CET Short Course

Centre for EXPLORATION TARGETING

Petrology Sedimentary Rocks: Chemical and mechanical processes at the scale of grains and pores

This 1-day short course examines the current state of knowledge about the post-depositional processes that take place in sediments within the broad zone of the subsurface that lies between the depositional surface and the on-set of metamorphism (c. 250-300° C). Broadly known as diagenesis, these processes are responsible for the conversion of sediments into sedimentary rocks through sediment/fluid interactions and are the prime control on the evolution of sedimentary rock properties in burial. The concepts of diagenesis find use in prediction of rock properties in many practical endeavors such as exploration and production of oil and gas (conventional and unconventional), subsurface sequestration of waste materials (e.g., CO2), and mineral exploration.

Duration: 1 Day - From 9.30 am to 4.30 pm

Location: 3rd Year Lab (room 111) - Robert Street Building, first floor
The University of Western Australia, Crawley 6009 - Link to map

Cost: CET Members AU$ 210 + GST - Non-Members AU$ 300 + GST
Students: Free

Registration: For registration and payment information please visit our website: www.cet.edu.au - All participants need to register - Places are limited to 30 participants

Certificate of Attendance: Upon completion, participants will receive a certificate of attendance

7th September 2022

THE UNIVERSITY OF WESTERN AUSTRALIA

Course Leaders

Kitty L. Milliken is a Senior Research Scientist at the Bureau of Economic Geology, University of Texas at Austin. She received a B.A. in geology (1975) from Vanderbilt University and M.A. (1977) and Ph.D. (1985) degrees from UT Austin. Her research focuses on diagenesis of siliciclastic sediments and the evolution of rock properties in the subsurface. She has authored and co-authored over 120 peer-reviewed papers and also digital resources for teaching sedimentary petrography. Her current work is focused on the application of electron microbeam imaging and analysis to interpret chemical and mechanical histories of mudrocks.

Claudio Delle Piane is a Senior Research Scientist at the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia, where he leads the Geosciences Team. He is a geologist with background in structural geology and rock deformation; his research interests lie in the qualification and quantification of microstructure and its influence on the geomechanical, petrophysical and elastic properties of rocks.His technical expertise is in the experimental evaluation of rock properties and microstructures by means of multiphysics laboratory measurements combined with analytical methods including optical and electron microscopy, X-ray and neutron diffraction and cathodoluminescence. These techniques have been used to gain better understanding of rock/fluid interactions, elastic anisotropy, stress/permeability evolution, frequency dependent seismic attenuation in rocks and fault reactivation.

Schedule

TIME	TOPIC
Morning	
9:30-10:00	**Lecture 1**: The nature and realm of diagenesis
10:00-10:45	**Lecture 2**: Grain assemblages: the starting materials of diagenesis
10:45-11:15	**Microscope activity 1:** A look at grain assemblages in sands and muds
11:15-11:30	**Break and discussion period**
11:30-12:00	**Lecture 3:** Mechanical diagenesis: Compaction and brittle deformation
12:00-13:00	**Lunch**
Afternoon	
13:00-13:30	**Lecture 4**: Chemical diagenesis at lower temperature: Grain dissolution and cementation
13:30-14:00	**Microscope activity 3**: Cement examples
14:00-14:45	**Lecture 5:** Chemical diagenesis at higher temperature: Cementation and grain replacement
14:45-15:15	**Examples of diagenetic investigations:** i) Quartz cementation, porosity reduction and elastic properties in the context of CO2 sequestration; ii) thermal maturation effects on the electrical properties of organic rich mudstones in the context of mineral and hydrocarbon exploration
15:15-15:30	**Break and discussion period**
15:30-16:00	**Lecture 6**: Special considerations for mudrocks (shales): Organic matter diagenesis and porosity evolution
16:00-16:30	**Microscope activity 4:** Further examination of mudrocks

For additional information on this, or any of our other CET Short Courses, contact CET Administration at **training-cet@uwa.edu.au**

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