



Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH



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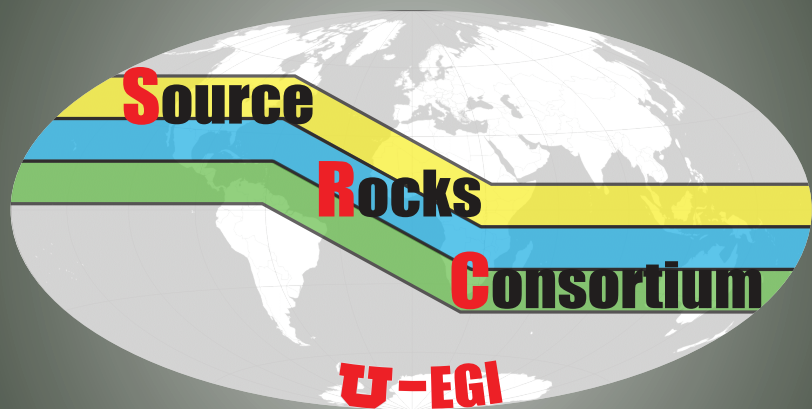
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SOURCE ROCKS IN SPACE AND THROUGH TIME:

Phase 2: Southeast Asian Basins



Rasoul Sorkhabi, Ph.D. | I 01020_2

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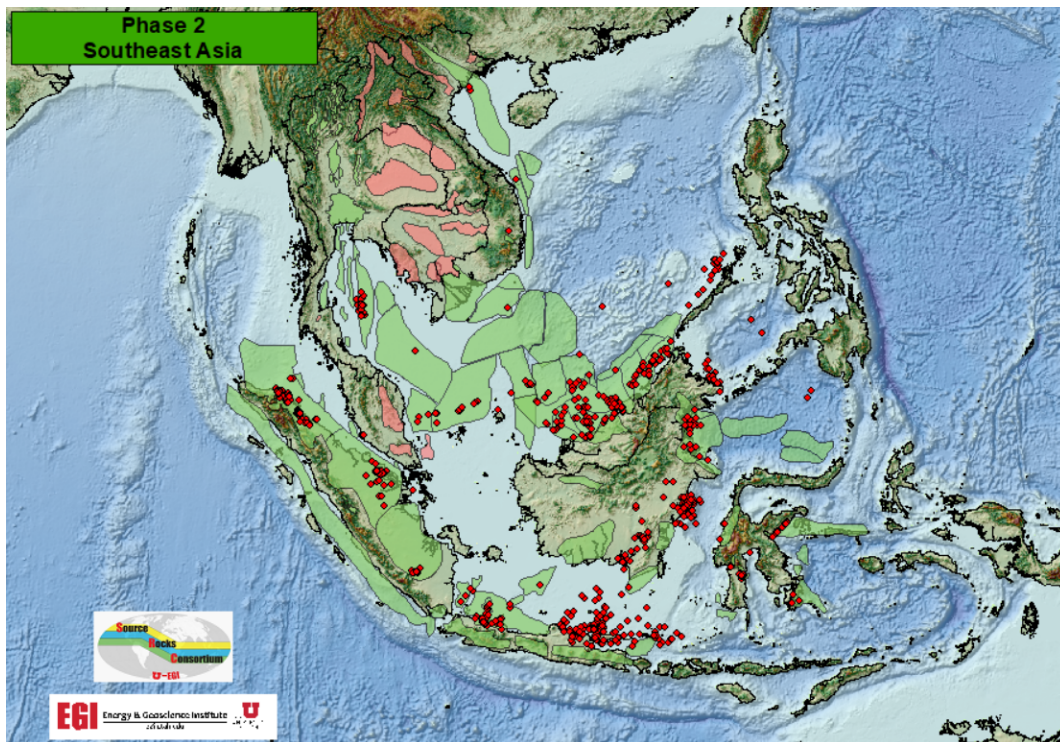
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VALUE

- By better understanding the source rock horizons and characteristics of sedimentary basins equipped with a user-friendly database, explorationists can reduce the risk of charge factor and hydrocarbon generation as part of the overall petroleum system analysis.
- A quick assessment tool for analysis of conventional as well as unconventional (self-sourced reservoir) plays based on source rock data and for assessing data-poor frontier and/or by-passed plays based on regionally correlatable source rocks.

KEY DELIVERABLES

1. An ArcGIS database of source rocks in Southeast Asia including basin tectonic, stratigraphy, lithology, depositional facies, and geochemical (TOC, Ro, RockEval, kerogen type, etc.) assembled and digitized from EGI's proprietary data archive, DSDP-ODP-IODP sites as well as from other technical publications.
2. ArcGIS geodatabase of source rocks in wells and outcrops and ArcGIS map layers depicting the distribution of source rocks in space and through the geologic history.



Summary of GIS DELIVERABLES

22 Thematic Maps
6 Paleogeographic Maps (50 Ma - 5 Ma)
523 Transects
140 Stratigraphic Charts
820 Well Locations
6,655 Source Rock Database Entries
1 Bibliography

PROJECT RATIONALE & SIGNIFICANCE

An appraisal of sedimentary rocks, which are mature both in terms of their organic carbon content and thermal history, lie at the base of the petroleum system analysis and exploration. While the early history of petroleum exploration was characterized by identifying structural targets, the modern exploration workflow incorporates source rock risk factor as an immediate priority. A quantitative knowledge of the distribution of source rocks in space and through time has important implications not only for the global budget of hydrocarbon resources but also for evaluating the geologic conditions favorable for the generation of oil and gas on a basinal scale.

EGI, with its four-and-half decades of research work in various basins and regions of the world, holds an archive of nearly 800 reports plus thousands of other reports and papers, which constitutes a valuable database on global source rocks. These considerations as well as the usefulness of an ArcGIS platform for data storage and display have led us to develop a new research project entitled “Source Rocks in Space & through Time.” The significance of this research work is amplified in view of the recent trends in the industry to drill directly into source-rock targets.

The expected significance of this research project may be summarized in the following key points:

1. Integrative data on source rocks and the geospatial and temporal distribution of source rocks assembled and analyzed in this study have practical implications for the risk/success evaluation of petroleum basins and identifying frontier or bypassed plays;
2. Sponsoring companies can augment their internal database on source rocks with the EGI database provided for in this project;
3. Previous studies have demonstrated that hydrocarbon source rocks and resources are distributed unevenly stratigraphically both on a global scale and in a given basin. Integrative data on source rocks including geology and geochemistry assembled in this study can be used in a holistic way to decipher the fundamental controls on source-rock effectiveness resulting from tectonic, sedimentologic, geochemical, atmospheric, and biotic processes.
4. Given the rise of unconventional shale plays and the industry’s trend to drill directly into the source rocks, this study will capture a knowledge-base for major shale horizons distributed globally and stratigraphically in a digital format. This tool will help the explorers to run a first, quick test on the shale plays by way of their comparison and contrast.

RESEARCH STAFF

Dr. Rasoul Sorkhabi, Research Professor at the University of Utah's Energy & Geoscience Institute, will act as Principal Investigator for the work. Scientists and technical staff from EGI will participate in the Project depending on the areas of expertise as necessary for this Project.

In addition, an Advisory Team of experts from the sponsoring companies will guide the research work.

EGI TECHNICAL CONTACT

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Research Interests

- Regional Geology
- Tectonics & Structural Geology
- Petroleum Systems & Plays
- Trap and Seal Analysis
- Geochronology & Thermochronology
- Well Logging & Formation Evaluation

Rasoul joined EGI as a Research Professor in 2003. Prior to EGI, he worked for Japan National Oil Corporation and Arizona State University. Rasoul holds B.Sc. and M.Sc. degrees in geology from India and a Ph.D. in geology from Japan. A native of Iran, he has lived most of his life in the United States, Japan, and India, and is multi-lingual. Rasoul is a member of AAPG, AGU, GSA, EAGE, etc. He has served as a contributing editor for *GeoExPro* and *Earth*, is a member of editorial board for *Journal of Earth Systems Science*, a member of AAPG History of Petroleum Geology Committee, a member of the GSA Academic & Applied Geoscience Relations Committee, and a member of the Advisory Board on Springer Publisher's Global Energy Program. Rasoul has published and presented hundreds of papers, is co-editor and co-author of *GSA Special Paper 328* (1999), *AAPG Memoir 85* (2005), *Tectonophysics Special Issue Volume 451* (2008), *Geological Excursions Around Miri, Sarawak* (2011), *GSA Special Paper 525* (2017) and *Geological Society London Special Publication 465* (2018).

Professional Philosophy: Regional Geology & Basin Evolution

Rasoul believes that the need to understand geologic processes and records in their evolutionary contexts calls for a holistic approach to basin analysis. Towards this end, his research focuses on constructing regional databases, integrative tectonostratigraphic records, play fairway maps, and paleofacies maps through time. Moreover, he investigates the impact of basement tectonics and plate settings on the distribution or destruction of plays.

Structures & Fluid Flow

An important application of structural investigation is to better understand fluid flows in rocks. Fault seals compartmentalize reservoirs, thus dismembering and localizing pools; leaking faults are risk factors in exploration. Fractures play critical roles in fluid flow on basin to prospect scales, and the significance for very low-permeability rocks is amplified in view of a major industry shift toward unconventional resources.

Back to the Source

After conducting a large number of regional geology projects, Rasoul is currently Principal Investigator for EGI's new research initiative "Source Rocks Consortium: Source Rocks in Space & through Time." This is essentially motivated by the recent convergence of conventional and unconventional hydrocarbon resources at the source-rock level and the question of why rich source rocks are located where they are in time and space.

Global Experience

Rasoul has over two decades of academic and industry experience, and has worked on projects in various parts of the world, from the fold-and-thrust belts through Tethys and Gondwana to deepwater toe-thrusts. Focus regions include: Asia and the Middle East, Africa, and North America.

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