WORKSHOP BROCHURE

22-24 July 2024
Hilton Windhoek Hotel, Namibia

AAPG GTW **FROM FRONTIER TO DISCOVERIES:**
NAMIBIA'S JOURNEY TO MAJOR OIL AND GAS DISCOVERIES

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WORKSHOP OUTLINE

WORKSHOP OVERVIEW

AAPG will be hosting a three-day workshop featuring a series of presentations focused on showcasing Namibia's exciting journey to major oil and gas discoveries detailing the deep-water play, its current understanding, and future potential.

Despite various exploration efforts over the past years, it has become apparent that there is a considerable need for revisiting the Cretaceous plays of the Orange Basin, and potentially, other Namibian offshore basins.

The results of recent drilling activities have turned Namibia's Orange Basin into a global hotspot for exploration activities, with multiple rigs currently operating offshore Namibia. The association of multiple successive, world-class deep-water discoveries in the Orange Basin, has further proven to be game changers for Namibia's upstream industry.

Namibia is now termed as a promising frontier margin, with the recent discoveries opening a new play fairway in the Orange basin.

WORKSHOP OBJECTIVES

This workshop aims to enhance the outcomes of the 2022 AAPG Namibia GTW by offering in-depth analysis of the onshore and offshore geology and, to describe the proven and potential petroleum systems. It will present the integration of data from seismic, geological, and geophysical data to better understand and describe the proven and potential petroleum systems. Professionals, scholars, and industry enthusiasts will be able to give talks and exhibit posters with excellent, comprehensive, and creative data on the considerably reduced-risk petroleum systems of Namibia's frontier basins. By enhancing regional knowledge of tectonic evolution, geology, and structure, these data hope to shed light on these basin's prospectivity.

Participants are expected to leave with knowledge and exposure to the following:

- Proven and possible petroleum systems of Namibia uncovering the transformational potential of the Orange Basin
- Regional understanding of sedimentary & tectonic evolution, providing new insights regarding the prospectivity of these basins.
- Deep water reservoirs: Reservoir distribution their depositional architecture and controls on reservoir quality
- Challenges of deep-water exploration the evolving trend of African deep-water exploration
- Current and projected exploration and appraisal activities in the Orange Basin

BENEFITS OF ATTENDING

The workshop is an opportunity for attendees to receive up-to-date knowledge about the recent deep-water discoveries, talks will be focused on understanding the proven petroleum systems and exploration plays that have been identified in recent exploration activities. It is an opportunity to network and share experiences.

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 POSTER ABSTRACTS

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 21 June 2024. All posters will be produced as pull-up banners and delivered by AAPG. There will not be any other format available for poster display.

REGISTRATION TYPES & FEES

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

$680 AAPG Non-Member
$680 Join and Save
$550 AAPG Member
$475 Committee/Presenter
$250 Young Professionals
$170 Academia
$90 Students

*To avail the Member rate you must be an active member of AAPG.
**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 15 July 2024.

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.

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SESSIONS DESCRIPTIONS

22 - 24 July 2024
Hilton Windhoek Hotel, Namibia

DAY 1: MONDAY, 22ND JULY

SESSION 1: TECTONO-SEDIMENTARY EVOLUTION AND STRUCTURAL HISTORY

Rifting was the predominant phenomenon in offshore Namibia during Late Jurassic to Early Cretaceous with continental break-up in the Barremian period leading to the establishment of a passive continental margin. The passive margin can be divided into 4 megasequences, the pre-rift megasequence which consists of Karoo formations as defined within the main Karoo Basin and southern onshore Namibia. The pre-rift is overlain by the late Jurassic to early Cretaceous syn-rift megasequence. The first phase of the syn-rift, Synrift I, is confined to the southern half of the Namibian offshore margin, whereas the second synrift phase (Synrift II) is present, and thickens rapidly northwards, within the Walvis Basin towards the Walvis Ridge. The transitional megasequence, marks the initial effects of thermal sag following the end of rifting and is the first to contain signs of a developing shelf break. A large marine-transitional source rock was deposited during the transgressive events of the Barremian-Aptian times with flooding culminating during the mid-Aptian. The mid-late Cretaceous to Tertiary megasequence developed because of continued sagging and tilting of the continental margin offshore Namibia. This megasequence in the south of the Walvis Ridge, is characterized by strata that is truncated and displaced by a listric slump detachment system that extends down close to the Cenomanian-Turonian unconformity. Further into the basin slumping often terminates in a mounded toe region or in a succession of mass flow gravity slides, MTDs and stacked thrusts south of the Walvis ridge. The Tertiary is separated from the underlying Late Cretaceous sediments by the Base Tertiary Unconformity.

This session will discuss the tectono-stratigraphic evolution of the various Namibian Basins, emphasizing on how it controls the supply and deposition of sediments and the distribution of petroleum systems elements. It will also highlight the type of potential petroleum traps and their integrity through time.

SESSION 2: PETROLEUM SYSTEMS OF NAMIBIA

The petroleum exploration in the Namibian sedimentary basins is still in frontier phase and the petroleum systems are not properly understood. The challenge of exploring in frontier basins is identifying and de-risking hydrocarbon play elements due to sparse and sometimes absence of seismic data, well data, lithological and stratigraphic information. To date, only 42 exploration wells have been drilled offshore Namibia of which seven have been drilled in the Kudu Gas Field. Exploration wells drilled on Graff, Jonker, Venus and Mopane prospects have all resulted in discoveries of light oil with associated gas. The regional petroleum systems are poorly understood but the discoveries in the Orange Basin have demonstrated that a working petroleum system is present offshore Namibia.

Onshore, there are two vast Neoproterozoic/Early Cambrian Basins, the Owambo Basin in the country's northern part, and the Nama Basin in the south. Most of the drilled onshore exploration and stratigraphic wells were relatively shallow, and hardly tested the full onshore potential. Hydrocarbon exploration both offshore and onshore Namibia has proven the presence of a working petroleum system and elements such as multiple reservoirs, source rock, trap, and seal sequences have been confirmed.

This session will discuss Namibia's petroleum systems with a focus on how all the various elements come together to define proven and potential petroleum systems.

DAY 2: TUESDAY, 23RD JULY

SESSION 3: SOURCE ROCKS OF NAMIBIA

Source rocks are organic-rich sediments that are one of the most critical elements of a working petroleum system. On the Namibian offshore margin, three potential source rocks have been intersected by a number of wells drilled offshore Namibia. Amongst these three potential source rocks, is the prominent transgressive marine Aptian ''Kudu" shale source rock. The Aptian source rock has a regional distribution and can be mapped across the margin on regional seismic data and has been modelled to be a matured source rock that is capable of generating and expelling huge volumes of hydrocarbons. The Cenomanian–Turonian source rock has also been penetrated offshore, although immature at intersected depths, the Cenomanian-Turonian shale was found to be a world class rich source rock, and with deeper burial is likely to be mature for hydrocarbon generation. Potential source rocks may also occur deeper in the Early Cretaceous syn-rift basins. This has been confirmed by the results from a biomarker and isotope analysis study that suggests the presence of a deeper lacustrine source rock. The Aj-1 well drilled in the South African portion of the Orange Basin has proven the existence of this source rock.

Onshore, source rock has been sampled in wells and encountered in outcrops from the Owambo and Nama Basins. Source rock presence within the Owambo Basin has been associated to the Otavi Group carbonates and marine shales from the Otavi and Mulden Group. The oil prone shales in the Nama group belong to the Karoo Prince Albert formation, these correlate well with the Whitehill formation in South Africa and the Irati Shales in South America. Source rock within the Nama Basin has been associated with the Permian age Ecca Group coal seams.

This session will showcase techniques for defining the limits of petroleum systems, how to map out the distribution of source rocks with the help of the current understanding resultant from the discoveries. Discussions will highlight the proven and potential source rocks of Namibia, their characteristics, burial history, and their proven / possible migration routes.

SESSION 4: RESERVOIRS OF NAMIBIA AND CHALLENGES OF EXPLORATION IN DEEPWATER

Reservoir rocks in Namibia range in age from the Proterozoic to the Tertiary, varying from sandstones to carbonates and were deposited from Aeolian to deep water environments.This session will attempt to address few of the challenges encountered while exploring these reservoirs. Potential reservoir rock horizons include the Proterozoic Nosib, Otavi and Mulden Groups.

The Nosib Group includes interbedded marine and continental clastics with minor Carbonates. The Otavi Group is believed to be a self-sourcing carbonate system, and is primarily dominated by shallow marine carbonates, with lesser amounts of interbedded Sandstones and shales. Potential in the Karoo section remains to be evaluated.

In the pre-break up section of the Atlantic Margin predicting the presence of sandstone and carbonates reservoirs in a section dominated by volcanics. The distribution of the Lower Aptian to Lower Albian carbonates and where good reservoir quality is likely to be found.

The facies and distribution of deep-water sandstone reservoirs, is often beautifully imaged by 3D seismic data, but can reservoir quality and hydrocarbon fill be predicted? The effects of bottom currents and contourite deposits on the reservoirs. Deepwater exploration adds cost and engineering complexity and the challenges may be exacerbated by a potentially high gas content in Graff and Venus.

Associated gas is being reported from these reservoirs suggesting either a free gas cap or a high gas-oil ratio, with significant volumes of gas dissolved within the liquid hydrocarbons.

Development wells would have to bypass any gas cap that may be present, and produced gas might have to be carefully managed, possibly reinjected to the reservoirs until an economic route for taking the produced gas to market can be confirmed. Gas management has already proven to be a challenge offshore. In addition, other geotechnical or engineering challenges associated with deep water production can also be discussed in this session.

DAY 3: WEDNESDAY, 24TH JULY

SESSION 5: QUANTITATIVE TECHNIQUES AND ANALOGUES TO CONSTRAIN PROSPECTIVITY

Several quantitative techniques are used by the industry in the assessment, risking and ranking of principal leads and prospects identified in the basin. One such technique is the direct hydrocarbon indicators (DHI) method which could be used to characterize the identified leads and prospects. This helps to improve the chances of success or minimize an obvious risky prospect. Whilst certain DHIs are evident from seismic profiles and as seeps, the absence of this should not be assumed to indicate that hydrocarbon accumulations have not occurred.

These DHIs seem to line up very well with presence of source rocks and accumulations. Earlier enthusiasm from drilling results have been replaced by mixed views due to complexity in reservoirs and the associated deliverability. The recent success of discoveries has been attributed to the use of the Amplitude -variation -with - offset (AVO) analysis although the exact details have not been shared with industry participants. Additional drilling programs, by various operators, are planned for this year and the success of AVO as a tool will be further assessed.

Whereas the use of AVO has been successful with wells such as Mopane-1X, Venus-1X and Jonker-1X, amongst others; there have been notable instances in which AVO resulted in well failure. This is exemplified by the results of the Kabeljou-1 well which was drilled based on AVO response/signal but had failures ranging from absence of reservoir to a leaky structure.

This session discusses the successes and challenges of quantitative seismic interpretation and analogues to constrain prospectivity in the basins along the Namibian offshore margin and beyond. It will also examine how these quantitative techniques, such as direct hydrocarbon indicators (DHIs) and AVO responses, have been used in the assessment, de-risking and ranking of leads and prospects identified in the basins along the Namibian offshore margins. It is appropriate to re-visit previous exploration campaigns in Namibia to analyze the successes and failures of DHIs and AVO to determine how these quantitative techniques should be used to derisk leads and prospects in the future.

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