

RESERVOIR QUALITY STUDY OF CARBONATES ROCKS
2 days course in Oybin, Germany
16th and 17th of January 2019



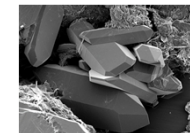
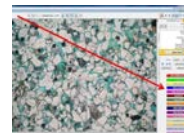
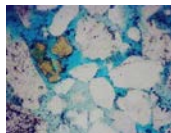
Course Agenda

16th and 17th of January 2019 in Oybin, Germany

This short course is aimed at giving geologists a detailed introduction to the study of carbonate reservoirs utilizing oil industry work methodologies. The course is structured in oral and practical sessions, with PPT presentations, didactic material/exercises on petrography & reservoir quality of carbonate rock-types through polarizing microscopy & stereo-microscopy. Examples of SEM and CL analyses are also shown to integrate the different methodologies utilized for diagenetic/reservoir quality correlation studies. Examples from carbonate oil reservoirs under exploration are also illustrated.

First Day

Mineralogy of carbonate sediments, Components of limestones, Table of taxa vs. mineralogy, carbonate matrix and pseudo- matrix, classification of limestones, Sedimentary structures of limestones, Carbonate depositional environments and facies, Exercises. Pelagic limestones, re- sedimented deep-water limestones. Limestone cycles, time units (relative & absolute dating of carbonates), correlations, response of carbonates to sea level changes, calcite vs. aragonite seas in the geological record, Carbonate diagenesis and reservoir quality, discussion of marine cements, meteoric diagenesis, vadose and phreatic zones, calcite spar and its origin, dolomitization of calcite, types of calcite cements. Dolomite textures, xenotopic vs. idiotopic dolomites, saddle dolomites, hydrothermal dolomites structure and stable isotope signature, dolomite texture vs. petrophysics, dolomitization models (Sabkha/evaporation, mixing zone, seepage reflux, burial), limestone vs. dolostone rocks in terms of poro-perm characteristics of the analysed rocks. Exercises. Carbonate diagenetic stages



Second Day

Silicification of calcite, SEM analysis of carbonate phases, chemistry of minerals through EDX traces, CL analysis (oxidizing vs. reducing environments) & stable-isotope geochemistry. Porosity in carbonate rocks, dissolution of carbonates and associated processes, petrophysics by carbonate rocks, porosity preservation in carbonate rocks. Exercises on visual estimation of carbonate porosity by TS photomicrographs on core and cuttings samples. Comparing visually estimated porosity vs. point count and discussing about the potential discrepancy of point count porosity vs. CA data in carbonate samples (e.g. heterogeneity of carbonate reservoirs). Microporosity definition & distribution. Reservoir quality of carbonate rocks, Reservoir quality and source potential of each of the analysed depositional environments. Main controls on reservoir quality. Exercises on diagenesis and predicted reservoir quality of cuttings by petrographic/petrophysical data. Relation between rock fabric and wireline log responses, carbonate porosity evolution vs. diagenesis and geological time. Exercises. Carbonate reservoir models (e.g. geological reef model), interpretation of diagenesis, mineralization and reservoir quality, porosity vs. depth, regional carbonate petrography vs. stratigraphy. Rock typing of carbonate sediments in uncored intervals. Definition of rock typing, Rock Typing Analogue Principle, rock typing cataloguing and classification schemes. Exercises. Fractured carbonate reservoirs: definition, fracture classification, fracture styles, synkinematic and postkinematic fracture-occluding cements, fracture description by petrographic analysis (geometry, opening, timing), fracture connectivity, diagenesis and fracturing and reservoir quality.

e-training material for all the attendees & **Training certificates**.

Field Trips 16th and 17th of January 2019 in Oybin, Germany

Day 1



Upper Turonian Sandstone
Kelchstein
90 minutes walk
guided tour

Day 2



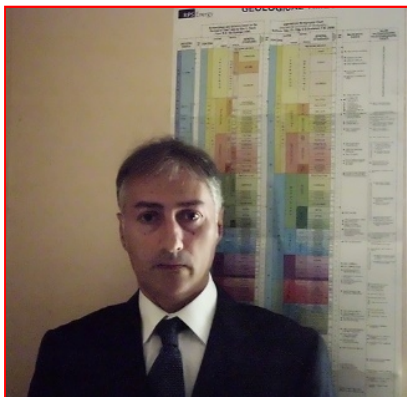
Upper Turonian Sandstone
Rosenstein
90 minutes walk
guided tour

Please note: There are unfortunately no carbonate outcrops in the closer vicinity.

Instructor`s Profile

16th and 17th of January 2019 in Oybin, Germany

Dr. Salvatore Morano
Senior Petrography Advisor at Morano Petrography
Napoli, Campania, Italy
www.moranopetrography.com



An experienced sedimentary petrographer, specialized in the assessment of reservoir potential of siliciclastic and carbonate oil and gas reservoirs at well, field and regional scales. Author and co-author of multiple regional projects from reservoirs in East/West Africa, South America, Asia, Australia, New Zealand, Middle East and Europe.

Author of many academic papers and contributor of oil industry events (posters, abstracts and presentations). Mentoring and training of oil corporation staff in sedimentary petrography topics. Expertise in TS analysis of core samples & cuttings tied to wireline logs, as well as, Rock typing, SEM, CL, stable isotopes & epifluorescence microscopy of gas shale samples.

Oil industry job positions did include:
ALS Petrophysics (UK), Core Laboratories (UK) & Corex (UK);

Academic research roles:

Post-doc at the University of Burgundy (France) & Libre Universite' de Bruxelles (Belgium), and PhD research position at the University of Naples "Federico II".

Key Information

- Dates:** 16th and 17th of January 2019 (2 Days)
- Location:** Oybin, Germany (next airport Dresden)
- For whom:** oil industry geologists/petrophysicists/geophysicists/reservoir/
engineers/drillers and post graduate students, useful for understanding of
sandstone and carbonate reservoirs types.
- Participants:** max. 15 persons
- Contact:** ok@klarenco.com
- Course Fee:** Option 1
(all excl. VAT) EUR 900 / p.p., including
2 nights at the Haus Hubertus, including breakfast and dinner
<http://www.naturparkhotel-oybin.de/haushubertus.html>
- Shuttle to Airport Dresden and back
Two guided tours to Upper Turonian Sandstone outcrops
- Option 2
EUR 700 / p.p.
without accommodation, shuttle and field trips
- For Eurogeologists:** Option 1: EUR 760 / p.p.
Option 2: EUR 560 / p.p.
- Cost for each field trip:** EUR 15