EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

Project Portfolio

Current Projects

Gas Basins of Africa

Guyana-Suriname Basins

Source Rocks of the North & Central American Basins

EGI Oceans – South Atlantic Source Rock Reclassification

Red Sea and Gulf of Suez Basins

Karoo Basin Reservoir Characterization

East African Basins & Petroleum Systems

Sheared Margins of Western Australia, Supplement

Eastern Mediterranean Basin Synthesis (EMBS)

Source Rocks of Gondwana Continents & Margins

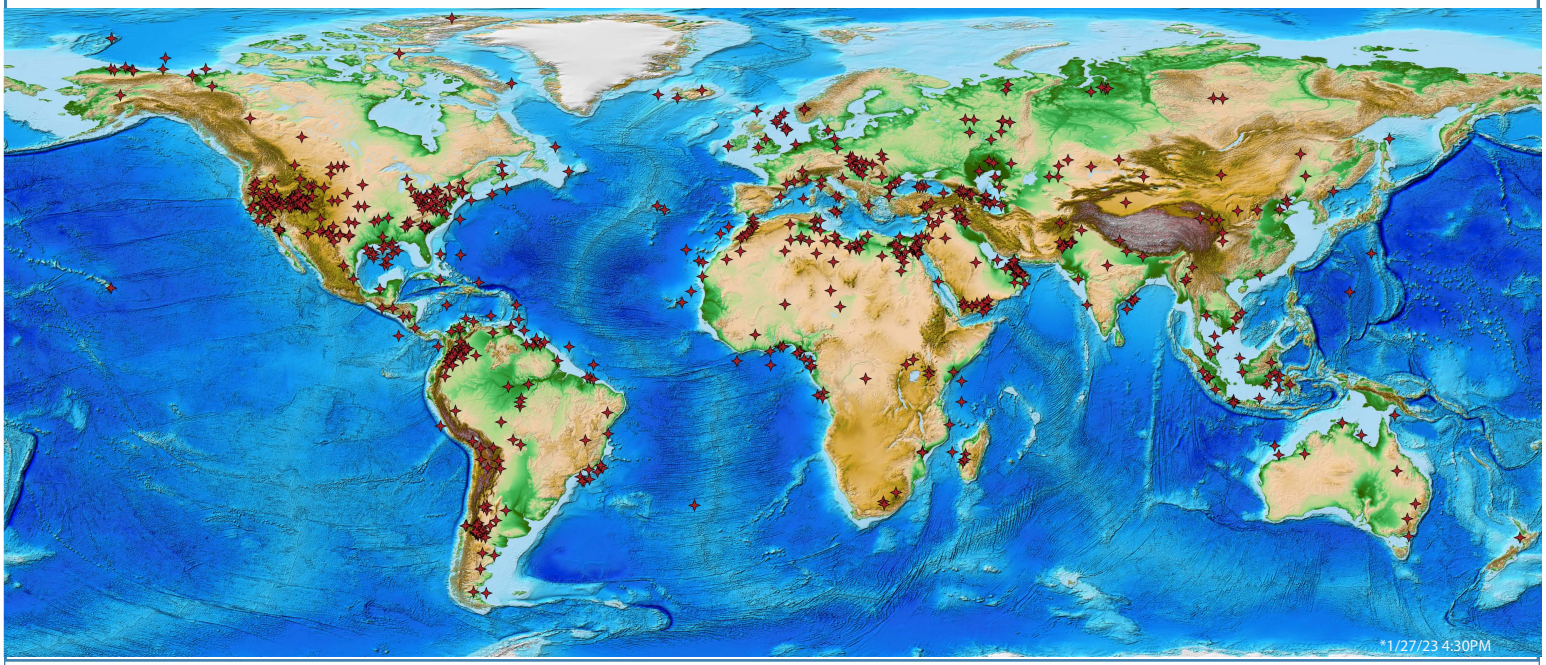
Organofacies Machine Learning Model

Available to All EGI Members

A) Chemical Fingerprinting of Middle East Produced Crude Oil
B) Characteristics of Tight Oil and Gas Geology in Denver and Powder River Basins
C) Predicting the Thermal History of the Oceanic Crust in the Circum-Sao Tome Region
D) Hydrocarbon Fingerprinting
E) Thermal History of Transform Margins
F) Geochemical Tracer Test Erwin-1 Well
G) Geochemical Tracer Testing Zunil
H) The Bradys, Nevada Geothermal Field Geochemical Tracer Testing
I) Geochemical Tracer Testing Placerita
J) Evaluation of Rock Samples of the Astrakhan Region, Russia
K) Geochemical Tracer Test Mckowen-1 Well
L) Dixie Meadows, NV Geochemical Tracer Test
M) Mammoth, CA Geothermal Geochemical Tracer Testing
N) Neal Hot Springs Geochemical Tracer Testing
O) Structural Architecture, Petroleum Habitat, and Potential of NE Slovakia

Open for Sponsorship

Recently Released, Now Available to all Members



EGI CONNECT
ONLINE GLOBAL DATABASE

EGI Project Portfolio Categories

In Development | For Sponsorship

Research topics in this stage range from concept to kick-off. As CA sponsors indicate interest and meet with the research team the critical goals and deliverables are developed along with the workfl w and timeline. Most projects require a minimum number of sponsors and when the goal is met the research commences. New sponsors are welcome to join at any time and provide guidance for the project goals and objectives.

In Progress | Open for Sponsorship

The project is moving forward based on the input of the initial CA sponsors and research team. Regular meetings provide updates and reviews. In some cases information and interpretations are uploaded to dedicated, secure websites for easy access during the study. New sponsors may join during this research phase and help steer the project through completion.

Completed | Immediate Delivery to New Sponsors

The research study is complete and the report has been delivered to the initial sponsors. New sponsors may join and immediately receive the entire report and all connected documents. Additionally, the principal investigator will be available for an on site, full presentation, including work fl w integration for the CA.

Recently Released | Available to all Members

These reports have recently been released from the two-year sponsorship period of confide tiality. All current EGI members may download these reports.

850+ EGI Reports & 17,000+ Additional Geoscience Documents

Via **EGIconnect.com** EGI Members access our entire Online Global Database from the convenience of their office. Along with > 850+ research reports and 17,000+ geoscience documents our online database contains 350,000 km+ of 2D seismic data and 9,000+ well logs with locations. The 850+ EGI research reports are represented on the map with a red star.

EGI CONNECT
ONLINE GLOBAL DATABASE

Exclusive Access to EGI Members

egi.utah.edu/egi_connect

(Note: EGIconnect supports Internet Explorer 10+, Google Chrome, Mozilla Firefox & Safari)

Contact Information:
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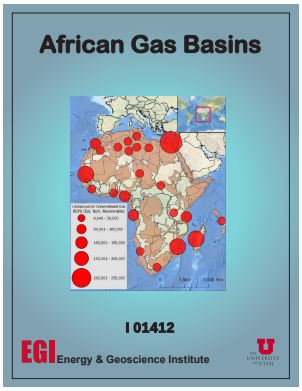
423 Wakara Way, Suite 300, Salt Lake City, UT 84108
milind.deo@utah.edu | (801) 585-7629

GAS BASINS OF AFRICA

In Development | For Sponsorship



) ΦΧΪΧΨ

Full Title: African Gas Basins

Estimated Investment & Timetable: $40k (USD) per non-CA sponsor$32k for EGI CA members.

Duration: 12 months

EGI Contacts:/Autors

Eiichi Setoyama, Ph.D. Research Scientist
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Bryony Richards, Ph.D. Research Scientist
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Rasoul Sorkhabi, Ph.D. Research Professor
Email: rsorkhabi@egi.utah.edu

Value

- This study report aims to assist energy E&P companies to diversify their portfolio and increase their natural gas supply sources and routes from African basins.

Deliverables

- ArcGIS geodatabase compiled from EGI reports, public data sources, and the literature with reference linking.
- Report with convenient, accessible evaluation of all African gas basins, including information on their geology, natural gas field development, production, future upside and potential markets.

Regional Framework and Study Rationale

This EGI study report is a new evaluation of the African basins both onshore and offshore in terms of their natural gas pools and potential (Figure 1). The database is harvested from EGI archive as well as other survey reports and research papers, and includes geologic, geochemical and geophysical information, natural gas field development and production, and basinal and infrastructure maps (Figure 2). The report will enhance the E&P investigations and decision-making activities.

For Contracts: Milind Deo, Ph.D., EGI Director | Tel. 801-581-7629 | Fax: 801-585-3540 | Email: contactegi@egi.utah.edu

GUYANA - SURINAME BASINS

In Progress | For Sponsorship

(I 01409)

Full Title: GUYANA - SURINAME BASINS DATABASE

Estimated Investment & Timetable: $40k (USD) per non-CA sponsor

$32k for EGI CA members.

Duration: 12 months

EGI Contacts:
Rasoul Sorkhabi, Ph.D. Research Professor
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Eiichi Setoyama, Ph.D. Research Scientist
Email: esetoyama@egi.utah.edu

Summary & Purpose

- Recent discoveries offshore Guyana-Suriname have placed this petroleum province in the spotlight. These discoveries indicate massive occurrent of oil and gas in the region and the need for regional synthesis and quantitative geologic and geochemical data on petroleum systems for further exploration.

Deliverables

ArcGIS integration and display of stratigraphic, geochemical, and well data and maps, including access to publicly-available seismic images.

Characterization of the offshore petroleum systems in the region by new geochemical and paleofacies data.

This EGI study report is designed to:

(1) Integrate all of data from EGI reports as well as research papers in a coherent schema.

(2) Compile geochemical data and add new geochemical analyses on samples from 51 wells

(3) Construct new paleofacies maps for key stratigraphic horizons from onshore to deepwater.

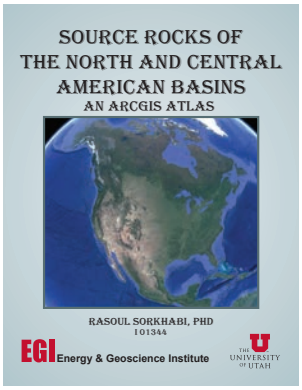
(4) Construct litho-chrono-biostratigraphic columns for the wells.

(5) Assemble structural and geophysical data on a unified, easy-to-use platform.

For Contracts: Milind Deo, Ph.D., EGI Director | Tel. 801-581-7629 | Fax: 801-585-3540 | Email: contactegi@egi.utah.edu

1 Source Rocks of the North & Central American Basins

In Development | Open for Sponsorship



I 01411

Full Title: Source Rocks of the North and Central American Basins: An ArcGIS Atlas

Investment & Timetable: $40k (USD) for non CA members. $32k for CA members.
Duration: 18 months

EGI Contacts:
Dr. Rasoul Sorkhabi | Research Professor | Principal Investigator
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Eiichi Setoyama, Ph.D. Research Scientist
Email: esetoyama@egi.utah.edu

Project Rationale & Significance:

North and Central Americas contain world-class petroleum provinces and have historically been prominent producers of oil and gas. USA alone is a pivotal market for oil and gas globally.

An appraisal of organic-rich and thermally mature sedimentary rocks lies at the base of the petroleum system analysis for both conventional (migrated) and unconventional (self-sourced) hydrocarbon plays. A quantitative knowledge of the distribution of source rocks in space and through time has important implications not only for the inventory of rich source-rock formations but also evaluating the geologic conditions favorable for source-rock sweet-spots and the generation of oil and gas in a basin.

The present study aims to assemble and digitize geospatial, geologic, and geochemical data on source-rock formations of various basins in North and Central Americas in a user-friendly and query searchable ArcGIS platform enhanced with geological, geophysical, and paleofacies maps.

EGI, with its 46 years of research work in various basins and regions around the world, holds an impressive archive of >850 reports plus thousands of non-EGI reports and papers. The main objective of this study is to assemble and standardize a source-rock database primarily from EGI sources supplemented by newer, public sources.

Value

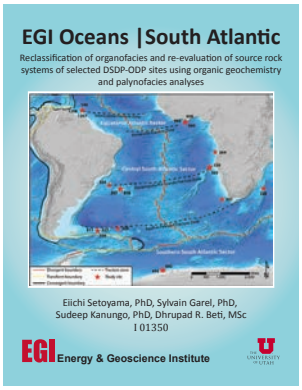
- By better understanding the source rock characteristics of sedimentary basins in North & Central Americas based on a user-friendly database, explorationists can mitigate the risk of charge potential and hydrocarbon generation as part of the overall petroleum system.
- A quick assessment tool for conventional and unconventional play analysis based on source rocks and for assessing data-poor and/or by-passed plays based on basin-scale correlatable source rocks.

Key Deliverables

- An ArcGIS database of source rocks of North & Central American basins (USA, Canada, Mexico and Cuba and certain relevant countries) including basinal, stratigraphic, sedimentological, and geochemical attributes (e.g. TOC, Ro, kerogen type, pyrolysis, HC type, etc.) compiled from EGI's proprietary data archive, DSDP-ODP sites as well as from other technical publications.
- ArcGIS maps highlighting distribution of source rocks in space and through geologic history.

2 EGI Oceans – South Atlantic Source Rock Reclassification

Completed | Immediate Delivery



I 01350

Full Title: EGI Oceans | South Atlantic – Reclassification of organofacies and re-evaluation of source rock systems of selected DSDP-ODP sites and industry wells from offshore Brazil and Gabon using organic geochemistry and palynofacies analyses

Investment & Timetable: $80k (USD)
Duration: 12 months

EGI Contacts:

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Dr. Sudeep Kanungo | Chronostratigraphy
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Project Rationale & Significance:

A focused and tested workflow from EGI's Central & North Atlantic research program supported by 10 major international oil companies, combining bulk geochemical data, new palynofacies observations, and bulk kinetic analyses, will be employed for a quantitative appraisal of the potential and quality of Mesozoic source rock systems delineated by the EGI Oceans South Atlantic Project (2017). Palynofacies observation enables unambiguous visual identification of organic matter (OM) type and composition, and the correction for the mineral matrix effect. Synthesizing the interpreted organic geochemistry and bio-chronostratigraphic data from the above mentioned Oceans project with new palynofacies, biomarker, and isotope data will provide improved, higher-resolution constraining of the spatial and temporal evolution of potential source rocks along the South Atlantic conjugate margin than understood before. The OM-endmember-specific kinetics will provide reliable kinetic parameters, critical for quantitative modeling of hydrocarbon generation, for each potential source rock system, and thus refine the assessment of YTF resources in the South Atlantic.

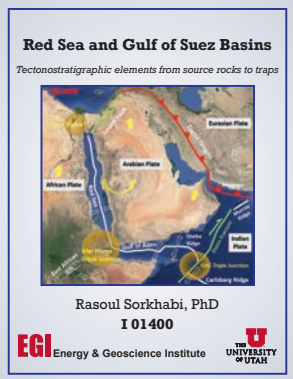
Palynofacies observations allow us to visually identify the main organofacies of the potential source rocks, and resolve whether Type II/Type III samples determined by pyrolysis are actually characterized by a mixture of marine and terrestrial OM (mediocre quality, oil and gas prone) or by degraded marine OM (good quality, mostly oil prone). This detailed classification and quantification of OM end-members and the correction for the mineral matrix effect will significantly improve the source rock quality evaluation. Palynofacies observations will also help reconstruct paleoenvironment including redox conditions and detrital inputs. An effort to combine the new results using paleogeographical maps to depict the distribution of potential source rocks will facilitate understanding of its evolution through time.

Deliverables

- Source rock characterization for richness, maturity, organofacies type and kinetics
- Multi-disciplinary paleoenvironmental interpretation (foraminifera, nannofossils, organic-walled microfossils and siliceous microfossils)
- Integrated paleoenvironmental and organofacies maps for identified source rock intervals
- Gas Risk Index (GRI) and Source Potential Index (SPI) ranking maps

3 Red Sea and Gulf of Suez Basins

In Development | For Sponsorship



I 01400

Full Title: Red Sea and Gulf of Suez Basins: Tectonostratigraphic elements from source rocks to traps

Investment & Timetable: $140k (USD) per non CA member; $120k (USD) CA members

EGI Contacts:

Dr. Rasoul Sorkhabi | Research Professor | Principal Investigator
Tel. (801) 587-9070 | Email: rsorkhabi@egi.utah.edu

Project Rationale & Significance:

Tectonic forcing of sedimentary evolution and facies distributions is well established in petroleum basins; therefore, it is important to decipher the various tectonic models for the Read Sea Basin (RSB). To do this, we will consider (1) internal structural framework and complexities in RSB, (2) the linkages of RSB to its surrounding structures: Dead Sea and Gulf of Suez to the north, the EAR to the south, and the Gulf of Aden to the east, and (3) relationships between the normal plate tectonics and the deep-seated plume tectonics in the region (for instance, the differences between the Afar triple junction and the Owen-Aden-Carlsberg triple junction, and their influences on the rifting processes).

Value

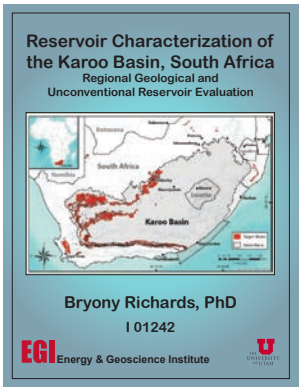
- Better understanding of the tectono-sedimentary evolution of the Red Sea and Gulf of Suez basins for petroleum exploration with a focus on key petroleum systems elements from source rocks to traps.
- An ArcGIS quick assessment and easy-to-use tool for analysis of petroleum plays in the region based on an integrative database that can be augmented to the internal databases of the sponsoring companies. This would help to assess data-poor frontier or deeper plays based on regionally correlatable plays.

Deliverables

- An integrative geologic model for the opening of the Red Sea and Gulf of Suez with a focus on the impact of tectonics on synrift depositional facies, and high-resolution, standardized stratigraphic correlation of the region bordered by six different countries (Egypt, Saudi Arabia, Sudan, Yemen, Eritrea, and Djibouti) which use different stratigraphic terminologies.
- An evaluation of pre-salt (pre-Late-Miocene) and pre-rift (Jurassic-Eocene) sedimentary packages and petroleum plays in the Red Sea basin constrained by paleofacies reconstruction and correlatable source rocks and geochemical data.
- An examination of geologic factors for the success of giant fields in the central Gulf of Suez sub-basin as an analog for similar possibilities in the Red Sea basin
- Play fairway mapping of hydrocarbon prospectivity in selected key areas in the Red Sea based on a synthesis of information from wells, seismic, and other data.
- An atlas of seismic, stratigraphic, and well data for quick reference and use.

4 Karoo Basin Reservoir Characterization

In Development | For Sponsorship



I 01242

Full Title: Reservoir Characterization of the Karoo Basin, South Africa | Regional Geological & Unconventional Reservoir Evaluation

Estimated Investment & Timetable: $80k (USD) per Sponsor
Duration: 24 months

EGI Contacts:
Dr. Bryony Richards | Senior Petrologist | Principal Investigator
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Project Rationale & Significance:

Recent estimates of unconventional resources in the Karoo Basin, suggest widely variable recoverable shale gas in-place from ~30 Tcf to ~500 Tcf (i.e. Decker and Marot, 2012). Potentially large gas reserves; coupled with the present energy shortfall in South Africa, has led to shale gas becoming an attractive new energy prospect, with much of the renewed exploration focus falling on the Karoo Basin shales.

Value

- The integration of three key technical areas to establish an unparalleled understanding of shale resources in South Africa's Karoo Basin.
- Core through Pore™ Integrated Petrological Workflow for cutting-edge interpretation of composition, texture, fabric, porosity, permeability, micro-tectonics, micro-facies/depositional evolution and diagenetic history.
- Geophysical & Petrophysical Data: integrated within the gross tectonic structural framework, taking into account the correlation of available gravity and magnetic data within the fundamental sequence stratigraphic framework of the basin.
- Organic Petrology: Evaluation of key samples using rock-Eval, TOC, and biomarkers with the integration of inorganic (petrological) analyses and regional (geophysical/petrophysical) data.

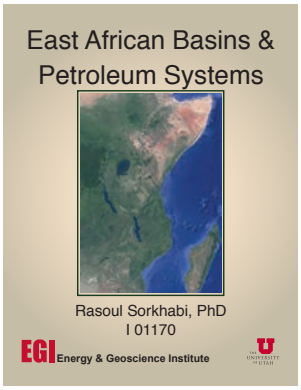
Deliverables

Project deliverables are proposed to focus on the critical assessment of potential shales in key areas of the basin, using available literature, geological modeling and new analyses of samples, including:

- Comprehensive petrological analyses using the Core through Pore™ integrated analytical approach using optical microscopy, XRD, XRF, QEMSCAN®, SEM, FIB-SEM and TEM/STEM.
- Geochemical and petrological databases and charts (Excel).
- Integrated assessment of analysis with available well log and magnetic data.
- Delivered on ArcGIS platform with GIS catalog delivered in Excel format.
- Analog table containing key shale parameters and potential analogous North American reservoirs (Excel).
- Documentation from interim and final project presentations

5 East African Basins & Petroleum Systems

In Development | For Sponsorship



I 01170

Full Title: **East African Basins & Petroleum Systems**

Investment & Timetable: $55k (USD) per Sponsor
Duration: 14 months

EGI Contacts:
Dr. Rasoul Sorkhabi | Research Professor | Principal Investigator
Tel. (801) 587-9070 | Email: rsorkhabi@egi.utah.edu

Project Rationale & Significance:

The East African region from Sudan as far south as Mozambique encompasses a sedimentary record from the Late Carboniferous to Recent times. The relative distribution and preservation of these sediments were largely controlled by tectonic events as the region evolved from an inter-cratonic basin at the heart of Gondwana in the late Paleozoic through the rift-drift fragmentation of Gondwana during the Jurassic-Cretaceous to its present settings as an onshore continental rift and offshore passive margin. This project constructs a regional framework for the paleogeographic, structural and petroleum-system evolution of East Africa (onshore to deepwater).

Value:

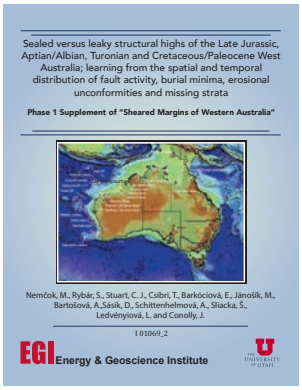
The project results will integrate the onshore and offshore basins of East Africa, will compare and contrast the East African margin with its corresponding Gondwana margins (including India and Madagascar) in terms of petroleum systems, and will analyze the superimposition of the Cenozoic rift basins on the underlying Cretaceous sediments and the effects of East African rift tectonics on the overall sedimentary and structural evolution of the East African margin. The work will be conducted in collaboration with institutions in selected East African countries.

Deliverables:

The ArcGIS deliverables will include detailed integrated stratigraphic charts, structural cross-sections, well-controlled paleogeographic facies reconstructions (Carboniferous-Recent), play fairway maps, basin modeling, and geochemistry of oil samples.

6 Sheared Margins of Western Australia, Supplement

Completed | Available for Immediate Delivery



I 01069_2

Full Title: Sheared Margins of Western Australia | Phase 1 Supplement: Sealed versus leaky structural highs of the Late Jurassic, Aptian/Albian, Turonian and Cretaceous/Paleocene West Australia; learning from the spatial and temporal distribution of fault activity, burial minima, erosional unconformities and missing strata

Investment: $25k (USD) per Sponsor

EGI Contacts:

Dr. Michal Nemčok | Research Professor | Principal Investigator
Tel. +421-2-2062-0781 (Bratislava, Slovakia) | Email: mnemcok@egi.utah.edu

Project Rationale & Significance:

Outer frontier margins of Western Australia are characterized by stranded continental blocks and marginal plateaus. Sedimentary section is prospective in Permian, Triassic, Jurassic and Cretaceous marine sequences with potential oil source rocks and siliciclastic reservoirs. Potential traps extend over 2500 km of under-explored Western Australian margin. This study will open minds to new plays over a vast region of Australian waters.

Value

Studying the spatial and temporal distribution of fault activity, burial minima, erosional unconformities and missing strata allows one to interpret:

- which eroding structures were footwall edges and which were horsts;
- which structures did not have a top seal and for which time span;
- which positive topographic features must have been hydrocarbon migration destinations and for which time span;
- where were the main sediment entry points into the deeper basins (i.e., the main input of the reservoir-rock prone sediment);
- where were the main sediment distribution pathways in the deeper basins (i.e., the main zones of the reservoir-prone sediment); and which sediment catchment areas were separated by positive topographic features from any potential reservoir-prone sediment input (i.e., areas prone to seal and source rock deposition)

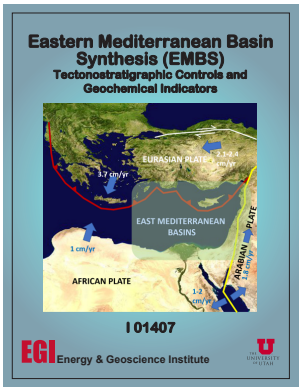
Deliverables

Arc GIS project (Arc Map v. 10.3), which contains:

- 10 horizon depth maps
- 8 sedimentary (resp. rock) thickness maps
- fault activity timing map
- 4 maps of unconformable and conformable portions of key horizons
- 6 maps of color-coded missing age span associated with erosional unconformities determined in wells

8 Eastern Mediterranean Basin Synthesis (EMBS)

In Development | For Sponsorship



I 01407

Full Title: Eastern Mediterranean Basin Synthesis (EMBS) | Tectonostratigraphic Controls and Geochemical Indicators

Estimated Investment & Timetable: $68k (USD) per Sponsor
Duration: 12 months

EGI Contacts:

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Eiichi Setoyama, Ph.D. Research Scientist
Email: esetoyama@egi.utah.edu

Value

- Better understanding of the geodynamic tectono-sedimentary evolution of the Eastern Mediterranean basins for oil and gas exploration with a focus on how tectonic and stratigraphic forces have controlled the key petroleum system elements from source rocks to traps.

- An ArcGIS assessment and easy-to-use tool for analysis of the regional geology and petroleum plays in the region based on an integrative database that can be augmented with internal databases of the sponsoring companies.

Deliverables

- An integrative digital database for the Eastern Mediterranean distilling a huge amount of information and publications that are currently scattered. The database would also evaluate and standardize the information on the region borderded by eight different countries in the region, from Egypt and Lebanon to Cyprus and Turkey.
- An easy-to-use geologic knowledge-base with a focus on basin evolution, structural framework, paleofacies distribution, geochemical evaluation, and origin of oil and gas accumulations.
- Play fairway mapping of hydrocarbon prospectivity in selected key areas based on regional synthesis of information from wells, seismic, biostratigraphic, and geochemical data.

Regional Framework and Study Rationale

Situated at the intersections of Africa, Asia, and Europe, the Mediterranean Sea with a surface area of 2.5 million sq. km includes 12 local seas and gulfs as well as over 3300 islands. The Mediterranean is also connected through narrow straits to the Atlantic on the west, the Black Sea to the north, and the Red Sea to the south. Moreover, 22 countries in Europe, North Africa, and West Asia face the Mediterranean. This geographic setting has given the Mediterranean a geostrategic position in the world both politically and economically. Indeed, the very term “Mediterranean” (Latin, “interior of Earth’s landscape”) signifies its key position historically.

In the past two decades, the Eastern Mediterranean has witnessed the discovery of several major gas fields such as Aphrodite, Leviathan, Tenin, Tamar, Karish, Dalit, and Zohr in the Levant Basin. These, in addition to the classic oil and gas fields of the Nile Delta and Western Desert basins in Egypt, indicate the existence of a prolific petroleum province for exploration with proximity to major markets in Europe. Nevertheless, many aspects of the petroleum systems in the Eastern Mediterranean are little known, such as the distribution of source rocks and reservoir in space and time, the causes of microbial (biogenic) vs. thermogenic gas fields, the impact of the Messenian Salt Giants on petroleum systems, and the nature of deep plays. Some of these problems can be investigated through integration of geologic, geophysical, and geochemical data from both onshore and offshore areas. In this way, petroleum systems can be viewed against the background of tectono-sedimentary evolution of the Eastern Mediterranean basins.

18 Source Rocks of Gondwana Continents & Margins

In Development | For Sponsorship

I 01345

Full Title: Source Rocks of Gondwana Continents and Margins: ArcGIS Database and Maps Version 2023

Investment & Timetable: $60k (USD) non CA members; $50k (USD) CA members
Duration: 12 months

EGI Contacts:
Dr. Rasoul Sorkhabi | Research Professor | Principal Investigator
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Project Rationale & Significance:

An appraisal of organic-rich and thermally mature sedimentary rocks lies at the base of the petroleum system analysis for both conventional (migrated) and unconventional (self-sourced) hydrocarbon plays. A quantitative knowledge of the distribution of source rocks in space and through time has important implications not only for the inventory of rich source-rock formations but also evaluating the geologic conditions favorable for source-rock sweet-spots and the generation of oil and gas in a basin.

The present study aims to assemble and digitize geospatial, geologic, and geochemical data on source-rock formations of various basins on Gondwana continents and margins in a user-friendly and query searchable ArcGIS platform enhanced with geological, geophysical and paleofacies maps.

EGI, with its 46 years of research work in various basins and regions around the world, holds an impressive archive of >850 reports plus thousands of non-EGI reports and papers. In addition, EGI Geochem Lab has over the decades analyzed rock and oil samples from several regions such as South America, Caspian Sea, etc. The main objective of this study is to assemble and standardize a source-rock database primarily from EGI sources supplemented by newer, public sources.

Value

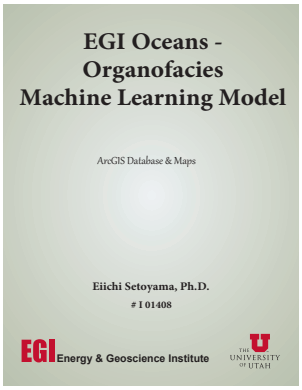
- By better understanding the source rock characteristics of regional and local basins based on a user-friendly database, explorationists can mitigate the risk of charge potential and hydrocarbon generation as part of the overall petroleum system.
- A quick assessment tool for conventional and unconventional play analysis based on source rocks and for assessing data-poor frontier and/or by-passed plays based on regionally correlatable source rocks.

Key Deliverables

- ArcGIS database of source rocks across Gondwana's Continents and Margins (South America, African, Arabian Peninsula, India and Australia) including basinal, stratigraphic, sedimentological, and geochemical attributes (e.g. TOC, Ro, kerogen type, pyrolysis, HC type, etc.) compiled from EGI's proprietary data archive, DSDP-ODP sites as well as from other technical publications.
- ArcGIS maps highlighting distribution of source rocks in space and through geologic history.

EGI Oceans - Organofacies Machine Learning Model

In Development | For Sponsorship



 # I 01408

Full Title: EGI Oceans - Organofacies Machine Learning Model

Mineral matrix effect correction and refined organofacies prediction utilizing the South Atlantic and the Central & North Atlantic EGI Oceans datasets

Investment & Timetable: TBD
Duration: 12 months

Authors/Principal Investigators:
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Authors
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Summary:

The project team is developing a machine learning (ML) model, trained using EGI Oceans Atlantic Margins data and worldwide data from the literature, as a means of predicting organofacies and organic matter (OM) composition in other basins or data sets. The methodology is designed to avoid the need for costly additional analysis (e.g., pyrolysis on isolated kerogen and palynofacies). It will also detect and correct for mineral matrix effect (MME), an artifact of anhydrous pyrolysis that can result in significant underestimation of generation potential (Figure 1).

The goal is to deliver an ML tool applicable to large data sets, not only on the Atlantic margins, but in other petroleum systems worldwide, delivering accurate information on generation potential and phase, and thus providing critical input to basin models.

Value:

- This project will be of interest to groups seeking to more tightly constrain organofacies, and thus generation potential, in petroleum basins worldwide.
- Sponsors will have exclusive, first-use rights to the tool.
- It will also benefit those companies seeking to incorporate advanced ML/digitalization techniques into their exploration toolkit as a means of developing better predictive capability.

Key Deliverables

A fully integrated ML model for organofacies prediction, which includes an MME correction function.

A hierarchy of variables/factors (e.g., TOC, HI, microfossil diversity, rock type, lamination, etc.) influencing accurate organofacies prediction.

Characteristics of Tight Oil and Gas Geology in Denver and Powder River Basins **Recently Released | *Open to all members***


Characteristics of Tight Oil and Gas Geology in Denver and Powder River Basins in United States and Cooperation Opportunity

Research Institute of Petroleum Exploration & Development (RIPED), PetroChina
Energy & Geoscience Institute (EGI), University of Utah

September 30, 2020

Tight oil and shale gas are two of the main types of "unconventional" oil and gas resources and have played an important role in the early-21st-century for the increased domestic production of oil (beginning around 2009) and natural gas (beginning around 2006), which resulted in the energy revolution in the U.S. and made US become an oil and natural gas export country from previous import country. The U.S. Energy Information Administration summarized the distribution and types of major tight oil and shale gas plays in the lower 48 states (Fig. 1-3), which shows most tight oil and shale gas plays are mixed plays consisting organic-rich shale and organic-lean finegrained reservoirs.

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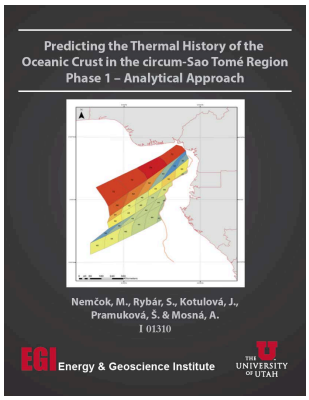
Background

The EGI has a rich history in worldwide petroleum geology research, which is highly consistent with our research focus of global oil and gas resource evaluation. The RIPED and UUTAH have closely cooperated for 10 years since 2010. In order to improve the scientific research ability and foreign language level of researchers, and to better and continuously carry out the national major projects of "13th five-year plan", the Research Institute of global petroleum resources and exploration planning signed 2 the cooperative research agreement on " Characteristics of Tight Oil and Gas Geology in Denver and Powder River Basins in the United States and Cooperation Opportunity" with the EGI, University of Utah.

EGI has worked on all seven continents. Fig. 1-2 lists data in North America EGI has accumulated, which brings strong records of global expertise to applied geoscience research.

Thermal History of Oceanic Crust in circum-Sao Tomé Region

Recently Released | Available to all members



I 01310

Full Title: Predicting the Thermal History of the Oceanic Crust in the circum-Sao Tomé RegionPhase 1 – Analytical Approach

Estimated Investment & Timetable: (USD) per Sponsor
Duration: 12 months

Authors : Nemcok, M., Rybár, S., Kotulová, J.,Pramuková, Š. & Mosná, A.

EGI Contact: Rasoul Sorkhabi, Ph.D. Research Professor | Email: rsorkhabi@egi.utah.edu

Introduction

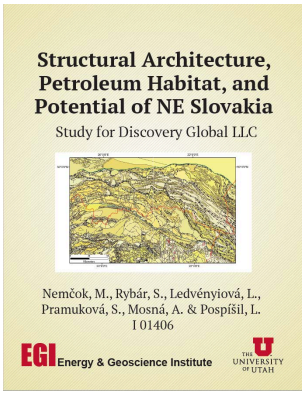
- **The result of this study is the Arc GIS project (Arc Map v. 10.3), which contains:**
- (1) present-day map of the oceanic crust tiles
- (2) present-day map of both the oceanic crust thickness and oceanic/proto-oceanic crust
- boundary
- (3) map of the zonal representation of oceanic fracture zones, including their individual
- troughs and ridges
- (4) map of the emplacement ages of individual volcanic loads of the Cameroon Volcanic
- Zone, together with the constraining interpreted reflection seismic sections through
- their flexural moats and spreadsheet with constraining radiometric dates of volcanic
- samples analyzed from the literature
- (5) map of the oceanic crust tiles with their spreading rate during accretion
- (6) thermal history determination
- (7) sensitivity analysis focused on (a) the difference between the cooling history of the tile
- containing the normal oceanic crust and history of the tile of the oceanic fracture zone
- containing reduced thickness of the underlying oceanic crust and (b) the significance
- of the warming effect of a volcano belonging to the Cameroon Volcanic Zone
- (8) map of oceanic tiles with thermal histories
- (9) phase 2 study proposal

Study Area

The study area includes oceanic crust, which surrounds volcanoes of the Cameroon Volcanic Zone in offshore Gabon, Equatorial Guinea, Cameroon, and Nigeria spanning from Bioko in the north to Annobón in the south.

Structural Architecture, Petroleum Habitat, & Potential of NE Slovakia

Recently Released | Available to all Members



) ΦΧΪo6

Full Title: Structural Architecture, Petroleum Habitat, and Potential of NE Slovakia Study for Discovery Global LLC

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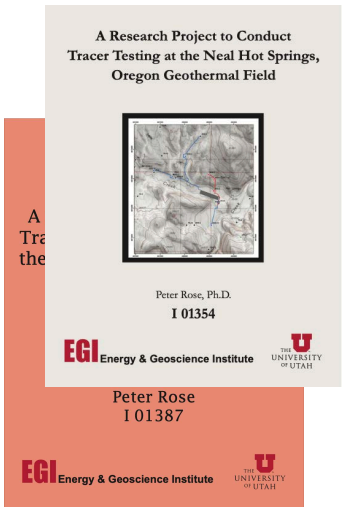
contactegi@egi.utah.edu

Authors
Nemčok, M., Rybár, S., Ledvényiová, L., Pramuková, S., Mosná, A. & Pospíšil, L.

Introduction

The objective of the study, which evolved into this paper, was to assess the structural architecture of the West Carpathian thrustbelt in the NE Slovakia in order to help with hydrocarbon exploration. Forming the proximal portion of about 100 km long accretionary wedge, the deeper levels of the study area were initially too deep for the reach of exploration wells and reliable extrapolation of outcrop data. This situation has changed with acquisition of 22 reflection seismic profiles that are interpreted in this study.

Geochemical Tracer Reports Recently Released | *Open to all members*



D) Geochemical Tracer Test Erwin-1 Well | I 01387

E) Geochemical Tracer Testing Zunil | I 01375

F) The Bradys, Nevada Geothermal Field Geochemical Tracer Testing | I 01367

G) Geochemical Tracer Testing Placerita | I 01360

I) Geochemical Tracer Test Mckowen-1 Well | I 01376

J) Dixie Meadows, NV Geochemical Tracer Test | I 01384

K) Mammoth, CA Geothermal Geochemical Tracer Testing | I 01325

L) Neal Hot Springs Geochemical Tracer Testing | I 01354

M) Geochemical Tracer Test Hebert-1 Well | I 01377

N) Salton Sea Geochemical Tracer Testing | I 01347

EGI Contacts:
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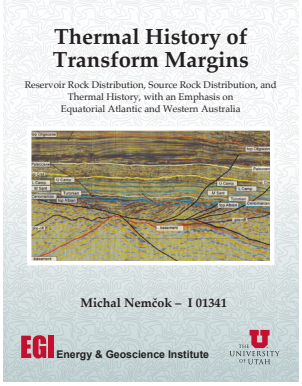
Email: prose@egi.utah.edu

Background

In the late 1980's, the U.S. Department of Energy requested that EGI initiate a program to develop thermally stable tracers for use in geothermal-reservoir tracing. At the time, several groundwater tracers were available, but no tracers had been characterized for high-temperature geothermal applications. EGI subsequently developed a family of fluorescent tracers—the naphthalene sulfonates—that were shown in the laboratory to be both thermally stable and very detectable (Rose et al, 2001). In biological studies, these tracers were shown to be neither carcinogenic nor mutagenic (Greim et al., 1994). EGI has confirmed these laboratory studies through numerous tracer tests at geothermal fields in the Western U.S. (Rose et al., 1997; Rose et al., 1999; Rose et al, 2001; Rose et al., 2002; Rose et al., 2003), Ohaaki, New Zealand and Awibengkok, Indonesia (Rose et al., 2000), Soultz, France (Sanjuan et al., 2006), Bulalo, Philippines (Rose et al., 2002), and Los Azufres, Mexico (unpublished). In the field tests at Bulalo and Soultz, excellent agreement was observed between the chemical analyses conducted at EGI and those conducted by the local laboratories (Rose et al., 2002; Sanjuan et al, 2006). More than 100 tracer tests have been successfully conducted by EGI using the naphthalene sulfonates in geothermal, petroleum and groundwater systems throughout the world.

22 Thermal History of Transform Margins

Completed | Available for Immediate Delivery



I 01341

Full Title: Thermal History of Transform Margins | Evaluation with application to reservoir rock distribution and source rock distribution and thermal history, with an emphasis on Equatorial Atlantic and Western Australia

Investment & Timetable: $65k (USD) per Sponsor

Project Completed: Q3 2020

Authors:

Dr. Michal Nemčok | Research Professor | Principal Investigator
Tel. +421-2-2062-0781 (Bratislava, Slovakia) | Email: mnemcok@egi.utah.edu
Samuel Rybár, Ph.D. | Co-Principal Investigator

EGI Contact:

ContactEGI@egi.utah.edu | (801) 585-3826

Project Rationale & Significance:

The main motivation for this study was to understand the thermal history of transform margins and spatial and temporal distribution of regions with a ductile lower crust. We completed another generation of thermal modeling, focused on how the thermal evolution of transform margins is controlled by deformation as ridge migration parallel to the margin causes a pronounced thermal perturbation. With respect to the structural architecture of transforms, described in detail in Chapters 1–3, one needs to understand that thermal history of transform margin sensu stricto is fundamentally different from that of both the associated and joining horse-tail structures. While the movements characterizing the transform sensu stricto are primarily parallel to the plate boundary, the movements characterizing the horse-tail structures in their normal fault-controlled portions are orthogonal to the ocean-continent boundary.

Value

- Determination of thermal histories of different transform margins
- Determination of how the rapid local pull-apart thinning influences such thermal history
- Determination of mechanisms and factors controlling the source rock maturation history with an attempt to develop a predictive tool

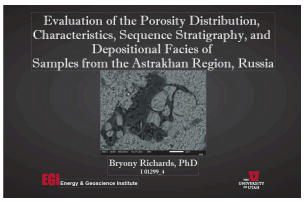
Deliverables

Arc GIS project (Arc Map v. 10.3), which contains:

- Folio with integrated write-up, figures, tables, maps and cross sections, organized in chapters addressing individual points listed as anticipated results
- Arc GIS format documentation of case studies

Evaluation of Rock Samples of the Astrakhan Region, Russia

Recently Released | Available to all Members I 01299_4



Full Title: Evaluation of the Porosity Distribution, Characteristics, Sequence Stratigraphy, and Depositional Facies of Samples from the Astrakhan Region, Russia

EGI Contacts:
Bryony Richards, PhD
Email: brichards@egi.utah.edu

Introduction

Phase 2B (EGI Reference # I_01299_4) of the advanced study of Astrakhan samples was proposed to build-on both Phase 1 (2017) and Phase 2A (2018). This continuation of the work on Astrakhan thin section samples from Wells AST-5, AST-8, and AST-45, is proposed to evaluate the distribution of pores related to depositional facies, in addition to the assessment of porosity changes through diagenetic alteration. Specifically, Phase 2B is likely to closely interrelate in terms of pore structure and evolution with that of the diagenetic histories of key stratigraphic intervals.

In addition to thin section petrography, key samples were proposed to be evaluated using scanning electron microscopy (SEM) utilizing a combination of backscatter (BSE) and secondary (SE) detectors to assess the pore structure of key stratigraphic intervals or those samples which have undergone extensive diagenetic alteration.

Pore architecture evaluation including a quantitative assessment of pore type, pore size, and relationship to diagenetic events and depositional facies.

Recently Released | Available to all Members

These following project reports have recently been released from the two-year period of sponsorship confidentiality. All current EGI members may download these reports at EGIconnect.com. When the GIS product is larger than 5GB the data will be delivered via a secure transfer site.

EGI CONNECT
ONLINE GLOBAL DATABASE

Exclusive Access to EGI Members

egi.utah.edu/egi_connect

(Note: EGI Connect supports Internet Explorer 10+, Google Chrome, Mozilla Firefox & Safari)

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