

28-30 October 2025 · Jumeirah Messilah Beach
Kuwait City, Kuwait

2ND EDITION AAPG/EAGE PETROLEUM SYSTEMS OF THE MIDDLE EAST GTW



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WORKSHOP OUTLINE

WORKSHOP OVERVIEW

The AAPG/EAGE Petroleum Systems of the Middle East, 2nd Edition workshop will gather industry experts, academics, and practitioners to address critical challenges and showcase innovative solutions for unlocking the energy potential within both conventional and unconventional plays in various petroleum systems present within the Middle East. This workshop will explore the region's unique geological complexities and provide a platform for sharing cutting-edge ideas and practices in both exploring and evaluating petroleum systems. It will focus on key challenges in reservoir characterization, hydrocarbon migration, and trap integrity. Particular attention will be given to overcoming limitations encountered in tight reservoirs, fractured carbonates, and deep-basin Paleozoic plays-areas, where traditional exploration methods are often less effective. Through case studies and advanced geochemical and basin modeling techniques, participants will gain valuable insights into breakthrough approaches for exploration and production in these complex systems.

This workshop will also introduce the role of petroleum system analysis in supporting the decarbonization of energy. This includes the assessment of natural hydrogen potential where petroleum systems provide a promising framework for assessing key hydrogen geochemical indicators and modeling hydrogen migration. Basin-wide thermal and flow modeling can also be applied to the assessment of geothermal potential and to the sequestration of CO₂ in aquifers.

In addition, the workshop aims to highlight the transformative impact of digital technologies on petroleum system modeling, showcasing how AI, machine learning, and advanced digital analytics are enhancing subsurface evaluation by improving accuracy, efficiency, and predictive capabilities.

KEY SESSIONS AND TOPICS

- Petroleum Systems of the Middle East – Challenges and Opportunities: Paleozoic and Older Petroleum Systems
- Petroleum Systems of the Middle East – Challenges and Opportunities: Mesozoic Petroleum Systems
- Petroleum Systems of the Middle East – Challenges and Opportunities: Cenozoic Petroleum Systems
- New Advancements in Petroleum Systems Modeling and Applications to the Decarbonization of Energy

Through these sessions, participants will gain a comprehensive understanding of how Middle Eastern energy resources can be developed sustainably, while advancing technological innovation and ensuring a responsible approach to energy exploration. This workshop will serve as a forum for knowledge sharing and collaboration, paving the way for an efficient and sustainable future in energy development.

WORKSHOP GUIDELINES

FORMAT

The workshop will be 3 days, consisting of oral presentations, poster presentations and breakout sessions where participants can discuss and investigate a specific theme that is of mutual interest. The first day will feature an inaugural keynote speech by a high-profile professional from the industry.

ATTENDANCE

Registrations are invited from all relevant disciplines with experience and/or knowledge of the subject areas being addressed in the workshop. Registrations will be accepted on a first-come, first-served basis.

CALL FOR POSTERS

You are invited to prepare a poster for presentation at the workshop. If you are interested in participating, please send a short abstract to cnavarro@aapg.org by **30 September 2025**. All posters will be produced as pull-up banners and delivered by AAPG and EAGE. There will not be any other format available for poster display.

REGISTRATION TYPES & FEES

Fees are inclusive of onsite documentation, coffee breaks and luncheons.

\$1,850 Non-Member	\$850 Young Professional **
\$1,650 Member *	\$500 Academia
\$1,550 Committee/Presenter	\$350 Student (Masters)

*To avail the Member rate you must be an active member of AAPG, EAGE, DGS, GSO or KGS.

**To register as a Young Professional you must be under the age of 35 with less than 10 years of work experience.

REGISTRATION DEADLINE

To guarantee your seat, please make sure to register by **21 October 2025**.

CANCELLATION POLICY

AAPG will refund the tuition, less a \$100 processing fee, if the request is received no later than 30 days prior to the workshop. Cancellations must be made in writing. The registrar will accept cancellation notices by telephone, but all such notices must be followed up by fax or e-mail. No refund will be made for cancellations received less than 30 days prior to a workshop being given. Nonpayment of tuition does not constitute automatic cancellation. If no cancellation notice is received by 30 days prior to a workshop, participants are liable for full tuition. AAPG reserves the right to cancel a workshop if enrollment is insufficient to ensure proper effectiveness. Substitutions for individuals can be made at any time. A paid enrollment may be transferred one time to a future workshop if the request is received prior to the 30-day cut-off date.

PARTNER SOCIETY



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Kuwait Geosciences Society

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SESSION 1: PETROLEUM SYSTEMS OF THE MIDDLE EAST - CHALLENGES AND OPPORTUNITIES: PALEOZOIC AND OLDER PETROLEUM SYSTEMS

The Middle East region has relatively few known source rocks of Paleozoic and older age, with most being geographically restricted. An exception is the widespread Lower Silurian source rocks, which are part of a global depositional event. These systems remain significantly underexplored. The Lower Silurian Qusaiba Formation, prevalent in Saudi Arabia and Oman, is a major source rock consisting of organic-rich shales deposited in a marine environment. It is highly prolific, contributing to substantial hydrocarbon accumulations in Saudi Arabia, Qatar, Jordan, and Iraq. The effectiveness of these source rocks extends, to varying degrees, across other parts of the Middle East, including the Sahmah Formation (Oman), Mudawwara Formation (Jordan), Sharawra Formation (Qatar), Rann Formation (UAE), Abba (or Tanif) Formation (Syria), and Akkas Formation (Iraq).

Cambrian and Precambrian petroleum systems are primarily confined to Oman basins, with some presence in Yemen. These systems are considered as one of the well-known oldest source rocks and reservoirs with widely dominated lithologies of shallow marine to deep basinal carbonates, siliclyte and evaporites. The unique Athel silicilyte and Ara carbonates-stringers are thought to be of self-charging systems. These systems serve as the primary source for the majority of Oman's hydrocarbon accumulations. Hydrocarbons generated from Paleozoic and older source rocks are found in reservoirs spanning a wide age range, from Precambrian to Tertiary formations.

SESSION 2: PETROLEUM SYSTEMS OF THE MIDDLE EAST - CHALLENGES AND OPPORTUNITIES: CENOZOIC PETROLEUM SYSTEMS

The Middle East possesses very important Cenozoic Petroleum systems particularly in Iraq, Iran, Red Sea countries (such as Egypt, Saudi Arabia, Yemen and Sudan) in addition to the Nile Delta Basin in Egypt. The Cenozoic systems in the Middle East are found in various settings such as rift, fold belt and stratigraphic settings.

In Iraq, the Cenozoic Petroleum system is considered the second most important system. About 16% of the Iraqi reserves and about 40% of the southwestern Iranian reserves are found in the reservoir elements of this system. Many Iraqi and Iranian giant and supergiant oil fields are produced from Cenozoic reservoirs within the Zagros fold belt and foreland, including the supergiant Kirkuk Oilfield, the first major discovery in Iraq, and the supergiant Ahwaz Oilfield in Iran. The Cenozoic of Iraq and Kuwait also contains unconventional resources represented by heavy oils in the Middle Miocene.

The Gulf of Suez is one of the oldest Miocene producing oil basins in the Middle East comprising large share of Egypt oil production. In addition, many oil discoveries were reported in the various Red Sea countries in the Miocene. One of most prolific Miocene basins for gas in the Middle East is the Nile Delta which included world-class gas discoveries.

The Cenozoic petroleum systems of the Middle East are significant yet poorly understood. The workshop is seeking submissions to improve the knowledge gap in the Petroleum potential of this important geological time.

SESSION 3: PETROLEUM SYSTEMS OF THE MIDDLE EAST - CHALLENGES AND OPPORTUNITIES: MESOZOIC PETROLEUM SYSTEMS

The Mesozoic era is the most important petroleum system in the Middle East, especially in the Arabian-Iranian Basin.

The Neo Tethys formed in the early Mesozoic had intrashelf basins with rich source rocks. The early Mesozoic arid climate caused the formation of evaporitic caprocks.

Major Jurassic reservoirs are carbonate rocks such as the giant Arab Formation in Saudi Arabia, UAE, and Qatar and Najmah in Iraq, Marrat in Saudi Arabia and Kuwait. Reservoirs in Yemen Jurassic while in Jordan and Syria are Triassic. The main cap rocks are the evaporites of the Gotnia Formation.

Cretaceous reservoirs are carbonate and clastic. In Kuwait, Saudi Arabia, Oman and Iraq the clastic reservoirs are Burgan, Zubair and Nahr Umr formations and Qishn in Yemen. Major carbonate reservoirs are Mauddud, Mishrif, and Natih formations

Most of the source rocks are dominated with marly limestone and are mature, marine, agal type with kerogen type II, IIS to II-III with rich in TOC. Jurassic source rocks are, Tuwaiq Mountain, Hanifa, Jubaila, Najmah, Sargelu, and Khatatbah as well as some Jurassic in Yemen, Jordan, Syria and Egypt. Cretaceous source rocks include the Makhul in Kuwait, Kazdumi in Iran, Chia Gara and Sulaiy in Iraq, and Natih formations in Oman.

Some of these source rocks are unconventional reservoirs too, such as Najmah and Makhul formations.

This session seeks new Mesozoic oil and gas discoveries in the Middle East. This also includes the unconventional reservoirs within the source rocks.

SESSION 4: NEW ADVANCEMENTS IN PETROLEUM SYSTEMS MODELING AND APPLICATIONS TO THE DECARBONIZATION OF ENERGY

Basin modeling is being used very successfully in the exploration for oil and gas for more than 40 years where the analysis of a functioning petroleum system helps clarify questions of source rock maturity, charge volumes and hydrocarbon fluid type. Today, basin modeling is fully integrated in industrial exploration workflows. In addition, applications have been extended to non-hydrocarbon fluids, to pore pressure prediction and reservoir quality prediction that all require the integration of the dynamics of a petroleum system and the notion of geological time into the analysis.

The recent effort of decarbonization of the energy led to new applications such as carbon sequestration, the search for geothermal energy, helium resources and the exploration for natural hydrogen that can benefit from a petroleum systems approach. New technological advances in modeling include inversion methods, quantification of uncertainties and other data science applications to forward modeling.

This session welcomes contributions of new approaches and alternative applications to basin modeling and petroleum systems analysis, including from software providers, academics and operators.

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INTRODUCTION TO THE PETROLEUM SYSTEMS OF THE PALEOZOIC IN CENTRAL AND EASTERN SAUDI ARABIA



FIELD TRIP INFORMATION

Field Trip Organizer



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Kuwait Geosciences Society

Field Trip Leaders



**Mohammed Al-Mahmoud
and Abdulaziz Al-Duaiji,
Independent Geological Consultants**

Date: 24-27 October 2025
Location: Qasim area in Central Saudi Arabia
Field Trip fee: \$1,760 for Buraidah locals (hotel not included)
\$2,000 for non-locals (hotel included).

Registration Deadline: 2nd October 2025
Register during workshop registration

Fee Includes:

- 3 nights accommodation (24th – 27th October) in a 4-star hotel in Buraydah
- Daily breakfast at the hotel, field lunch boxes with beverages, and dinner.

Please note that the fee does not include the travel to and from Qassim which should be arranged by the participants

FIELD TRIP OBJECTIVES

This field trip offers a comprehensive understanding of the major elements of the Paleozoic Petroleum System of Saudi Arabia at their surface exposures. This includes:

- The major source rock (Silurian Qusaiba Shale),
- The major Upper Paleozoic clastic reservoir (Unayzah Formation)
- Anticlinal traps (Kahfah and Qusaiba anticlines)
- Examples of the top and lateral stratigraphic and structural seals
- The ultimate top seal (Sudair Shale) of the whole Paleozoic Petroleum System
- Some of the fracture systems and deformation bands and their role in reservoir permeability
- Discussion of the pressure system and hydrodynamics and their role in the petroleum system at relevant field stops
- Addressing the unconventional hydrocarbon accumulations within the Paleozoic at relevant stops.

Subsurface case studies from Central and Eastern Saudi Arabia will be integrated into discussions at each relevant field stop.

This field trip has been successfully conducted many times for Aramco's E&P professionals and for geoscience departments at KSA universities, making it a proven educational and professional development experience.



FIELD ACTIVITIES

- Day 1:** Participants check in at hotel. After lunch, participants will visit a heritage exhibition and return back to the hotel for an evening pre-trip meeting in which the field trip leaders will give an introductory presentation on the Paleozoic Petroleum System of Saudi Arabia and the field trip program.
- Day 2 (field):** Visit to the Qusaiba area to observe and discuss the Middle to Upper Paleozoic (Qalibah to Unayzah) formations, the Qusaiba Anticline, and the pre-Hercynian Unconformity. Late in the day, the group will visit the outcrops of the ultimate top seal of the Paleozoic Petroleum System (Sudair Shale Formation) near At-Tarafiyah.
- Day 3 (field):** Visit to the Kahfah area to observe and discuss the stratigraphic traps, Kahfah anticline, fault and fracture systems, and deformation bands, and adjourn the field trip.
- Day 4 (Departure):** Participants check out from hotel.

IMPORTANT TRAVEL INFORMATION FOR THE FIELD TRIP

The field trip will take place in the Qassim region of Saudi Arabia, starting and ending in Buraydah City. Participants traveling from Kuwait have the following options to reach Buraydah:

- Direct Flight – Al Jazeera Airlines operates direct flights from Kuwait to Prince Naif Bin Abdulaziz International Airport (Qassim), followed by a 15 km taxi ride to Buraydah.
- Connecting Flights – Saudia, Kuwait Airways, Etihad, FlyDubai, and Gulf Air offer non-direct flights to Prince Naif Bin Abdulaziz International Airport (Qassim).
- By Road – A six-hour drive from Kuwait to Qassim via Hafr Al-Batin.

Participants are advised to plan their travel accordingly.

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EXPLORING REGION PETROLEUM SYSTEMS THROUGH CORE DISPLAYS



28TH – 30TH OCTOBER

The AAPG/EAGE Workshop on Petroleum Systems of the Middle East offers an excellent opportunity to examine the region's diverse geological history through core display sessions. Participants will be able to study carefully selected cores that highlight the variety of geological settings and petroleum system elements across the region. These displays encourage meaningful conversations about the significance of these formations in hydrocarbon generation, migration, and accumulation, making the workshop an ideal setting to expand technical knowledge and connect with fellow professionals.

The core displays will feature key stratigraphic units from three countries in the region:

1. Oman

- a. Buah Formation (Precambrian, Ediacaran): Characterized by deep marine silicilyte facies and high total organic carbon (TOC) intervals, the Buah Formation is a prolific pre-salt source rock supporting significant hydrocarbon accumulations in South Oman.
- b. Athel Formation (Cambrian, Paleozoic): Exhibiting a transition from fine-grained, organic-rich silicilyte to dolomitized carbonates, the Athel Formation is notable for its high TOC content and role as a source rock and tight reservoir.

2. Saudi Arabia

- a. Qusaiba Formation (Rhuddanian, Silurian, Paleozoic): The principal Silurian source rock on the Arabian Plate, the Qusaiba Formation, comprises organic-rich, graptolitic shales with extensive lateral continuity and high TOC, making it a fundamental contributor to the region's Paleozoic petroleum systems.
- b. Tuwaig Mountain Formation (Callovian, Jurassic, Mesozoic): This formation is distinguished by finely laminated, organic-rich lime mudstones and marls, serving as a prolific source rock for the giant oil fields of Central Arabia.

3. Kuwait

- a. Najmah Formation (Callovian-Oxfordian, Jurassic, Mesozoic): Consisting of organic-rich argillaceous limestones, the Najmah Formation is a primary source rock and a fractured reservoir within the Jurassic petroleum system, supporting significant hydrocarbon accumulations.
- b. Makhul Formation (Berriasian, Cretaceous, Mesozoic): Composed of dark grey to black, bituminous, pyrite-rich limestones, the Makhul Formation is a significant Cretaceous source rock, contributing to oil accumulations in overlying reservoirs.

By showcasing these important stratigraphic units, the workshop provides a platform for geoscientists to share insights, discuss regional challenges, and foster collaboration on future research and exploration throughout the region.



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