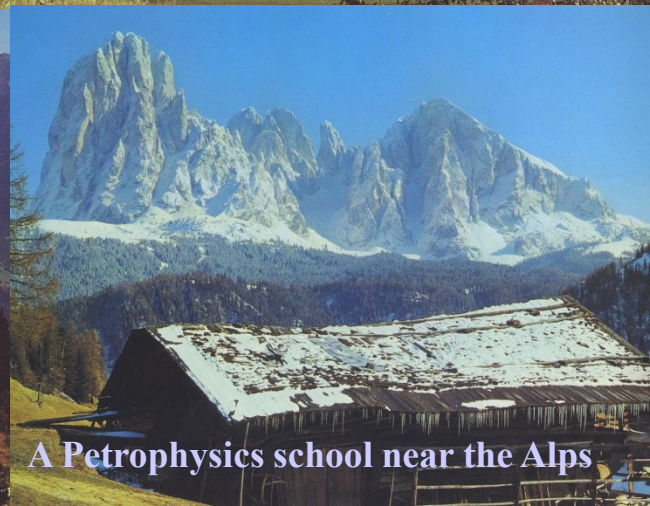
•Geologically important is the presence of carbonate formations in the subsoil that are very favourable for low enthalpy geothermal exploitation, which requires the solution of complex petrophysical problems, similar to Oil Exploration.

•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 Petrophysics school near the Alps