CA Members

Africa Oil
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Rhino Resources
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Southwestern
Statoil
Suncor
Total
Tullow Oil
Whiting Oil & Gas
Winchester Energy
Wintershall
YPF

Access Scientific Knowledge

Examples of Project Reports Available to All Members

- Upkeep from Shale: A Mechanistic Study Phase I & Phase II
- Shale Gas Production Analysis
- South American Shale Gas and Shale Oil Plays: Phase I & Phase II
- China Shale Gas and Shale Oil Plays: Phase I & Phase II
- Energy & Geoscience Institute
  - South America Shale Gas and Shale Oil Plays: Phase 1
    - Regional Geological Characteristics and Play Modelling
  - China Shale Gas and Shale Oil Plays: Phase 1
    - Reports: Phase 1 & Phase 2

- Liquids from Shales: A Mechanistic Study Phase I & Phase II
- Niobrara Energetic Description & Dynamics: Phase 2
  - Reports: Phase 1 & Phase 2

- Energy & Geoscience Institute
  - North Atlantic Shale Gas
  - Shale Gas Production Analysis
  - Ian Walton, Ph.D.
  - Reports: Phase 1 & Phase 2

- Energy & Geoscience Institute
  - Principal Investigator: Dr. Milind Deo
  - Liquids from Shales: A Mechanistic Study Phase I & Phase II
  - Niobrara Energetic Description & Dynamics: Phase 2
  - Reports: Phase 1 & Phase 2

- Energy & Geoscience Institute
  - Michal Nemčok, Ph.D. & Júlia Kotulová, Ph.D.
  - Petroleum Systems of Sheared Margins
  - Evaluation of the Evolution, Development and Prospectivity of Basins Along the Sheared Segments of Continental Margins with Special Emphasis on the Equatorial Atlantic

- Energy & Geoscience Institute
  - CIRCUM-INDIA BASINS PROJECT
    - PHASE 1 - EAST INDIAN MARGIN
    - PHASE 2 - WEST INDIAN MARGIN
    - ArcGIS Integrated Stratigraphy, Structure & Paleogeography
    - Principal Investigators:
      - Dr. Sudeep Kanungo & Dr. Rasoul Sorkhabi
      - ArcGIS: Christopher Kesler

- Energy & Geoscience Institute
  - Atlantic Margins Basins Project:
    - A Joint EGI-Industry Evaluation of the Evolution, Development and Prospectivity of Basins along the Eastern and Western Atlantic Continental Margins

- Energy & Geoscience Institute
  - Morocco-Nova Scotia-Georges Bank and Evolution of the Central Atlantic Basin
  - Chronostratigraphy and Paleoenvironments of the North Coronie 01 and SON-1 Wells, Offshore Suriname
  - Dr. Emil Platon, Dr. Paul Sikora, Dr. Anthony Gary

- Energy & Geoscience Institute
  - Tectonic development model and hydrocarbon potential of the Guyana-Surinamese basin

- Energy & Geoscience Institute
  - Development of a Predictive Resource Model for Shale Gas Systems (SGS)
    - Phase 1 – GIS Catalog of Potential and Existing Shale Gas Plays in U.S. and Canada

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EGI: the science to inspire new ideas to explore for and produce the Earth’s energy resources.

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**Competencies**

- Structure & Tectonics
- Petroleum Geochemistry
- Basin Modeling
- Petroleum Systems Analysis
- GIS & Image Analysis
- Geomechanics Testing
- Shale Characterization
- Biostratigraphy & Chronostratigraphy
- Reservoir Engineering & Simulation
- Production Data Analysis
- Absolute & Relative Permeability
- Tracer Technology

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Improved Research Services are expanding our knowledge base and EGI expertise, offering unique access to unparalleled source rock & high-resolution reservoir characterization technology, petrophysical analysis & interpretation & high-pressure equipment to evaluate tight formations.

**PETROLEUM GEOCHEMISTRY**

**HAWK™ Hydrocarbon Analyzer with Kinetics**

The HAWK™ Analyzer provides S1, S2, S3, and TOC data as well as Tmax information. The specially designed instrument has better free petroleum (S1) sensitivity for improved identification of pay in resource plays and adds a new level of sophistication for specialized analysis and integrated interpretation.

**Hydrous Pyrolysis**

**Parr Pressure Vessels**

Provides source rock kinetic information while evolving fluid and gas for characterization by GC, GC-MS, and GC-IRMS. Analysis by hydrous pyrolysis and evaluation of pyrolysates enables careful calibration of maturity indicators, fluid types and generation-expulsion relationships.

**X-ray Diffraction (XRD)**

**Mapping**

bulk analysis

D8 ADVANCE Bruker XRD

• Rapid analysis of crystalline phases/material.
• Advanced characterization of minerals including clay species within rocks.
• Quantitative analysis of minerals, including clay species.
• Assessment of brittle/ductile behavior of samples.
• Lithofacies characterization.

**Argon-ion Milling**

• Atomic-scale polishing of samples using high-powered argon ions.
• Shear-force-free polishing allowing for an artifact-free surface.
• Artifact-free polished surface allowing accurate high-resolution (SEM) imaging and assessment of shales.
• Preservation of shale features down to the nano-scale.

**X-ray Fluorescence (XRF)**

**Mapping**

Microscope scale

Eagle III Microspot XRF

• Advanced (non-destructive) elemental characterization of rock fabrics and textures.
• Large’ sample characterization on centimeter-scale samples (i.e., core).
• Assessment of brittle/ductile zones within samples.
• Qualitative analysis of elemental signatures within samples.
• Lithofacies characterization.

**Scanning Electron Microscopy (SEM)**

• Electron imaging including backscatter (BSE) and secondary electron (SE) analysis.
• Energy dispersive x-ray (EDS/EDX) analysis allowing point and mapping of samples.
• Accurate fracture and porosity characterization.
• Assessment of mineralogy and mineralogical associations.
• Organic matter characterization.

**High Resolution Composite Mapping (MARSTM)**

• Automated acquisition of high resolution SEM images from ‘large’ areas across samples.
• Data is exported as interactive, composite image datasets.
• Correlation of features (i.e., sedimentological cyclicity).
• Allows a larger, more representative area of a sample to be evaluated and correlated with complimentary techniques.

**Focused ion Beam SEM (FIB-SEM)**

• Dual-beam microscopy allowing focused ion beam (FIB) milling and SEM imaging.
• Automated sequential milling and imaging of samples allows reconstruction of 3D volumes.
• Three-dimensional cube modeling allowing shale space to be accurately assessed.
• Precise assessment of nano-scale rock properties (i.e., pore/ permeability characterization).

**Scanning Transmission Electron Microscope (STEM)**

• Ultra-high-resolution imaging and ultra-sensitive elemental mapping (EDS) for chemical analysis.
• FIB-SEM slicing used as preparation method.
• Precise nano-scale assessment of rock properties (i.e., pore/ permeability characterization).
• Nano-scale chemical mapping (EDS) of samples.

**GEOMECHANICS**

**Triaxial Rock Mechanics Loading Frame**

The Schlumberger Rock Mechanics Triaxial Test System is a computer controlled system designed to simulate in-situ stress and strain for the determination of physical properties of geotechnical core samples. The system simulates in-situ conditions and characterizes a test sample’s behavior under those conditions. Axial load, horizontal stress (confining pressure), and pore pressure can be precisely controlled. In-vessel instrumentation, directly in contact with the rock sample, accurately measures the sample’s response to testing variables.

**MINERALOGICAL**

**Electron Microscopy (SEM)**

Microscope scale

Zeiss MinScan

Micrometer-to nano-scale

Zeiss Axio Scope A1

• Petrographical assessment of samples providing quantitative analysis of minerals and organic material.
• Characterization of rock fabrics, textures and fractures.
• Lithofacies classification.
• Assessment of brittle/ductile behavior of samples.
• Depositional environment characterization and evolution.

**Mineralogical Mapping**

• Automated petrological analysis of samples providing quantitative analysis of minerals.
• Advanced characterization of rock fabrics, textures and fractures.

**Micrometer-to nano-scale**

**Electron Microscope (SEM)**

FEI Helios NanoLab 650

FEI Quanta 600 FEG SEM

Dual Beam FIB, FEI Helios NanoLab 650

Dual Beam SEM

Quantitative analysis of minerals, including clay species.

Evaluation of pyrolysates enables careful calibration of maturity indicators, fluid types and generation-expulsion relationships.

**Electron Microscopy (STEM)**

Nano- to atomic-scale

JEOL-2800 Transmission Electron Microscope

MinScan

Parr Pressure Vessels

• Precise nano-scale assessment of rock properties (i.e., pore/ permeability characterization).

**PETROPHYSICS**

**High Precision Petrophysical Characterization**

EGI is using high-resolution high-pressure equipment to evaluate the porosity, saturations, and relative permeabilities of tight formations. Called the "EGI Shale Interrogator," the apparatus is capable of high pressure and high temperature studies that provide accurate measurements useful for petrophysical model calibrations. High precision, low volume pumping capability allows this advanced instrument to provide steady-state data previously not readily available. Finally, the capability to conduct evaluations of liquids-producing formations makes this service unique in the world.
The global experience, expertise, and industry-relevant geoscience research conducted by EGI researchers and engineers are the fundamental building blocks for the knowledge, design, and delivery of Field & Short Courses offered to EGI members. Course participants are taught by thought-leaders in the energy sector who bring an independent perspective to the major challenges facing the industry today.

**PETROLEUM EXPLORATION & DEVELOPMENT**
- Thrustbelts
- Rifts & Passive Margins
- Strike-slip Settings & Transform Margins
- Exploration for Unconventional Oil & Gas
- Geologic Characterization & Production of Shale Plays
- Introduction to Petroleum Exploration & Production
- Chronostratigraphic Applications of the Composite Standard DB for Exploration

**PETROLEUM SYSTEMS & GEOCHEMISTRY**
- Introduction to Petroleum Systems Analysis
- Techniques in Play Fairway Analysis
- Petroleum Geochemistry & Basin Evaluation

**ENGINEERING & PRODUCTION**
- Introduction to Geomechanics in Low Mobility Plays
- Petroleum Geomechanics: Fundamentals & Applications
- Shale Gas Resource Development
- Introduction to Reservoir Simulation

**DEPOSITIONAL SYSTEMS & STRATIGRAPHY**
- Rocky Mountain Depositional Systems (Conventional & Tight)
- Utah Field Course
- Carbonate Sedimentology & Sequence Stratigraphy

**MASTERS OF SCIENCE IN PETROLEUM ENGINEERING**
EGI, in collaboration with the Department of Chemical Engineering at the University of Utah, launched a Masters of Science degree program in Petroleum Engineering in the 2013 fall semester. Understanding that one of the most significant challenges facing humanity is the depletion of natural resources we recognize the valuable contributions to be made by Petroleum Engineers to meet mankind’s energy needs while safeguarding the environment. Equally satisfying, petroleum engineers also gain responsibility faster and supervise important projects sooner than those in other engineering fields. Learn more at [http://www.che.utah.edu/pe/](http://www.che.utah.edu/pe/).