Finding Petroleum

StrategicFit - overview to business opportunities in the Middle East

Spectrum – maybe have a look at Lebanon

PGS – a new opportunity offshore Egypt

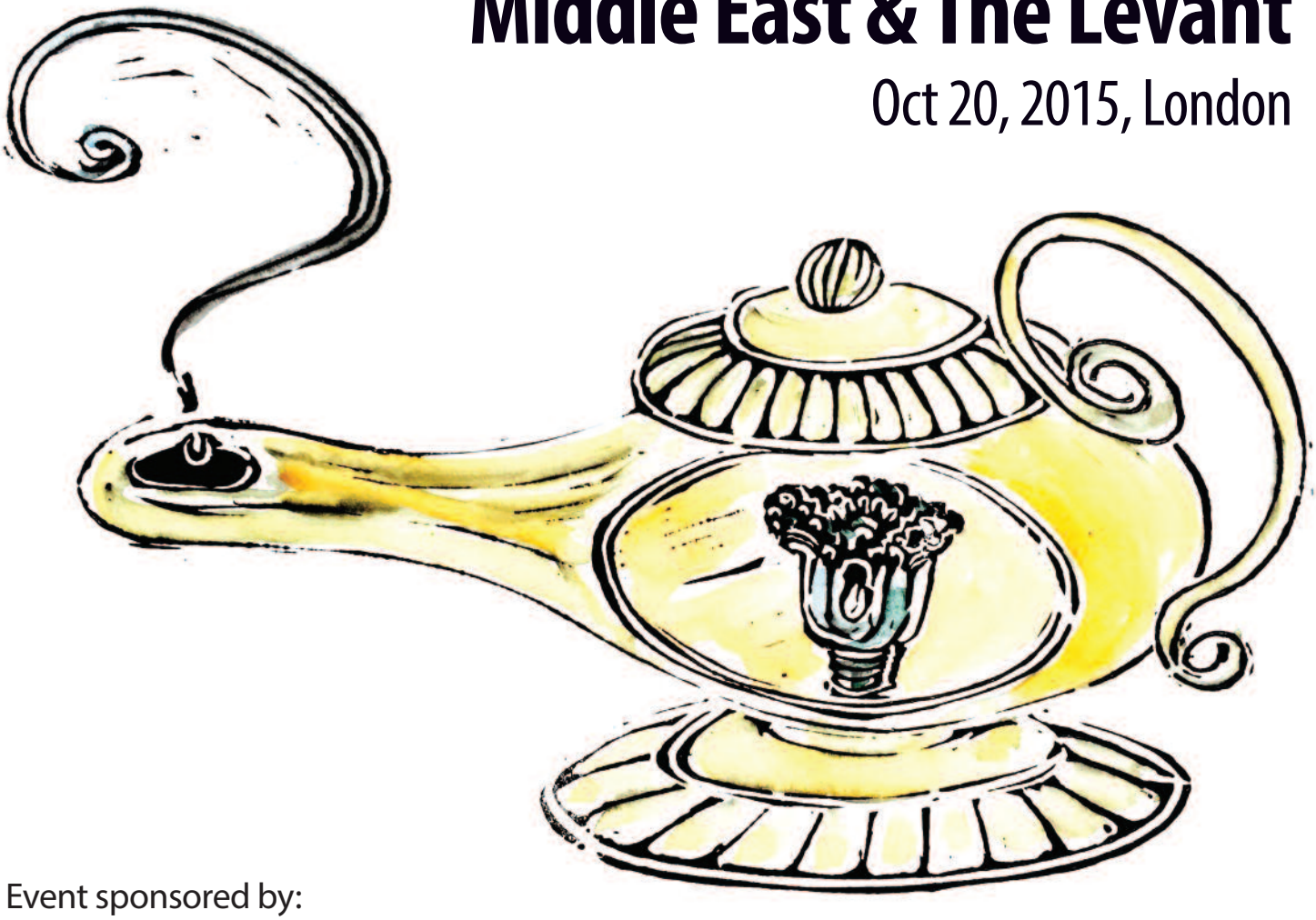
FGE – Iran has possibilities

Event Report, Opportunities and Risk in the Middle East & The Levant , Oct 20, 2015, London

Special report

Opportunities and Risks in the Middle East & The Levant

Oct 20, 2015, London



Event sponsored by:

StrategicFit PGS PGA Ltd Geological Consultants HALLIBURTON Landmark GRL CC

StrategicFit

Helping you make quality decisions

StrategicFit is a strategy consulting firm specialising in the upstream oil and gas industry.

We help companies, licence partnerships and stakeholders make difficult decisions they can be confident in.

Through decision analysis, a collaborative strategy process and sector expertise, we'll give you a clearer way forward.

www.strategicfit.co.uk

+ 44 (0) 20 7637 0324

Middle East is where the oil is

The Middle East is where the oil is – but producing it is far from easy, as we heard in our Finding Petroleum forum in London on October 20th, "Opportunities and risks in the Middle East & the Levant" – with a special focus on Iran, Lebanon, Egypt and the Zagros

"I've worked now for two direct supervisors, both CEOs, who said, if you want to be in the oil and gas industry from 2030 onwards, you need to be in the Middle East," said Andrew Lodge, Principal with oil & gas strategy consulting firm StrategicFit, and Chairman of the conference, in his opening remarks.

Mr Lodge is a former Exploration Director for Premier Oil and VP Exploration for Hess.
The Middle East "has the opportunity, but it has significant issues."

The Middle East is the source of 30 per cent of the world's oil production, dominated by Saudi Arabia, and the reserves for future oil production are also in the Middle East, Mr Lodge said.

There may be great potential for unconventional oil and gas operations in the Middle East, given the "wonderful world class source rocks," he said. Although there haven't been much efforts to try and find it so far, with so much conventional oil available.

"We could still be, in the oil industry, at the end of this century still focussed on Middle East. It is theoretically a land of opportunity," he said.

But of course there are plenty of difficulties with oil and gas operations too, including political instability and terrorist attacks.

Mr Lodge quoted Espen Barth Eide, Managing Director of the World Economic Forum and former Norwegian Minister of foreign affairs, who once said. "Energy politics in the region must change from being divisive to an enabler of sustainable and inclusive economic growth."

"We all know it's unlikely to change," Mr Lodge said.

Given security and instability issues, and limited demand for oil, a realistic prediction is that production from the Middle East in 2025 will be roughly the same as it is today, he said.

Politically, "maybe we can say that the US is less interested in the Middle East now it has its own domestic supplies of oil, he said. But China is having a growing interest in the region. The influence of China in the Middle East is already there and will continue to grow."

The Chinese have a growing influence in the region from a demand point of view, basically in partnership with the National Oil Companies," he said.

"CNPC (China National Petroleum Corporation) does invest with other companies. So there will be relationship opportunities to partner with CNPC and join them. They have the contacts and diplomatic clout."

The majority of the Middle East has low finding cost, low development cost and low operating cost, with the only exception being offshore deepwater Egypt, he said.

One particularly interesting area is the Zagros region of Iran. "That's where the oil is," he said.

Apache has a strong position in Egypt. "It has done a fantastic job there, bought it, developed it, found more, protected it, got costs down. Having a physical location slightly away from main centres of protesting has helped it go forward," he said.

Oxy (Occidental Petroleum Corporation) has "a long history of relationship building, investment, investing for growth," he said. It is one of the few US

This is an Event Report from our Finding Petroleum forum in London on Oct 20, 2015, " Opportunities and risks in the Middle East & the Levant"

Event website

www.findingpetroleum.com/event/e03a4.aspx

Some presentations and videos from the conference can be downloaded from the event website.

Conference produced by David Bamford

Report written by Karl Jeffery, editor of Finding Petroleum
jeffery@d-e-j.com
Tel 44 208 150 5292

Sales manager

Richard McIntyre
rmcintyre@d-e-j.com
Tel 44 208 150 5291

Conference produced by Karl Jeffery

Layout by Laura Jones, Very Vermilion Ltd

Cover art by Alexandra Mckenzie

Finding Petroleum

www.findingpetroleum.com

Future Energy Publishing,
39-41 North Road,
London, N7 9DP, UK
www.fuenp.com

The conference was sponsored and supported by Neftex Exploration Insights (part of Halliburton), Cambridge Carbonates, Spectrum, PGS, Geospatial Research and Petroleum Geological Analysis Ltd.

The full agenda and links to download videos and presentations (where speakers have agreed to make them available) is www.findingpetroleum.com/event/e03a4.aspx

Also speaking at the conference but not included in this report:

Stephen Trueblood, Commercial Manager for Sasol Petroleum International, gave a presentation on the future of Egypt's oil and gas industry. The talk is not included in this report, the slides and video were not released.

Richard Jones, CEO of Geospatial Research, gave a presentation on the geological structural style of the Zagros mountain belt through Iran and the Kurdistan Region of Iraq, characterised by world class structural traps and stacked fractured reservoirs. The talk is not included in this report, but the slides are available on the Finding Petroleum website.

Andy Horbury, Director of Cambridge Carbonates, gave a presentation on the geology of the Zagros margin of the Arabian plate. The talk is not included in this report, but the video and slides are on the Finding Petroleum website.

John Hurst, recently retired Head of Exploration with Genel Energy, gave a talk on the highs and lows of exploration in the Kurdish Region of Iraq. The talk is not included in this report and the video and slides were not released.

Mike Simmons, Technology Fellow with Neftex Exploration Insights at Halliburton, gave a geological talk on exploration potential in Iran, including Classic Zagros Fold Belt plays, Extension of the fractured carbonate plays from Kurdistan, Resource plays from rock units such as the Kazhdumi and Pabdeh shales and the potential of the South Caspian. The talk is not included in this report and the video and slides were not released

companies that has continued to invest in the Middle East."

Genel Energy has been successful in the Kurdistan Region. "A lot of us saw that map with wonderful undrilled folds. But it is one thing to think about them, another thing to get in there and do something about it."

Some oil companies start by trying to work out where they can make money – but Genel started by looking for where the resource (oil) was, on the basis that if it could find oil, it would be able to make money, Mr Lodge said.

Egypt

There has been a major discovery by ENI (the Zohr field) in offshore Egyptian waters. "It gobsmacked me," Mr Lodge said.

The field was found in "a published seismic line," and many people saw the same data. This leads to possibilities for other future developments in Egypt and Lebanon.

"Egypt has been a wonderful country, because it is most like Western oil industry of any country in the Middle East," he said.
"There is a farm in market, people buy companies, sell companies. But a lot of uncertainty exists."

If it was his personal choice of where to invest, Mr Lodge said he would not currently invest in Egypt in the current price environment. "It is difficult to do what Apache have done," he said.

Saudi Arabia

"Saudi Arabia is pivotal to the area, it has the most production and the most reserves and it controls OPEC," he said. "It is essentially at the moment dominating the market, forcing the market price of oil, to some extent attempting to destroy unconventional resource of the US."

"Are they determined to basically bust US unconventional production - or get it to a certain level where they are comfortable US oil stays in the US [ie the US does not export any oil] and Saudi dominates emerging markets?" he asked. "Saudi Arabia could theoretically change course."

Iraq / Kurdistan

In recent years the most exciting exploration opportunities have been in the frontal fold belt of Kurdistan. "It's a great place to find oil."

"The oil which comes out is not sold at market price, it is sold at a discount or sometimes not even paid for," he said.

The Kurdistan Regional Government (KRG) has challenges are getting oil to market, with regular damage to their pipelines. "The companies who invest there don't get paid very often," he said. "KRG needs that money to fund its own fight against ISIS."

"But I'm pleased to see DNO and GENEL have in fact received payments over the last couple of months.
KRG did a deal with Baghdad, where it would supply oil to Baghdad in return for cash. But, "Iraq can't give you cash and they claim that KRG can't give them the oil," he said.

Current production overall in Iraq is "well below" what it has been in the past, and there's no quick fix to this in sight.

Iran

Iran is likely to open up, with upcoming lifting of sanctions "theoretically related to the nuclear deal, one suspects also [linked to] to IS threat," he said.

The Europeans see it as a great opportunity, while Americans are "a little bit more reserved," he said

"If you listen to the rhetoric of some of the US Republican candidates, they are for tearing up the nuclear deal and going back to the way it was. The Europeans say, yes let's go for it."

"So there's an opportunity for oil companies based in Europe to take a lead in this, and for the UK."

Many oil companies including Premier, Hess and BHP were close to signing contracts in Iran before the last wave of sanctions. This means that many people are ahead of the game in terms of understanding the subsurface, he said. "I see this primarily as a development opportunity (not an exploration opportunity)."
Although the value of the opportunity will depend on what sort of contracts the Iran government is willing to sign, he said.

Lebanon

Looking at the Eastern Mediterranean / Levant region, many people have evaluated Lebanon, and then been dismayed "that the offshore has never opened up," he said.

"It has been there for 10 years as a potential opportunity for investment."
The country claims, even on advertising billboards, that the country has oil. "But it doesn't," he said. "It thinks it has."

However, "some figures suggest it has a significant amount of oil and indeed gas," he acknowledged.

"My own view, having seen the data, is that I'm not too sure whether offshore Lebanon is a major opportunity."

ENI drilled 2 wells in offshore Cyprus, on the same plays which are present in Lebanon, which turned out to be dry.

"And if there is an opportunity will there ever be a license round? And if there was a license round, and we find oil and generate cash, what would happen to it? How would the country behave?"

"It is probably best for the country to be a little bit slower, let the whole thing play out and then open up to the industry with clear contractual obligations," he said.

Economics

It is also important to note that oil fuels the economy of Middle Eastern countries, and they need a certain oil price to keep their budgets going.

Even at a $100 oil price, many of the

countries did not meet their own budget requirements from the cash generated
from oil sales," he said.

"The situation today at $50 is even bleaker. Only Kuwait generates more funds from oil than it needs for its own budget."

Iraq has managed to reduce its requirements for a break-even oil price (ie reduced government spending).

If the oil price stays low, that could lead to more tension in the region, especially with Iran increasing production. "Will this lead to further instability in the region? Probably."

OPEC has issues enforcing any quotas it makes. "They will do a certain quota but actually do more than that. It undermines the premise of cuts and control."

Security and contracts

If you are investing in the Middle East, as well as the subsurface issues, you have to look at the security situation and sanctions, delayed payments and contract uncertainty," he said.

"All this means - when a company makes an evaluation of Middle East - it has to think much more critically about the risks it is prepared to take," he said.

"Delayed payments are always an issue in Egypt. Generally the money comes but delayed," he said.

"For an oil company, the key sanctity is, 'do I have a contract to work with'," he said. "Have I signed something so, if I find the oil I will gain something from it - either oil or cash.

Having said all that, companies are successful, he said.

See a link to Andrew's talk on video and slides at
www.findingpetroleum.com/event/e03a4.aspx

Neil Hodgson – maybe have a look at Lebanon

Offshore Lebanese waters could hold more oil than is commonly thought, said Neil Hodgson - Executive Vice President Mediterranean and Middle East Region, with seismic company Spectrum

"I strongly believe that the Levant has only started to give its reward, and it will keep giving," said Neil Hodgson, Executive VP Multiclient with Spectrum and formerly Exploration Director for Matra Petroleum, and with BP, BG and Premier Oil.

By the "Levant," Mr Hodgson is referring to the eastern Mediterranean, with areas around Lebanon, Israel, Egypt and Cyprus.

The North Levant waters, offshore South Lebanon, is 'probably an oil play' as well as a biogenic gas play, and it has bigger and less complex structures than offshore Israel, he said. The reservoir rock is 3-4 times thicker than offshore Israel.

The prospects for gas changed with Eni's Zohr 30 TCF gas discovery earlier in 2015, and there may be other gas fields like it, he said. Zohr "not only changes the geopolitics of the area, but it also changes the geological story quite dramatically. There's got to be 50 TCFs in the Zohr analogues," he said. "I heartily encourage you to explore it if you can."

Gas

Most people think that there is only gas in the region, and it is deep and expensive, he said.

Combined with security issues, and commercial issues (particularly getting gas from Israeli oilfields out to wider markets), and poor results from two ENI wells drilled offshore Cyprus in 2015, "It leads to a picture that the Eastern Med is not a very interesting place at all," he said.

Offshore Israel is widely considered to be a gas basin. "It is, sort of, so far. But is it always going to be a gas basin?"

Israel's 11 TCF Tamar gas field, drilled by Noble Energy in 2009, was "quite a landmark type of well", under 1500m of water, which counted as deep in 2009, he said.

It was brought online in just 3 years, by tying it back to a facility in shallower water, using a 75km tieback. "You don't need a 15 year development cycle," he said.

Tamar was followed by a series of roughly similar gas discoveries in the region of 14 – 15 TCF. So the industry has decided it is a gas basin, and it is probably dry biogenic gas (caused directly from organisms).

People also believe that the plate (tectonic) structures in the region are quite complicated, and this means you need many wells to get high production levels, because the production for each individual well is lower. If the sands were simpler, you could get the same production from two or three wells as you can get from 30 wells in a complex structure, he said, quite a factor when wells can cost $150m to drill.

"All these things point to Eastern Med being an awkward place to be. But I don't think any of that is true."

Alternative story

Mr Hodgson presented a seismic line running southwards, going through the Tamar field offshore Israel, into the Northern Levant basin in offshore Israel.

The Tamar field shows up on the seismic as a 'flat spot', a horizontal line, indicating a fluid boundary. "This was the thing that made Tamar so attractive, it reduced the risk of drilling," he said. But "it was still risky because no-one knew what the sand was going to be."

There is another area of the seismic line which shows a light acoustic impedance contrast (ie blurry picture). "That tells you it's full of clastics," he said.

Clastics are fragments of pre-existing minerals and rock, which have been deposited on a seabed (sedimentary rock).

This leads to the story of the drainage pattern of the Nile Delta during the Cretaceous era, with a large area of hinterland draining through the Nile Delta.

At the end of the Cretaceous (moving into the Miocene era), the Mediterranean was open to the East, leading into the Tethys Sea. There was a rift system moving Northwards, which brought Arabian sands into the basin, dragged from East to West by water currents.

The seaway to the Tethys Sea closed later, at the end of the Miocene era (Messinian period) due to Northward movement of the Arabian plate. At this point in geological time, the region was dried out and covered by Messinian salt. "The Nile Delta starts to develop like a normal delta," he said.

So if we look at the basin offshore Lebanon and offshore Israel, most of the deposition has come from the Nile Delta, and we have we have small sands which may have come from the Arabian plate margin.

The water would have been very deep during the Cretaceous, and the deposits formed turbidite (defined as the geologic deposit of a turbidity current, a type of sediment gravity flow responsible for distributing vast amounts of clastic sediment into the deep ocean). This would fill up the Northern Levant basin.

The Southern Levant would have been a platform. This is where Tamar was found.
But most of the sand from the Nile would have bypassed the Southern Levant and been deposited in the deeper waters of the North Levant basin.

Another thing known by geologists is that in the early Miocene era there were big carbonate reefs developing. Zohr was found in one of these carbonate reefs.

The flow of clastics kills reefs, so that indicates that the sand from the Nile basin must have been deposited a long way from where Zohr was found.

The sands probably just dropped into the Northern Levant basin, directly in front of the Nile Delta, they didn't go westwards, towards where Zohr was found, and towards Cyprus, he said.

Looking at a seismic line running East to West, you can see a shelf in the rock, which would have been the seabed in the Cretaceous.

The turbidite deposits would have dropped off the edge of the shelf and been deposited in deepwater.

"There's no reason a turbidite would sit on the edge of the shelf," he said. "It's like when you drop soap in the bath, it ends up on the bottom of the bath, not where the taps are."

The two wells drilled by ENI in Cypriot waters, which were dry, were on the Western side of the Northern Levant basin – so probably away from where the sands were deposited, he said.

Looking at ENI's "Onasagoras-1" well, "it seemed to be drilled in a valid structure," he said. But it was drilled into early Miocene sand (Arabian sand which was carried over from the East), not sands from the Nile (deposited in the cretaceous).
The well was also drilled into a point where the Miocene sands are just about pinched out (narrowing to nothing). "It is not surprising that the well was unsuccessful.

So this dry well does not reveal anything about the prospectivity of the Nile sands, he said.

And in the centre of the basin, there are a kilometre thick (Arabian) Miocene sands. "That is the main play offshore Lebanon in my opinion," he said. "We are not looking for stratigraphic play, looking for nice simple sand.

"It is the same geometry as Tamar, rather simple structure."

So "there may be an argument for a decent reservoir in Northern Levant based on offset basin and where the sands may have come from," he said.

Oil not gas?

All the Miocene sands drilled so far have led to dry gas, thought to be biogenic gas, formed directly from organisms, rather than thermogenic gas, formed from cooking organic matter under high pressure.

Of course, oil can only be produced by thermogenic means, so if the gas is biogenic that makes it less likely that there will be oil.

"The normal way of finding oil is to understand geology and do some basin modelling, trying to work out where the source rocks will be," he said.

Looking again at the North South seismic line which goes through the Tamar field, there is a section beneath Tamar from the Oligocene (which fills part of the space between the Cretaceous and Miocene).

"Not much is known about Oligocene because it doesn't outcrop in Lebanon," he said.

Here, "the Oligocene is one or two per cent organic carbon. It is an established source rock," he said. "It is known to be a contributor to deeper structures in the Nile Delta".

In the Southern Levant, where the Tamar field is, "the Oligocene rock is not mature for [thermal] generation of oil or gas." But the biological activity generates biogenic gas. "That's why Tamar is stuffed full of gas."

But moving to the North Levant, the Oligocene rock is deposited at much greater depth, so it is at higher temperatures, making it possible to generate oil.

"The Oligocene source rock sitting underneath a kilometre of sand is generating oil and that oil will be migrating into those structures," he said.

"Maybe the reason we don't see obvious flat spots offshore Lebanon is just because it's not gas, its oil."

"Then the question becomes, just how big this oil play could be."

There have also been a series of natural oil seeps in the waters above Lebanon, which show up on SAR Satellite data, running parallel to the coast.

Because the seeps appear close to the coast, people think that the oil reservoirs are near the coast, he said.

But it could be that the Oligocene source rock generates oil which starts to migrate beneath the Messinian salt layer above. "The oil will migrate along the base of the salt and pop out close to the coast," he said

Another interesting discovery is the Karish field offshore Israel. "It first looked like a boring gas story," he said. "Then it was reported that Karish was slightly different, it was gas condensate."

Perhaps rather than being gas condensate, Karish is full of oil, which comes from the Northern Levant basin and migrates up dip to the Karish structure," he said. "Karish, I think, has got up dip closure."

Spectrum has drawn a map of where it thinks the early Miocene sand is, which could be feeding oil into Karish.

"It may not be exactly right," he said. "In this area, our colleagues PGS have 3D data and probably nailed that pinch-out better than I can on 2D."
"So there's a bit of a story about a potential oil play."

North Levant structure

When you try to work out the subsurface structures of the North Levant, "the 2D data would seem to justify the model that North Levant is just shattered by faults and its hopeless finding anything, and it's deepwater," he said.

But if you look at a map of some of the structures, you can see they are less faulted than Tamar.

The Leviathan gas field off the coast of Israel is highly faulted. It actually manages to hold the gas because there is so much sand. "It's unlikely you'll get faults sealing," he said.

So the Lebanon oilfields "will be very easy to develop, they won't need too many wells, they will be developed extremely quickly. If it is oil, "these will be billion dollar fields."

The faults do not break up the Oligocene shale. "The reason is that Oligocene is source rock and it is viscous," he said.

There are many similar structures, which enable repeatability in drilling.

"This is what will happen when Northern Levant is drilled offshore Lebanon

We'll have one well and we'll have the repeatability

"This is exactly what has happened to the South Offshore Israel where Noble drilled well after well and found 50 TCF."

Zohr

Looking again at Zohr, in an early Miocene reef. "We understand that the gas is a very dry gas, nobody has said it is biogenic," he said. "But the odds are, it's the same biogenic gas you get in Tamar."

After the Zohr discovery, Spectrum had a look through the seismic data to see how well it could see Zohr, and if there was anything similar.

It is possible to see Zohr once you know it is there. "This fuzzy sort of imaging is not just poor seismic imaging, it is the reef part," he said. "In the middle you have some more coherence."

Perhaps there is a reason why the seismic imaging in the middle of the field is clearer than on the left and right edge.

The Spectrum interpreters looked for other parts of the subsurface which had a "fuzzy reflectivity on either side, coherent reflectivity in the middle" and found one.

"It's a 500km carbonate reef, covered by Messinian salt," he said. "These are probably the key play areas that we need to think about."

There are other examples as well. "Presumably they all have prospectivity rather similar to Zohr," he said.

See a link to Neil's talk on video and slides at **www.findingpetroleum.com/event/e03a4.aspx**

PGS – A new opportunity offshore Egypt

Offshore Egyptian waters, west of the Nile Delta, offer a potentially exciting new opportunity for oil and gas exploration, says Øystein Lie of PGS

Egypt offshore, west of the Nile Delta, could be an exciting new opportunity, said Øystein Lie, Project Manager MultiClient for the Middle East and CIS with seismic company PGS.

He was speaking at Finding Petroleum's forum on October 20th 2015, "Opportunities and risks in the Middle East & the Levant."

PGS will do a non-exclusive 2D survey of a large area of the Egypt's West Mediterranean Sea, after winning a contract earlier this year with Egyptian Natural Gas Holding Company EGAS (the Egyptian state owned company which is responsible for issuing of natural gas exploration licenses in Egypt).

The survey will take into consideration all of the geological domains known to be present. "Special processing techniques need to be adapted and PSDM imaging will be performed," he said.

PGS is also re-processing all of the legacy data, and will use this together with the new survey data.

Some areas, such as the fold belt area, are tricky to illuminate with 2D data, so they might be followed up by 3D.

The survey will start with infill lines in existing directions (North East to South West), and follow with the perpendicular (North West to South East).

"The density of the grid will be decided based on industry feedback," he said.

PGS has also done surveys in neighbouring waters, including Greek waters (commissioned by the Greek government in 2014) and in Cypriot waters (commissioned by the Cypriot government). It has also done MultiClient 3D surveys, including in Cypriot waters close to the Zohr discovery (Zohr is in Egyptian waters).

EGAS will use the results of the survey to define exploration blocks to be on offer in a bid round planned for 2017.

"It is very important to have your eyes open and to look at new data and new opportunities," he said. "The 2017 bid round should provide interesting acreage."

A couple of blocks have been taken up in offshore West Egypt in the past and been relinquished, he said.

Zohr

The interest in Egyptian waters begins with ENI's Zohr discovery in ultra-deepwater (1450m depth), discovered in 2015.

Zohr was reported to be biogenic gas, but it is likely to be a thermogenic system in the region as well, he said.

ENI found Zohr using 2D data, he said. Mr Lie showed the 2D section which ENI used, re-processed and depth imaged.

"If the structure is big enough, you can still do exploration based on 2D data," he said.

Zohr is claimed to be 30 TCF, based on one exploration well, with a 630m thick hydrocarbon column.

The structure is a satellite structure of the Eratosthenes high (an enormous 2000m high mountain on the seabed between Cyprus and Egypt).

It is thought to be biogenic gas from the Tertiary source rock, of the same system as gas discoveries in Israel.

The question is whether another giant like this could be found elsewhere in the Eastern Mediterranean.

Shelf

Looking at other areas of Egyptian waters, the Egyptian continental shelf area could be interesting.

There is already a working petroleum system onshore Egypt, and we expect this to be continued to the shelf, he said.

There is a canyon in this region, called the Matruh Canyon, which is filled with a thick sedimentary sequence, he said.

Deepwater

Beyond the shelf, it quickly becomes ultra-deepwater where the Herodotus Basin is situated, which is covered with Messinian salt, he said.

There is an important exploration well, "Kiwi", drilled by Statoil about five years ago, in the deepwater basin. They drilled through the thick Messinian salt to see what was below it.

"It was reported as a dry well but they discovered high quality sands (below the salt), he said. "Of course they could have been unlucky with the location of the well and might have hit hydrocarbons in another location."

In Cypriot waters, further north, there have only been three exploration wells, of which one was successful, Aphrodite which is a 5Tcf discovery

"New geophysical data is needed to do a proper assessment of the whole area, both seismic and gravity / magnetic data," he said.

Nile Delta

Further East, the most important feature is the Nile Delta. There could be sand lobes coming from the Nile Delta, which could extend West and North.

The main play type for the Nile Delta is Pliocene sandstones (Pliocene is part of the tertiary era). There could be reservoirs sealed by Messinian salt above.

Using legacy seismic data, you can see "nicely defined basin floor fans," he said. "Some are very sparsely sampled by seismic and a better seismic coverage is needed to evaluate the area properly."

See a link to Øystein's talk on video and download slides at
www.findingpetroleum.com/event/e03a4.aspx

FGE – Iran has possibilities

Siamak Adibi of Middle East consultancy FGE struck a cautious note on Iran – it would like to grow production but isn't necessarily offering good opportunities to outside companies

Iran plans to offer contracts to oil and gas companies at a London conference in February 2016 – but the terms could be tough, and will be offered to local companies first, said Siamak Adibi, senior consultant with Middle East focussed consultancy FGE.

He was speaking at the Finding Petroleum forum in London on October 20, 2015, "Opportunities and risks in the Middle East & the Levant."

Iran is keen to develop more oil, and gain more power in OPEC. But "Every time they go for exploration they find gas," he said.

A chart of oil exploration shows that the oil discovery rate has dropped to nearly zero for the past 2 years. Sanctions and the low oil price have not helped.

Iran has the largest gas reserves in the world, more than Russia. There are many gigantic fields, just one of which would be sufficient for the Iranian market.

Iran is subject to sanctions from the US and EU, but there have been discussions lately about lifting the sanctions based on an agreement over Iran's nuclear research, he said.

Contracts

Contracts between oil companies and Iran is a very sensitive subject politically - for more information read the Wikipedia page on "Anglo-Persian Oil Company".

Recently, Iran has only been offering inflexible "service contracts" to oil companies, where the oil company essentially provides a

service to the government, and all costs must be agreed in advance.

In the past, these have been a long way short of a level which will give companies the expected 15 to 20 per cent internal rate of return. Some companies actually lost money in South Pars projects phase 6-8, he said.

Production sharing agreements, where oil revenues are split between the oil company and the Iranian government, are banned under the Iranian constitution.

However there could be a contract which is a hybrid of service contract and production sharing agreement, Mr Adibi said.

Another option is that the international oil company can form a joint venture with the state-owned National Iranian Oil Company (NIOC). Iran is also considering longer service contracts, which could be 35 years rather than 7-8 as previously, so a similar time scale to production sharing agreements. They could also be more flexible.

The government has also considered systems such as paying companies a fixed fee per barrel, Mr Adibi said. "If they want to bring IOCs in the country they have to bring some kind of attractive contracts for them. They understand this."
]

But there is still political pressure to keep contracts tough, he said.

There are 49 contracts which might be ready for investment post sanction.

Statoil, BP and ENI have already announced that they are interested in setting up operations in Iran again.

Oil

Before the sanctions, Iran's crude oil production was 4m bopd, now it is 2.9 m bopd.

The oil fields are well maintained, so once the sanctions are lifted, expected to be around the end of the first quarter of 2016, there could be around 500,000 barrels of oil per day coming onto the market.

"By end of 2016 they can ramp up production close to pre-sanctions level," he said.

Iran has ambitious plans to get production to over 5m bopd, but this might not be achievable.

"Many of Iran fields are ageing oilfields," he said. "Going beyond 4m bopd is possible, but it means huge investment."

Gas

The South Pars field is the largest gas field in Iran, producing 12 bcf / day. It is also the most important field for gas development projects, he said. There are several development phases

planned, all numbered. Phase 12 was recently completed, adding another 2 bcf a day.

The plan is to get production to 27 bcf a day by 2018. "We believe [this date] is not realistic, but maybe by 2025, and maybe to 25 bcf a day," he said.
"The local contractors are capable of finishing these projects."

The gas stream includes condensate, which could itself reach 1m bopd. Iran does not plan to export the additional condensate, but use it to produce petroleum products for use within the country, such as naphtha.

The production could be compared to 17 bcf / day currently being produced from Qatar's North Field, which is liquefied for Asian markets.

"South Pars will probably achieve similar production level to Qatar around 2020," he said.

But "they are still far behind Qatar in terms of cumulative gas production."

Of the current gas production, 13 per cent is reinjected, 16 per cent is flared or lost, and 71 per cent if marketed, he said.

The overall gas production in Iran is planned to increase from 24-25 bcf /day to over 42 bcf/day by 2030, mainly by developing large gas fields.

This raises the question of what Iran will do with the gas.

Up to 8 bcf/day might be injected into the oilfields, to improve oil recovery.

They may need to install pipelines and compressors to send the gas to domestic or export markets.

The Iran domestic market currently consumes about 17 bcf a day, making it the 4th largest consumer after US, Russia and China, with a higher consumption than Italy and France.

The Iranian market could absorb more gas, particularly for power generation, he said.

There has already been a dramatic fuel substitution over the past 2 years, equivalent to switching 200 kbpd oil consumption to gas, he said.

The gas is also used in the petrochemical industry and for transport, where Iran has the second largest compressed natural gas (CNG) fleet in the world, with 3m cars, planned to be increased to 5m.

FGE estimates that if the remaining gas goes to other markets, Iran will be exporting 5 bcf by 2030.

This could be 0.5 bcf/day exported across the Persian Gulf to UAE, 0.5 bcf/day to Kuwait, 1.5 bcf for Iraq (although that is only temporary because Iraq plans to develop its own production). Some gas could go to Pakistan, which the country shares a border with.

Sending Iranian gas to Europe is currently not a viable economic position, with gas prices not high enough to support the necessary pipelines.

Liquefying the gas could not be done today due to the sanctions blocking import of the necessary technology, but would still be tough without the sanctions.

There is an option of sending gas by pipeline to Das Island, which is around 50 miles offshore Abu Dhabi, UAE, where there is a gas liquefaction facility.

Political risk

There is always a risk of political instability and sanctions coming back. It has hard to make predictions so it comes down to what sort of risks companies are comfortable with.

There are similar risks in all Middle East countries, he said. "The oil is there, the problem is politics," he said. "There is always risk.

Even US politics is very unpredictable. If the next president is Republican, it could be less likely that US sanctions get lifted – but there are also many US companies lobbying politicians to lift sanctions. "Who knows the future," he said.

See a link to Siamaks's talk on video and download slides at
www.findingpetroleum.com/event/e03a4.aspx

What did you enjoy most about the event?

To get an overview of important issues in the Levant and the Middle East.
Olav Nipen, Statoil

"Good number of relevant details I hadn't been aware of.
M. Al-Chalabi

top class presentations
Martin Anderson, Ikon Science

This was the best, most content filled event I have attended at Finding Petroleum. Excellent vivid speakers with huge experience and insight, well delivered.

John Hurst's presentation - lots of information, opinion, and insight
Richard Jones

"Very good presentations
David Sendra

"Good mixture of the political and economic challenges v the geology
CGG

Well organised. Diverse and well presented subjects.

Neil Hodgson. Always good value since I first saw him present Triassic 'podology' using a Toblerone 25 years ago!

Good selection of talks, with a balanced mix of overviews and detail, in both geotechnical and the commercial spheres. Well done.

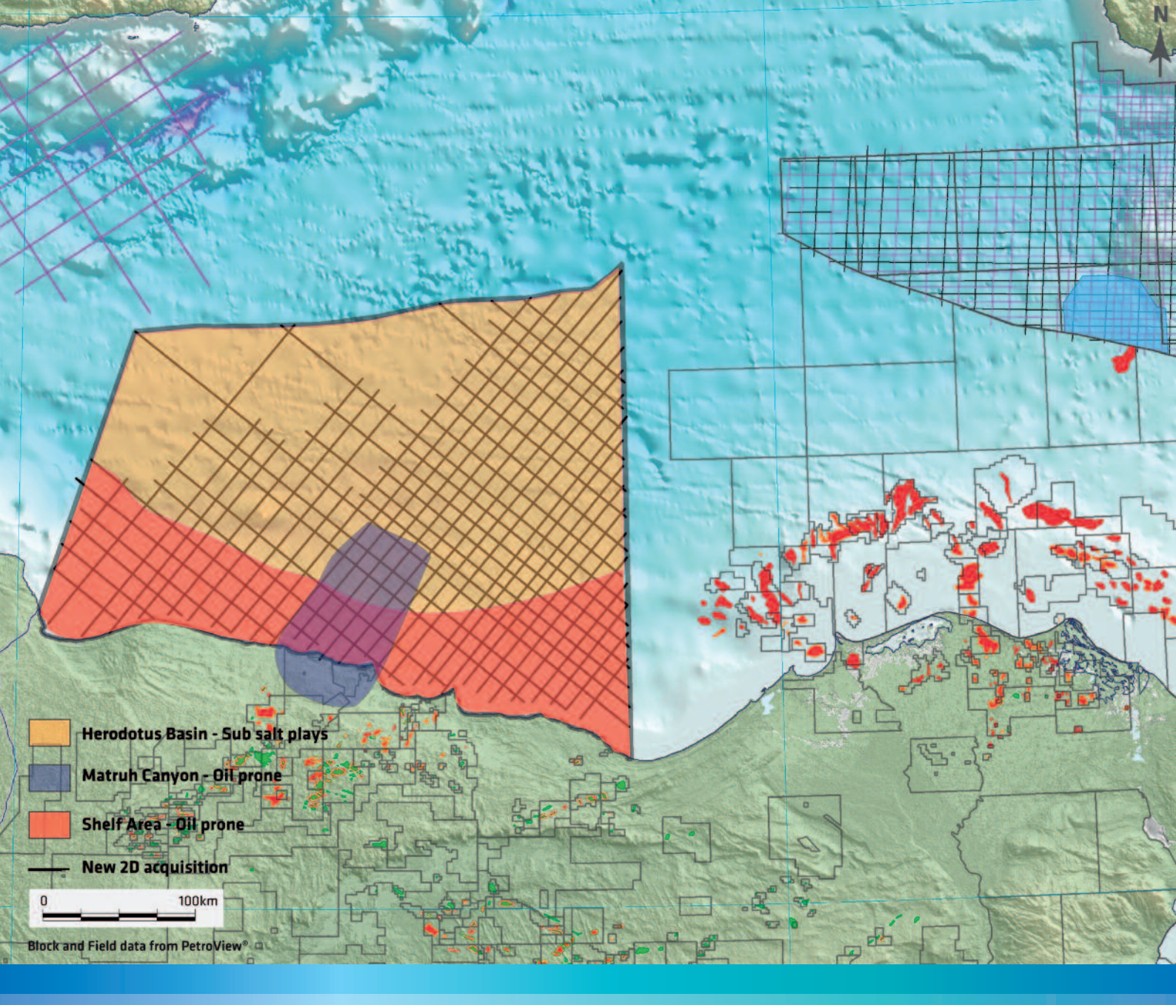
"Good variety of talks and introduction to opportunities in the ME and Levant

Thought provoking and good to see some technical rather than just marketing exercises.

"Well organised. Diverse and well presented subjects."

List of attendees - Finding Petroleum: Opportunities and risks in the Middle East & the Levant, The Geological Society, London, Oct 20 2015

Evi Otobo, Senior Geoscientist
Stuart Amor, Analyst
Hugh Ebbutt, Associated Director
A.T. Kearney
Christian Bukovics, Partner, Adamant Ventures
Rushen Patel, Chief Operating Officer
Afraz Advisers
Paul Murphy, Key Account Manager,
Oil and Gas Division, Airbus Defence and Space
Anil Katyal, AK Associates
Duncan McSorland, Business Development Manager,
Aker Solutions
Chris Beech, Business Development Manager - Capital
Projects, Amec Foster Wheeler
Richard Hedley, Director, International New Ventures,
Anadarko
Geoffrey Boyd, Field Development Consultant Antium
Frontfield
Christian Richards, VP Sales, EAME ARKeX
Neil Frewin, Exploration Manager - Global New Ven-
tures, BG Group
Mark Houchen, Global New Venture Manager BG
Group
Sarah Brazier, Geophysicist, BG Group
Mick McCaughey, Exploration Stategy and
Portfolio Manager, BG Group
Sean Goodman, Geophysicist, Bridgeporth
Robert FE Jones, Director, Caithness Petroleum
Robert Kennedy, Commercial Director
Caithness Petroleum Limited
Andy Horbury, Director, Cambridge Carbonates
Adam Thomas, Senior Consultant, CGG
James Andrew, Busines Development Mgr EAME CGG
Mustafa Elsherif, Sales Manager, CGG
Ali Zolalemin, Head of Business Development, CGG
Siebe Breed, Structural Geologist
CGG - NPA Satellite Mapping
Tina Brough, Scouting Geologist, CGG Robertson
Paul Logan, Director, Chase Geoscience
John Lyle, Senior New Venture Earth Scientist, Chevron
John Glass, Consultant Geologist, Cloverfield Consulting
Ltd
Peter Farrington, Geophysicist, Consultant, Geophysicist
Corneliu Cosovanu, Senior Geologist,
CoreLab Integrated Reservoir Solutions-UK
Dan Kunkle, Director, Count Geophysics
David Boote, DBconsulting Ltd
Paulo Godinho, Marketing Manager, DigitalGlobe
Ben James, Sales Coordinator, Dolphin Geophysical
Chris Anderson, Marine Sales Manager
Dolphin Geophysical Ltd.
Ian Blakeley, VP Asia, Drilling Info
Michael Sharman, International Territory
Manager - EMEA Drillinginfo
Justin Sangster, EMEA Manager, DrillingInfo
Gavin Mc Aulay, Business Development
Manager, Earthworks Reservoir
Martin Riddle, Technical Manager, Envoi
Mark Lonergan, Senior Business Development Manager
EPI Ltd
Murray Johnson, Geologist, Europa Oil & Gas
John Hurst, Ex-Genel
Marlene Haase, Geologist, ExxonMobil
Paul Nicholson, Team Technical Lead North and East
Africa New Ops, ExxonMobil
Siamak Adibi, Senior Consultant, Head of Middle East
Gas Team, Facts Global Energy
Rob Beckmann, Facts Global Energy
Audrey Dubois-Hebert, Oil analyst, FGE
Richard McIntyre, Sales Manager,
Finding Petroleum
Avinga Pallangyo, Conference Coordinator,
Finding Petroleum
Karl Jeffery, Editor, Finding Petroleum
Salar Golestanian, Managing Director, Finity Asset
Tom Whittington, Associate, FirstEnergy Capital
Nikki Jones, MSc Student, GeoExpro
Richard Jones, CEO, Geospatial Research Ltd
Stephen Shorey, General Manager, Geotrace
John Stafford, V.P. Operations
Gulf Keystone Petroleum
Faouzi Khene, GXT
Simon Berkeley, Principal, Halliburton
Mike Simmons, Technology Fellow
(Geosciences), Halliburton/Neftex
David Harper, Principal Consultant,
Harper Associates
Giles Middleton, Director,
Hermes Datacommunications International Ltd
Luke Calladine, Exploration Researcher, IHS
Claire Woolsey, Analyst, IHS
Alastair Reid, Consultant, IHS
William Gibson, Legal Analyst, IHS
Martin Anderson, Business Development
Manager, Ikon Science
Cameron Davis, SVP Sales, Ikon Science
Ehsan Naeini, Senior Research Advisor
Ikon Science
Manouchehr Takin, Independent consultant
Mark Jones, Business Development Manager
E&A INTECSEA
Bob Lambert, Founder, Ipex Energy Ltd
Ritchie Wayland, Exploration Manager
JKX Oil & Gas plc
Christopher Tiratsoo, Editor, Journal of Petroleum
Geology
Peter Knox, Consultant, KTS
Richard Handley, Account Manager
Landmark Software
Qusay Abeed, Petroleum Geologist,
Landmark, Neftex
Rod Makin, Consultant, LK Exploration
David Peel, Technical Director, Lukoil
Ahmed Elghorori, Lukoil
Richard Bootle, Lukoil
Artem Kotener, Lukoil Overseas
Amrit Brar, Marketing and Sales Representative Lynx
Information Systems
Jim Lee, Associate Director, Macquarie
Robert Palfrey, Managing Director,
Minerva SRM
Paul Richardson, Geoscientist, Neftex
Harish Pillai, Vice President, Neo Energy
David Bamford, New Eyes Exploration
Greg Jones, Team Lead, Europe New Ventures Explo-
ration, Nexen-CNOOC
Frances Morris-Jones, Non-Executive Director, OGA
Ramesh Shukla, Shareholder of exploration companies
Shah Jahan Khandokar, Associate, Norton Rose Fulbright
Elsa Weatherley-Godard, Associate
Norton Rose Fulbright LLP
Jodie Cocker, Remote Sensing Geologist
NPA Satellite Mapping
Toby Walker, Account Manager, OneSubsea
Peter Dolan, Advisor to the Board of Directors Ophir
Energy PLC
Robert Parker, Consultant, Parker
Howard Dewhirst, Managing Director, Petroalbion P/L
Jonathan Popper, Vice President Business
Development, Petrofac Integrated Energy Services
Greg Coleman, MD, Petromall Ltd
David Sendra, Associate Consultant,
Petrophysical Consultant
M. Al-Chalabi, Head, Petrotech Consultancy
Grenville Lunn, Manging Director, PGA Ltd
Lance Usher, Sales Manager, PGS
Oystein Lie, PGS
John Maciver, MultiClient Supervisor, PGS
Soraya Derdiri, Private Investor, PI
Kevin Sylvester, Director,
Pinnacle Energy Limited
Chris Newton, Sales Manager, Polarcus UK Ltd
Aruna Mannie, Senior Exloration Geoscientist
Premier Oil
Tim Davies, Global Portfolio & NV Manager
Premier Oil
Rick Moore, Director, Quad Operations
Mike Rego, Managing Director,
Rego Exploration (Oil & Gas Consultancy Services)
Robert Snashall, Consultant, RGSConsult
Robert Stevens, Richmond Energy Partners
Alastair Bee, Partner, Richmond Energy Partners
Andreas Exarheas, Assistant Editor, Rigzone
Patrick Taylor, Director, RISC (UK) Limited
Robert Waterhouse, Director, Rosha Resources Ltd
John Georgiou, Exploration Consultant Geophysicist
Rps Energy
Janice Weston, Principal Advisor, RPS Energy Ltd.
Matteo Di Lucia, RPS Group
Stephen Trueblood, Commercial Manager, Sasol
Rajan Gupta, Principal Geoscientist, Sasol
Jan Nietzer, Senior Geoscientist, Global New Ventures
Sasol
Kevin Dale, Exploration Advisor, New Ventures
Sasol E & P International
David Webber, Seismic Operations Supervisor
Sceptre Oil & Gas
Tomi Owodunni, Schlumberger Account Manager
Schlumberger
Oddi Aasheim, Managing Director SLP Global Ltd.
Neil Hodgson, New Ventures Manager, Spectrum
Gareth Morris, Account Manager, Spectrum
Olav Nipen, Specialist Geology, Statoil
Domenico Lodola, Geologist, Sterling Energy
Andrew Lodge, Principal, Strategic Fit,
Egdon Resources
Chris Jones, Senior Consultant, StrategicFit
Daniel Barnes, Consultant, StrategicFit
Adam Mitchell, Principal, StrategicFit
David Green, Head of Sales, The Energy Exchange
Patrick Djuma, Commercial Manager - Africa
The Energy Exchange
Brian McBeth, Managing Partner
The Oxford Consultancy Group
Andy Cooper, Sales Director, ThyssenKrupp
Mick Michaelides, General Manager,
Troika International
Steven McTiernan, Director, Tullow Oil plc
Pete Brooke-Monti, Recruitment Manager
Upstream Technical Consultants Ltd
Alec Robinson, President & CEO, Valient Energy
Mike Branston, WesternGeco
Cesar Purchio, Marine MENA Sales Manager
WesternGeco
John Wood Consultant Geophysicist-Geosciencetist
Wood Geoscience Limited
Chris Gumm, Business Development Manager -
Automation Business Unit, Wood Group Mustang
Caron Howard, New Client Development Manager
Wood Mackenzie
Phil Houston, Senior Consultant, Worleyparsons
Chris Phillips, General Manager, WorleyParsons
Mohammed Khalil, Business Development Manager
Xodus Group
Andrew Zolnai, Consultant, zolnai.ca



Innovate Explore Discover

New PGS acquisition and imaging technologies have the power to reveal the potential offshore western Egypt

EGAS and PGS plan to acquire up to 20 000 km new GeoStreamer® data over western Egypt before the 2017 license round. True broadband data can reveal clearer and more reliable images of the prospectivity of this under-explored area. Contact us if you would like to participate in the project, and tailor the acquisition and processing parameters to meet your exploration objectives.

Schedule a meeting to learn more about this exciting opportunity: mcmiddleeast@pgs.com

PGS