

Logical, Systematic, Complete

Carbonate and Fracture Petrophysics - Course Contents

DAY1

INTRODUCTION

Course Objectives
Reservoir Schematics
Borehole Environment
Logging Tools Summary
Aquifer, Transition Zone Hydrocarbon Zone
Petrophysical Objectives and C&F Failure Points

PHYSICAL CHARACTER OF CARBONATES & FRACTURES

Contrasting Geological Origins
Clastic vs. Carbonate Physical Differences
[Micropractical](#)
Dominant Minerals
Clastics: Clay Minerals & Total Porosity
Carbonates: Pore Geometry and Total Porosity
Clastic vs. Carbonate Diagenesis
[Video](#)
Effect on Pore Geometry, Porosity vs. Permeability, Resistivity
Fracture Key Physical Properties & Controls
Stress, Orientation, Spacing(D), Width(E) & Mean length(L)
Carbonates & Wettability
Is your reservoir non-strongly water wet? Check list
Fracture-Matrix Interaction
[AM Practical Session: Physical Characteristics. MS Excel](#)

LUNCH [Technical video, Slide show](#)

Carbonate Classification Systems vs. Petrophysical Requirements
Lucia's "Rock Fabric" approach, its derivatives and application
In Defense of Lucia!
[Video](#)
Fracture Reservoir Classifications
Fooled By Fractures
Why Classification Systems are Crucial to C&F Petrophysics
[PM Practical Session: Classification Systems Application. MS Excel](#)

DAY2

Morning: Daily Recap, Questions, Debate

IMPACT OF CHARACTER ON MEASUREMENT AND EVALUATION

Cheap Logs and Failure Points
Impact on Porosity, dolomitisation, anhydrite
[Micropractical](#)
What is Carbonate "Effective" Porosity?
Porosity Measurements Compared: Reference?
Fracture Porosity Calculations
Carbonates Impact on Saturation
Swrt, Swnmr, Swcr, Swpc, Swsig
Carbonates Impact on Permeability
Impact on kpor, knmr, kcts
Carbonates Impact on Netpay Thickness
Carbonates Impact on Contacts & FWL
[Micropractical](#)

MISLEADING DATA

Fracture Well Tests
Access the Matrix!
Biased Routine Core Analysis

Cheap Logs
Missing Clay and Cap BW
Tight Carbonates and Common Mineral Variations
[Video](#)
Low Rt, High Rt
Viscous Oils Shorten NMR T2
[Micropractical](#)
Conventional Log Analysis
Do You Understand Cheap Logs in Carbonates?
C&F Major Petrophysical Difficulties
[AM Practical Session: MSEXcel](#)

LUNCH [Technical Video / Slide show](#)

ACHIEVING COST-EFFECTIVE DATA ACQUISITION

Characteristics of C&F Cost-Effective Data
Adopt a problem Solving Philosophy
Achieving Optimal Data Acquisition
The Principles & Application to C&F Reservoirs of:
- Mud properties
- Drilling Data
- Mudlog data
- SP
- Rxo
- Miniperms
- Whole core
- Sonic Density Neutron: Using dtfa variations
- Water zones
- Analog data selection
- Purpose designed well tests
- [PetroDB](#)
- HFU/FZI
- Magnetic Resonance (NMR) logs
- Dielectric logs
- Pulsed neutron (Sigma) logs etc

POWERFUL DATA!

You must come to the course for this LONG LIST of Carbonate Powerful Data and How To Use It!
Includes: Drilling Fracture Check; Test Design & Analysis; Image Logs; NMR; Video; NMR Sw-ht; Using NMR Por bins; Acquire BFV!; Modern sonics; What we need from the Sonic Scanner; Pulsed Neutron; Micropractical; Dielectric logs; 3D Seismic; Kwell test and HCIP; etc

[PM Practical Session: Impact on Measurements & What To Do. MSEXcel](#)

DAY3

[Morning: Daily Recap, Questions, Debate](#)

Relative Contribution of Different data types: Clastics vs. C&F
The Key Questions Your Data Acquisition Program Must Answer
Examples of Powerful Carbonate Data Sets
Carbonate Logging Program

ACHIEVING FIT-FOR-PURPOSE QUICK-LOOK RESULTS

The basic problem for the Clastics petrophysicist
Reminder: the reservoir, borehole, invasion, symbols, tools, principles, curves, petrophysical function
QL Porosity density-neutron
QL Porosity, sonic
QL Reconciling nuclear and sonic porosities, dtfa
[Micropractical](#)
QL Common matrix problems
QL Vugs
QL Impact of vugs and fractures on m
QL Variable cementation exponent (m) and prediction(s)
[Video](#)
QL Ro prediction
QL Is Sw100zn ma related to dtfa?
QL Saturation exponent (n)

[AM Practical Session: Achieving Cost Effective Data Acquisition. MS Excel](#)

LUNCH [Technical video, Slide show](#)

QL Swrr (resistivity ratio)
QL Logical reconciliation of Por, Sw
QL HC detection, qualitative but reliable
[Micropractical](#)
QL Fracture ID
QL Carbonates key points - recap

PM Practical Session: A Carbonate Log Analysis. MSEXcel

DAY4

Morning: Daily Recap, Questions, Debate

FULL CARBONATE MATRIX EVALUATION

Key elements and Logical Information Flow: Pore geometry-Fluid distribution-Fluid flow
Principles to remember
What are GR, SP, DN separation telling you and how to use them
Achieving accurate matrix properties and porosity in tight carbonates
Carbonate m values - measure, understand, predict!
More about m and vugs vs. fractures
How to recognize pore geometry (m) variations from Cheap logs/Modern hi-tech logs/NMR/Cores/Special core/Water zones/Pulsed neutron logs/Carbon oxygen logs/Forgotten logs
[Micropractical](#)
Capillary Pressure: What is it? How it controls Sh, Cap. equilibrium in carbonates, Lab measures, Reservoir measures, Use in carbonate matrix evaluation
QL Swpc (yes, quick-look cap.press Sw's are possible!)
Swpc: Process summary
[Micropractical](#)
More about Rock types
Carbonate Swcore
AM Practical Session: Achieving Fit For Purpose QL Results

LUNCH [Technical Video / Slide show](#)

NMR - the wasted resource
Pore Throat Size Distribution vs. NMR. It's use in carbonate matrix evaluation
Using NMR porosity bins quickly and effectively
Movie
Using Coates Bound Fluid concept in C&F's - reasons to be cheerful
NMR permeability
What is an acoustic Stoneley wave and is it useful?
WFTs (MDTS etc) FWLs
Movie
Carbonate matrix evaluation Key Points
Integrating matrix results in the C&F geo.model
A Consistent Geological Model

FRACTURE EVALUATION AND FRACTURE MATRIX INTERACTION

Fracture evaluation - Process
Fracture porosity and permeability equations
Fracture finding data - Ranked
PM Practical Session: Achieving Fit For Purpose QL Results, contd

DAYS

Morning: Daily Recap, Questions, Debate
Fractures Modern Techniques
More about Acoustic Stoneley waves
Acoustic shear wave splitting - what is it and how to use it
Movie
[Micropractical](#)
Image logs: resistivity, acoustic. Application to C&F evaluations
Estimating Fracture-matrix interaction
Fracture surprises!
Key questions for the Petrophysicist and geo.model
Fractures: Summary, Key Questions, Key Recommendations

Major Practical Session: How to use Carbonate Capillary Data: Look up tables, Sw-Ht functions, RCA, resistivity and geo.model integration

LUNCH Technical Video / Slide show

Continue Cap.Press Practical Session

RECAP AND RECOMMENDATIONS

**10 Common Systematic Errors which will Ruin your C&F geo.model
C&F Key Recommendations for the Petrophysicist, Management and User of Petrophysical Results**

Record of Daily Recaps

Twice Daily Practical work sessions

Each morning - Your considered questions and debate

100+ Critical Equations in MSExcel format

Abbreviations

Key C&F technical papers

References

Charts

Being able to recognize, understand and treat the critical issues which threaten the C&F petrophysicist via the structured process detailed in this course, will give you fresh confidence and enthusiasm for your work as a C&F geoscientist.

If you love petrophysics you will love this course!

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