EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

TRAINING COURSES

Geologic Characterization & Production Properties of Shale Plays

Available to EGI Corporate Associate Members

Instructor:

Professor Shu Jiang
Research Associate Professor
and China Program Coordinator

Course Structure
Lectures, presentation & materials

Participants
10–25

Duration
3 days

Location
EGI's Salt Lake facilities or Member's location

OVERVIEW

This course is an integrated multi-scale and multi-discipline course covering geology, geophysics, geochemistry, petroleum systems, petrophysics, geomechanics, drilling, reservoir engineering, and production engineering. It begins with an introduction to shale geology source rock characteristics, and follows with shale reservoir characterization, sweet spot prediction, and production characteristics. The course focuses on and compares shales widely deposited in the U.S. and China in marine, transitional, and lacustrine settings spanning in age from Pre-Cambrian to Quaternary.

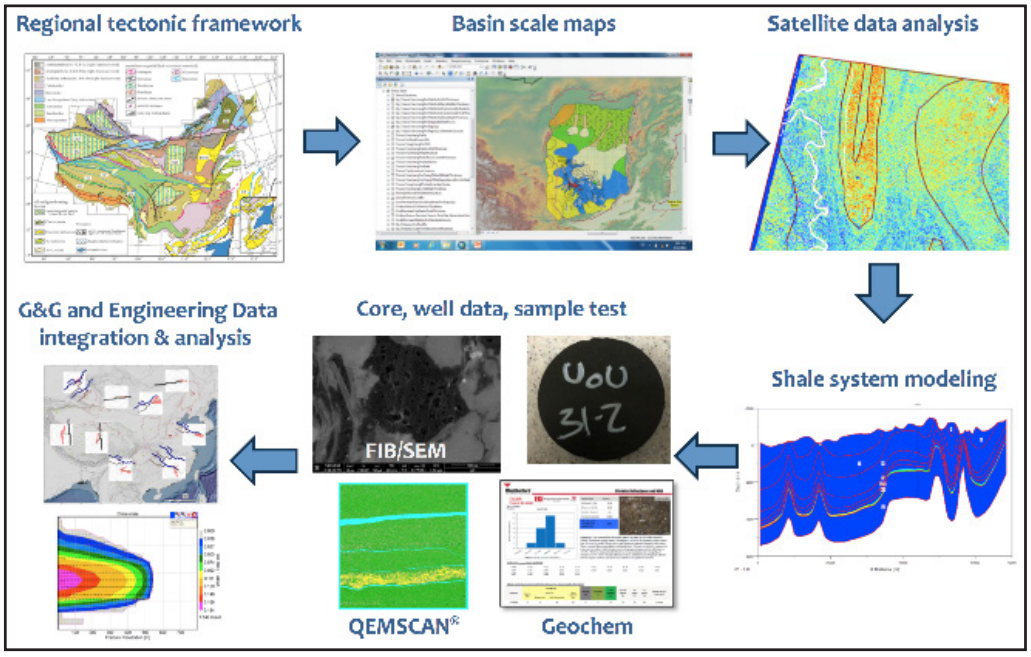

Figure 1 Integrated Multi-scale & Multi-discipline Short Course.

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Industrial activities and our ongoing research indicate that the successful U.S. shale lessons can not be simply copied for other shales in the world since each shale is unique in terms of geologic setting and rock properties. Notably, the geology of many shales in the world is more complex than U.S. shales that have been successfully exploited. This course elaborates on the geology and unique properties of typical producing, emerging, and potential hydrocarbon-bearing shales in U.S. and China.

The key geologic variables include the regional tectonic and depositional settings, the geologic history and the rock properties of heterogeneous lithofacies, variable geochemistry and mineralogy, as well as the presence of natural fractures, reservoir pressures, and geotechnical properties and stress fields. The geology determines the shale properties, hydrocarbon accumulation, and production properties of each shale, as well as the effectiveness of hydraulic fracturing. Sweet spots for shale resource plays can only be predicted by the integrated evaluation of reservoir quality and completion quality.

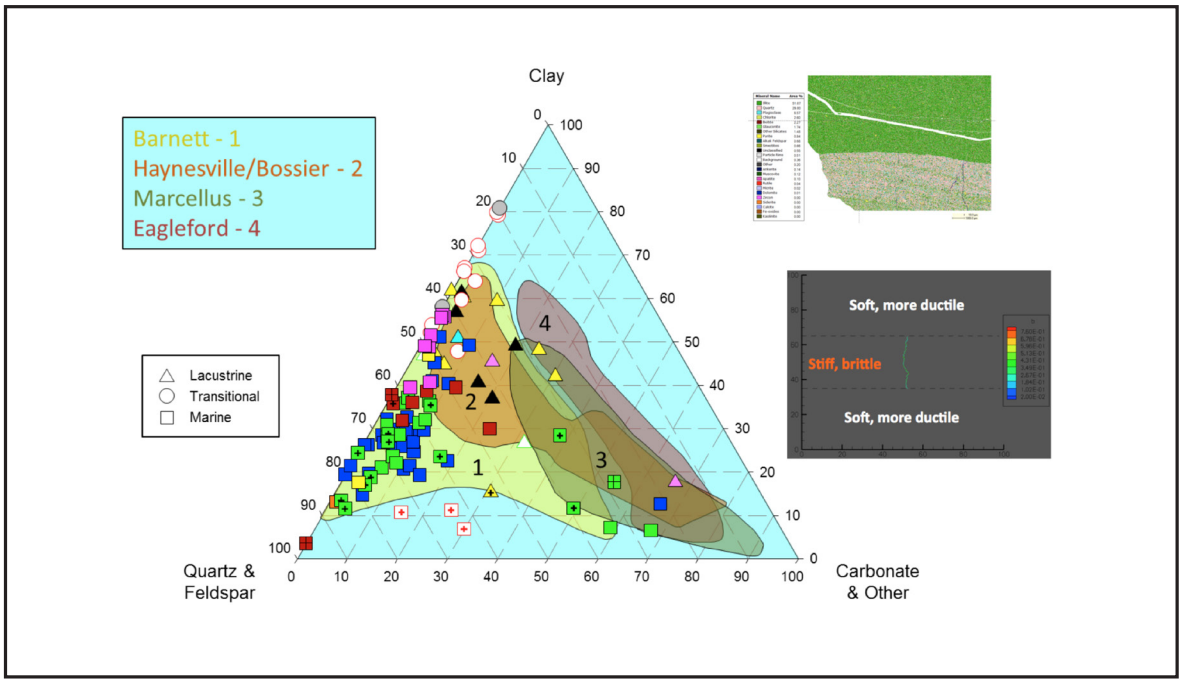

Figure 2 Mineralogy & depositional settings for typical China and U.S. shales and their Impact on Hydraulic Fracturing.

Case examples will be given from producing shales including Barnett, Niobrara, Bakken, Eagle Ford in U.S. and producing Silurian Longmaxi marine shale, emerging Cambrian Qiongzhusi marine shale, and potential Triassic to Tertiary lacustrine shales in China from basin-scale to nano-scale. Access to research insights from two recent EGI China Shale studies integrating literature and data is unique to this particular course.

Objectives

At the end of this course, the participants should have the knowledge and capabilities to:

- Understand the key aspects of shale plays
- Characterize shale reservoir properties
- Master what makes a working shale petroleum system

- Relate geology to hydrocarbon accumulation and production
- Screen potential shale plays located across the globe
- Predict sweet spots with favorable reservoir quality and completion quality
- Estimate what productivity levels can be expected in different geologic settings

Target Audience

This course is designed for petroleum geologists and engineers with interests in unconventional shale geology and E&P.

Course Outline

1. Overview of the unconventional shale characteristics, concepts, and technologies for shale plays
2. Screening criteria for shale play
3. Geologic setting of U.S. and China shales and overview of current producing shale plays
4. Comparison of marine, lacustrine and transitional shales
5. Multi-scale and multi-discipline reservoir characterization and shale reservoir evaluation of typical U.S. and China shales: geological setting, geochemistry, petroleum system, mineralogy, petrophysics, mechanical quality properties, etc.
6. Geologic control on shale oil and gas accumulation and production
7. Expertise gained from shale reservoir evaluation and production

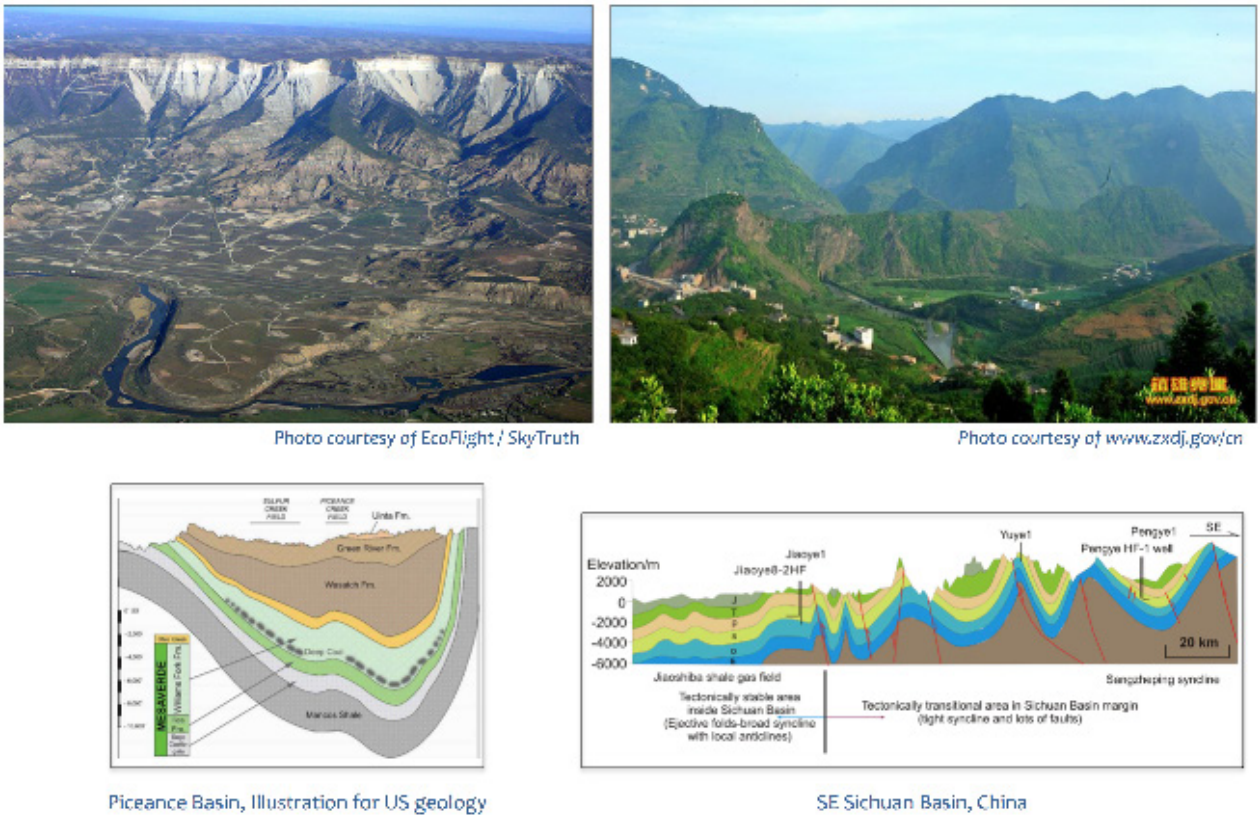

Figure 3 Simple U.S. geology vs. complex Chinese geology. (L) Photo courtesy EcoFlight / SkyTruth; (R) Photo courtesy www.zxdj.gov.cn.

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Research Interests

- Petroleum geology for conventional and unconventional resources
- Geothermal geology
- Sequence stratigraphy
- Basin analysis
- Lacustrine to deepwater sedimentary geology
- Petroleum systems
- Reservoir characterization
- Lacustrine to deepwater depositional systems
- Seismic interpretation integration of geology, geophysics, geochemistry, and engineering

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Shu Jiang, PhD

Research Associate Professor

Coordinator for China Program Development

Senior Research Scientist and Research Associate Professor Shu Jiang joined EGI in 2010. He earned his Ph.D. in Petroleum Geology from China University of Geosciences at Wuhan and completed postdoctoral research at the University of Colorado at Boulder He worked at CNOOC in Beijing for two years where he was involved in a significant gas discovery in Bohai Bay, China.

Shu has over 20 years experience in petroleum geology, sedimentary geology, basin analysis, sequence stratigraphy, petroleum systems, lacustrine to deepwater depositional systems, and unconventional reservoirs research spanning geology, geochemistry, geophysics and petroleum engineering. He is a Certified Petroleum Geologist (CPG), active member of AAPG, SEG, IAS, and GSA and has more than 90 publications to his credit. He also serves as an Advisory Member of the AAPG Shale Gas & Liquids Committee and has convened and chaired many international meetings.

Sequence Stratigraphy, Basin Analysis & Petroleum Systems for Conventional and Unconventional Reservoir Prediction

Shu conducts innovative and applied research in sequence stratigraphy and basin analysis in various tectonic settings by integrating core, well logs, seismic data, outcrop, etc. He proposes practical depositional models and suggest potential drilling targets for both conventional and unconventional reservoirs by integrating petroleum system analysis.

Lacustrine to Deepwater Depositional Systems

Shu's studies include the ancient and modern lacustrine to deepwater siliciclastic sediments transportation from source to sink and characterization of spatial and temporal evolution of depositional element architecture to predict deepwater reservoirs. Projects integrate structural, sedimentological and geomorphic studies and bridge both fundamental and petroleum geosciences.

Reservoir Description & Characterization

His work achieves successful reservoir model characterization by accurate property and architecture of all the siliciclastic depositional elements and uses state-of-the-art interpretation tools on a wide range of outcrop and subsurface data-sets to predict stratigraphic occurrence, 3-D geometry, and geophysical attributes of sandstone, CMB and shale reservoirs from lacustrine to deepwater setting.

Global Experience

Shu has worldwide industry and academic experiences from continental to deepwater setting basins (from East China lacustrine rifted basins, Northern China Cratonic basin, West China foreland basins, to South China Sea passive margin basin, basins in SE Asia, the Rocky Mountains, onshore Africa, and South America ,through deepwater GOM, Angola, Australia basins).