Finding Petroleum

The market for buying oilfields

Growing influence of UK and France

Somalia - a big opportunity?

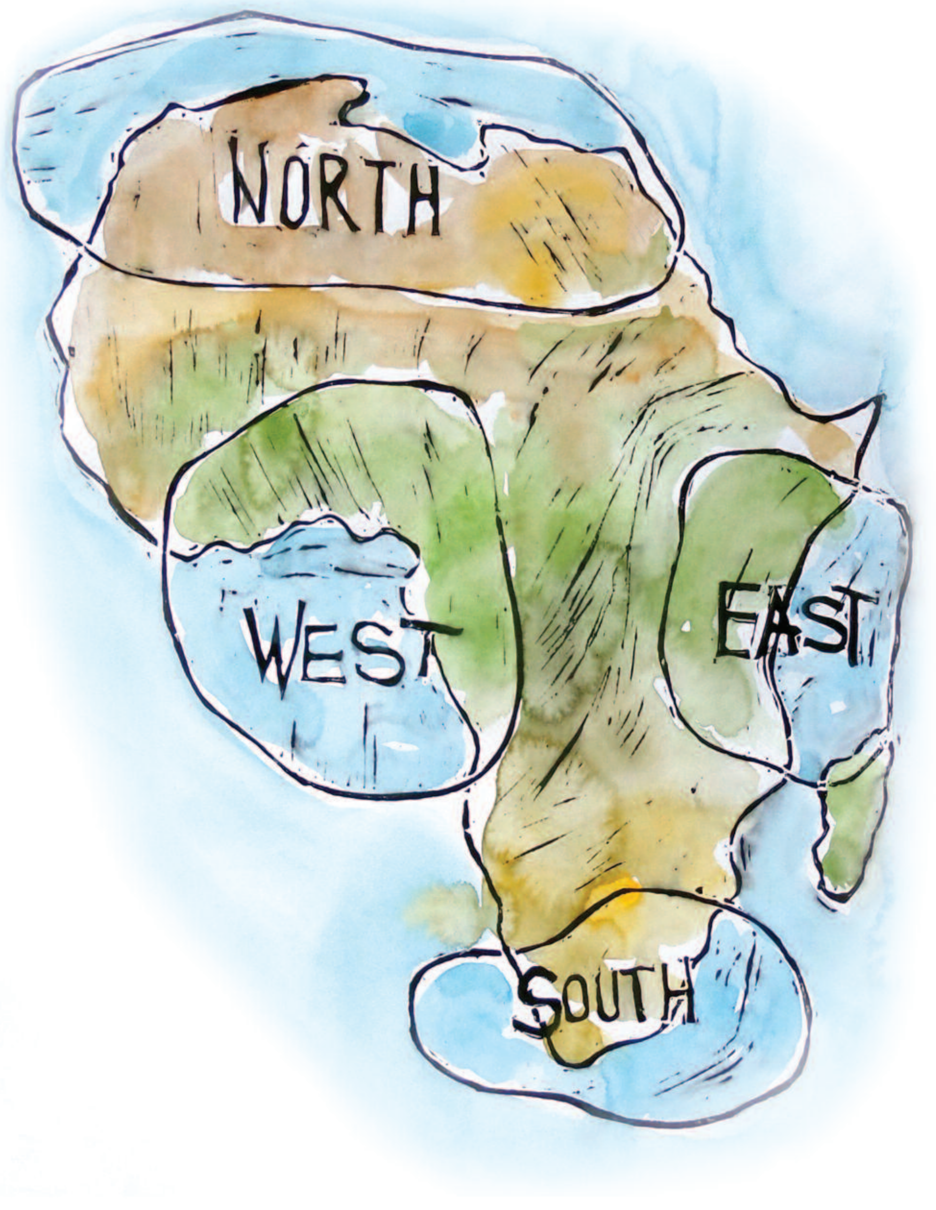
Looking at offshore Madagascar

Event Report, Finding African Oil, Jan 25, 2016, London

Special report

Finding African Oil

Jan 25, 2016, London



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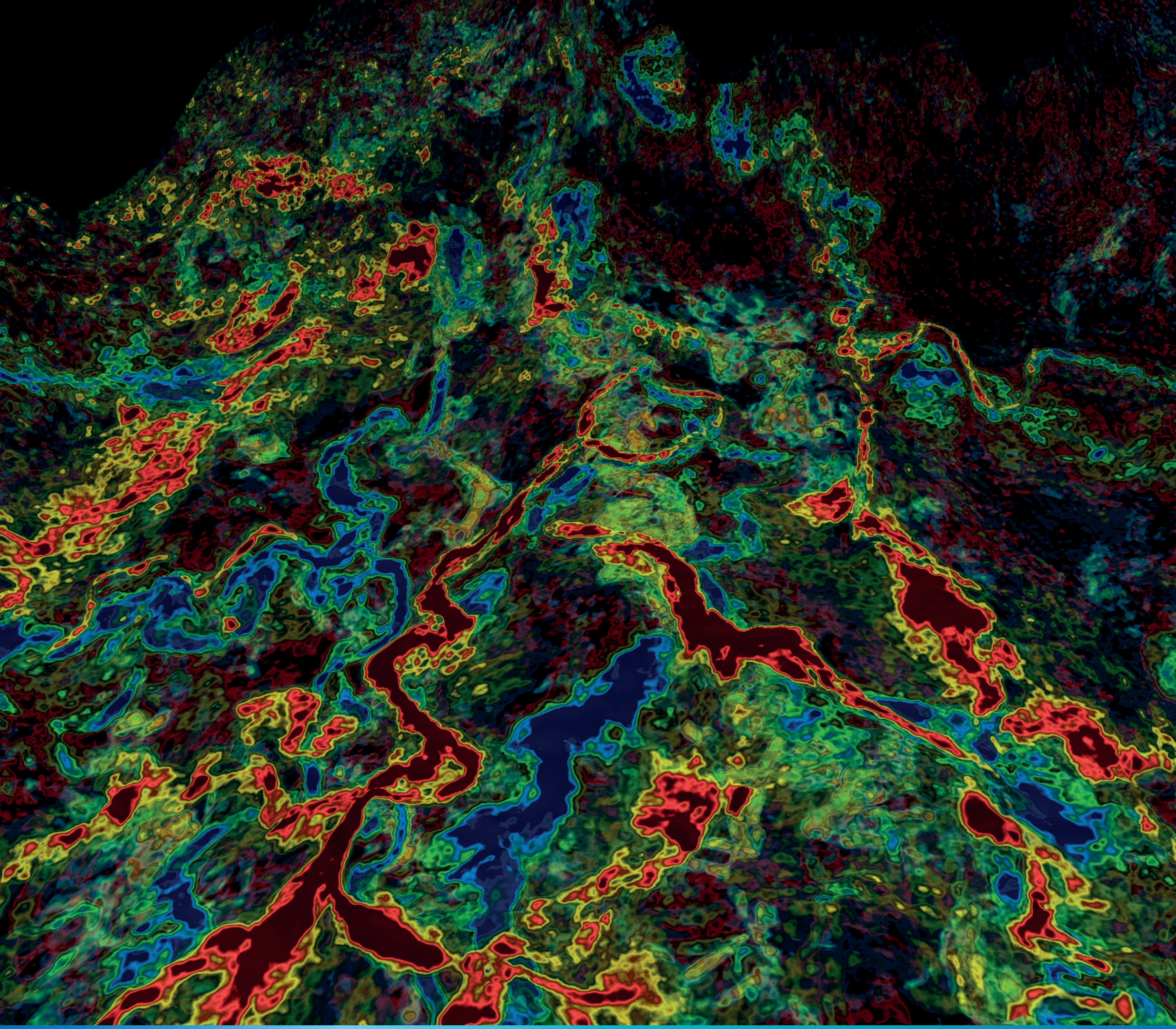

Finding Petroleum

Finding African Oil

Our report from Finding Petroleum's forum in London on Jan 25 2016 "Finding African Oil," covering with updates on African politics and economics, developments in geological understanding, and looking in detail at hydrocarbon potential offshore Côte d'Ivoire, Somalia and Madagascar.

This is an Event Report from our forum in London on Jan 25, 2016, "Finding African Oil".

Event website

http://www.findingpetroleum.com/event/35f2d.aspx

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

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Finding Petroleum held its 4th "Finding African Oil" at the Geological Society, London, on Jan 25, 2016, with updates on African politics and economics, developments in geological understanding, and looking in detail at hydrocarbon potential offshore Côte d'Ivoire, Somalia and Madagascar.

An interesting question is whether oil companies should bother with exploration at all. If they want to increase their reserves (and so value to shareholders), are they better doing it by acquiring companies which have reserves, than exploring for it themselves? Bear in mind that the drop in the oil price makes reserves less expensive – and exploration hasn't got any easier.

The political perspective was provided by Alex Vines of Chatham House; the financial perspective was provided by Stuart Amor, formerly head of oil and gas research with RFC Ambrian. The geological perspective was provided by Chris Willcox of Landmark, Patrick Coole of PGS (with a talk on offshore Western Côte d'Ivoire), Jake Berryman of Spectrum (offshore Somalia), and Ben Sayers of TGS (offshore Madagascar).

You can view high resolution videos and slides online for talks from Alex Vines and Ben Sayers, and high resolution video only for Stuart Amor.

Notes

Not all slides and videos are available online due to companies wishing to maintain control of their proprietary information.

We are unable to report on talks from Chris Willcox (Landmark) and Patrick Coole (PGS) since the talks were not video recorded.

The talks by Jake Berryman (Spectrum) and Ben Sayers (TGS) included a large amount of geological description, which is very difficult to cover in a written report. However Mr Sayers' talk is available for free download online.

All available videos and slides can be accessed via the conference website **http://www.findingpetroleum.com/event/35f2d.aspx**

digital energy journal

Alex Vines – Africa is paying attention to UK and France

Many African countries are starting to pay more attention to the UK and France, because this is the source of much of the increase in investment, said Alex Vines of Chatham House

The biggest source of Foreign Direct Investment (FDI) in Africa at the moment is the US and Europe, and within Europe, it is coming from France and the UK, said Alex Vines, Head of the Africa Programme at Chatham House (otherwise known as 'The Royal Institution of International Affairs').

Mr Vines was speaking at the Finding Petroleum forum in London on January 25 2016, "Finding African Oil".

Mr Vines is also Director for Regional Studies and International Security at Chatham House.

He chaired the UN Panel of Experts on Côte d'Ivoire from 2005 to 2007, and was a member of the UN Panel of Experts on Liberia from 2001 to 2003.He has also been a UN election officer in Mozambique and Angola, and served as a consultant for the UN Office on Drugs and Crime and for the Economic Community of West African States (ECOWAS).

"The world is changing," he said.

The biggest foreign direct investors in Africa by country in 2011 were France, USA, UK and Malaysia, he said. In 2015 it was US, UK, France and South Africa. So there has been some change, but China and India are still not making it to the top four.

Some African countries are opening or reopening embassies or diplomatic missions in London, he said. Countries opening embassies over the past 2 years include Mauritania, Guinea, and Burundi.

They are opening embassies to be closer to the City of London and sources of finance, not for diplomatic reasons, he said, and much of this investment is going into extractive industries.

"We see countries like Angola trying to improve their relationship with the US, trying to be more conciliatory to international oil companies, be they Chevron, Exxon, Total ENI," he said. "There's less resource nationalism taking place."

"Even in a country like Zimbabwe, [where] Robert Mugabe said 10 years ago, 'the sun is setting in the West and rising in the East, we have turned our backs to the West.'"

"Zimbabwe, this year, is looking for more investment including from the UK. It is swinging back."

There's "only a few Sub-Saharan countries where we're not seeing that."

Part of the growing emphasis on the 'old' partners, such as France, UK, USA and others, is because of a slowing economy in China.

A lot of people are talking about large amounts of investment from China and India, but they are not the biggest source of foreign direct investment "in its pure sense", which means a financial investment from a company or entity based in one country, put into a company or entity based in another country, he said.

There was a recent China Africa summit where China announced a number of state loans to African countries. That may have been partly because China wanted to compensate for the slowdown in its economy (leading to fewer business investments), he said.

"They needed big headlines of what China was still to do in Africa."

"Whether that [the loans] will be delivered is a different question."

Most people are keen on more diversification these days, both suppliers and buyers. So

African countries don't want to send too much oil to China or India, and buyers don't want too much from Nigeria and Angola for example.

Some African countries are now talking about joining the Commonwealth in order to be diversified away from France and get more investment from London, he said.

The shale revolution in the US has meant that African oil production has less strategic importance to the US. But there are still a great deal of oil exports from Nigeria and Algeria, and other African countries, to the US.

Currently the largest destination for Angolan crude oil is China, followed by India, which overtook the US in 2015.

Nigeria is exporting more oil to India and less to the US.

Africa and commodities

African oil plays a big part in the economy of many African countries.

There are four African OPEC members, Angola, Algeria, Nigeria and Libya, and many other African countries producing smaller amounts of oil, including Sudan, Congo, Equatorial Guinea, Gabon, Chad, and Tunisia, he said.

Africa is also strategic for many minerals, for example 20 per cent of global production of uranium comes from Niger and Namibia.

"One of the reasons French have intervened so dramatically in the Sahel is that seven per cent of French energy supply comes from Niger's uranium," he said. "No other former colonial state is so dependent on an energy source for its energy security. So it does matter."

Risk picture in Africa

Mr Vines presented an overview of the risk picture in Africa.

Starting with the West coast, "we're seeing continued piracy at sea in the Gulf of Guinea," he said. "Much of it comes out of Nigeria. The numbers are on the decline but they are still there. This is a Nigeria problem basically."

"With the new administration of (Nigerian) President Buhari that was elected last year, hopefully there will be improvements. The region is trying to deal with these issues.

"The problem is just like regional economic communities around the world, different bits don't really talk to each other there's a lack of trust."

"There's under-reporting in terms of the armed robbery and piracy that's occurring."

"There are international efforts, international navies that are assisting various regional governments. There's real progress in countries like Ghana. Togo is planning a maritime security conference this year."

"It does add to the perception of risk, including for any offshore exploration that's taking place."

Moving South to Angola, "I attended a big conference in Angola fairly recently," he said. "The problem there was all different bits of the Angolan government were pulling in different directions, nobody had a common position of what the issues would be."

"The biggest threat wasn't piracy for Angola, it was illicit fishing around rigs."

On the East coast, Somalia "has fits and starts, politics remains very unstable, there is more violence," he said. "Some of the easy security interventions have taken place, the more difficult work is ongoing."

The appetite for investing in Somalia "is much less than it was," he said.

In South Sudan, "it is an elite dispute, it's going to continue despite the discussions and negotiations. I'm very pessimistic this year for any progress. "That in turn impacts on some of the calculations about pipelines and investments."

"Another country you wouldn't have thought about is Burundi," he said. "The crisis in Burundi is impacting regional politics, including the calculations of Tanzania, [asking] does it stay as part of East African community."

"There is a scenario where you have pulling apart of this region over the crisis in Burundi. It is a nightmare scenario. I don't necessarily think it will happen, but you can't completely discount it. There's a fault line here."

The Boko Haram crisis in Nigeria "affects the oil industry less, but it does overspill into Chad," he said (Chad shares a border with North East Nigeria). "It impacts into Niger."

"There are plenty of other parts of Africa that are much quieter."

A wider risk analysis

A dark period for the oil and gas industry in Africa was January 2014, when Mokhtar Belmokhtar, Algerian lead of the Al-Murabitoun group, led the "In Amenas" hostage crisis in Algeria, when 39 foreign hostages were killed. 132 foreign nationals, and 800 people in total, were taken hostage, including employees of Statoil, BP and Japanese engineering firm JGC.

Following the event, "Statoil, BP, the Japanese partners, all have a much wider risk analysis now, looking at North Africa," he said. That's also been reflected in the way that governments are looking at this region."

The lesson is that if you are interested in the risk in Algeria, you need to understand the risk in more regions than just Algeria, he said. "These borders are artificial, they don't really mean anything. They come and go all the time."

"You can't silo-ise your risk appraisal, just rely on the host government [to provide security]" he said. "You need to look at things regionally."

The UK Foreign and Commonwealth Office (FCO) "now has an analyst whose job is to look the overspill of North Africa with the Sahelian area," he said.

The Sahelian area is a region crossing the whole of Africa south of the Sahara, covering northern Senegal, southern Mauritania, central Mali, northern Burkina Faso, extreme south of Algeria, Niger, extreme north of Nigeria, central Chad, central and southern Sudan, and northern Eritrea.

Mokhtar Belmokhtar was also involved in the recent attack on Mali's Radisson Blu Hotel in Bamaki on November 2015. It was "partly to say I'm still in business I can do this stuff, I don't want to allow just Islamic State," Mr Vines said. "It's a bit of a beauty contest going on."

"I think we're going to see more of this. It was inevitable something will happen.

"The question is if any of this will spread down to the coast, to Lagos and others. I tend to think not at the moment, but you can't really discount it."

In Nigeria, "Boko Haram remains the most violent conflict in sub-Saharan Africa, with more casualties than in Somalia," he said.

There have been many attacks by female suicide bombers in Boko Haram, 12 in 2014 and over 33 in 2014.

This is "something never seen before in Nigeria, quite shocking," he said. "It just goes to show some of the dynamics."

This violence diverts attention of the Bukhari administration away from other issues such as trying to reform the oil and gas industry and reduce corruption, he said.

There is a risk of problems re-emerging in the River Niger Delta on Nigeria's coast, which could impact oil exports. "At the moment it is relatively quiet [but] there are issues bubbling up," he said. "I'm surprised it's being as quiet as it has up until now, but how long that can last?

"If I had one worry in West Africa, it is about resurgence of the Niger Delta crisis."

Over the past few years Nigeria has 'bought' peace by distributing funding gained from oil exports. But with current low oil prices it is very difficult to maintain that system, he said.

Looking at other risk zones in Africa, "Somali Piracy is very marginal now," he said.

In central Mozambique a rebel group has emerged. "It is a bit like the Boko Haram issue for the Nigerian government," he said. And "the government's capacity to deal with a crisis is overstretched. It diverting attention from big decisions that need to be made about FID and gas."

There are also 'elite' (high level) disputes going on, over who should benefit from the big oil and gas contracts from new onshore production in North Mozambique.

It "makes a bit of a headache for Anadarko, ENI and the others which are hoping for the investment to progress," he said.

"I don't think there will be gas production by 2020. The question will be, who's first, Tanzania or Mozambique."

Demographics

As a background to these issues, consider that Africa has some of the most youthful countries in the world.

Many people know that Lagos (Nigeria) is the fastest growing city in the world, expecting a population of 20m by 2025.

But not many people know that Dar es Salaam (Tanzania) is the fourth fastest growing city in the world. With a continuation of current trends, Tanzania could be the fifth largest country in the world by 2100, after India, China, Nigeria and the US.

Consequently, politicians are very keen that the oil and gas industry provides jobs to local people. This leads to potential problems with high expectations of how many jobs the oil and gas industry can generate.

The pressure on the industry to create jobs does not go away just because the oil price is low, he said.

When foreign oil companies are looking to cut costs in Africa, it is very important not to cut local jobs, because this will lead to falling out with the local government, he said.

"Some of the IOCs are facing issues because they didn't understand that and they have retrenched local staff. In this environment that is suicidal for governments trying to create jobs."

Politics

Looking at the politics across Africa, many oil rich countries have elections in 2016, including Equatorial Guinea, Gabon, Congo Brazzaville and Uganda, he said.

In all of these countries, it is likely that "the incumbents are going to be re-elected," he said. "Many of these are strongmen and they will prevail."

There is a little more uncertainty about whether the incumbents will be re-elected in Zambia, Chad and Niger.

"Benin is very uncertain, I wouldn't like to say who's going to be the next president.

"Ghana is the interesting one, coming up at the end of the year. All the politics in Ghana at the moment is about elections. Will it be the incumbent President Mohama, who has spectacularly mis-managed the economy in my view, and hit by low commodity prices? Or will it be the leader of the opposition? I think that election is too close to call."

"Whoever is elected in Ghana, does it make a different in policy for oil and gas? I'm not so sure.

"The fight in Ghana is that oil and gas is about to increase exponentially, whoever wins this election will get some of these spoils."

"It is a country that has strong institutions. If it were to deteriorate - that would have some serious implications for the oil and gas industry and West Africa."

"In Ivory Coast last year, President Ouattara was re-elected with a much increased majority. I'm very optimistic about Ivory Coast. It is one of the real positive Africa stories, post conflict growth. In my list it is one of the places I would put my time."

Mr Vines was asked if he had any thoughts about Somaliland's possible secession from Somalia.

"No-one is going to recognise Somaliland as a sovereign state any time soon," he said. "The issue is that it would take an African country to do so, others will follow suit. {But) No-one in Africa wants to do that, no-one wants to be the first."

"The thinking at the moment is a very loose federal structure, designed to try and keep theoretically Somaliland part of the rest of Somalia. That's not what Somalilanders' want at all."

Watch Alex's talk on video and download slides at **http://www.findingpetroleum.com/event/35f2d.aspx**

Stuart Amor – plenty of transactions still happening

Stuart Amor, ex Head of Oil and Gas Research with RFC Ambian, presented an analysis of oil and gas mergers and acquisition opportunities in Africa, including where the opportunities might be and how to get a better understanding of their value

According to US Geological Survey (USGS) estimates, Africa has more undiscovered oil resources than any other continent, said Stuart Amor, ex Head of Oil and Gas Research with natural resources advisory firm RFC Ambrian.

Recently around 40 per cent of frontier exploration spending globally has been in Africa, and over the past few years 40 per cent of global wildcat discoveries have been in or offshore Africa.

He was speaking at the Finding Petroleum forum in London on Jan 25 2016, "Finding Oil in Africa".

There is a great deal of exploration potential in Africa, and that's "why many companies should be there," he said.

"There's plenty of appraisal and development projects too, including some low cost development projects which may be commercial (even at today's price). These are onshore or in shallow water."

Not all of it is commercial of course. "Pretty much all offshore deepwater projects in Nigeria and Angola are unlikely to be commercial using today's forward curve and fiscal regimes," he said.

African production

Africa currently produces about 8m barrels a day of liquid, down from 10m barrels five years ago.

The main cause of the fall in production has been the reduction in output from Libya, which is currently facing a civil war.

In 2015, 80 per cent of the crude volumes on the continent came from just four countries, Nigeria, Angola, Algeria and Egypt. Algeria and Egypt alone provided 85 per cent of Africa's gas production.

So any discussion about oil and gas in Africa is dominated by these countries, he said.

Dr Amor estimates that the full supply cost of marginal African oil production is around $80 a barrel, by analysing the "FAS 69" statements attached to companies' US GAAP accounts. So based on this you'd need Brent oil prices to be above $80 to incentivise marginal production to be explored for and developed. However operating costs are usually low. Thus not much African oil production is currently at risk of being shut in, he said.

African transactions

A study of the number of merger and acquisition transactions, tracked by Bloomberg, shows that the number of deals in 2015 rose in Africa, although they fell over the whole world.

In 2013, most of the African deals were East African gas, with a number of stakes sold to Asian companies.

In 2015, over half of the deal value was attributed to Nigeria. That's due to international oil company divestitures (continuing a trend which has been going on since 2010).

The buyers were all indigenous Nigerian companies, who have purchased $10bn of assets since 2010. Some of these companies are backed by rich Nigerian groups, some are backed by Western firms. They are taking advantage of better fiscal terms which are offered to indigenous Nigerian companies, he said.

In the transactions, companies generally paid $4 to $5 a barrel for 2p (proved + probable) reserves, or $1 to $3 a barrel for 2P + 2C (proved, probable reserves and contingent resources).

Values depend on the proportion of resources which were gas or oil, and what proportion are developed and what proportion need developing, he said.

Dr Amor showed a map of all the international oil company divestitures in Nigeria, including licences bought by SEPLAT and Eland.

Many blocks are still owned by international oil companies. "Once the oil price becomes less volatile, I would expect most of these licenses to be divested over time," he said.

Whilst it has been indigenous Nigerian companies buying petroleum assets in Nigeria, in Angola, state oil company Sonangol has been the main buyer.

The price proposed for buying Cobalt Intl's assets equates to $4.5 a barrel for mean 2C resources based on the two "commercial" fields, although the price would be lower than that if you take the other discoveries, that aren't clearly commercial, into consideration.

The value of the deal may have been based more on the book value of the assets, rather than the per barrel valuations.

There are over 100 TCF recoverable gas resources in areas 1 and 4 of offshore Mozambique, and another 30 TCF discovered to the North in blocks 1-4 Offshore Tanzania.

"Such world class gas resources have attracted buyers from Asia who on our estimates paid between $2.50 per boe and $3.00 per boe in 2013," he said.

Maersk Oil has also recently farmed into some Kenya and Uganda blocks owned by Africa Oil Corp, he said.

"The exact terms have not been made public (but) it appears to me, Maersk paid roughly $4 to $5 / barrel for those resources," he said.

Looking at Egypt, in one deal, Apache sold a third of its Egyptian business to Sinopec

(China) with a price of just over $7 / boe, despite half of the reserves being gas.

The value was increased because Apache had bought many licenses in adjoining blocks and put them together to create a single integrated business, he said.

Egyptian focussed SDX Energy and Madison PetroGas have merged more recently. The deal was a share exchange, and based on the net present value of the 2p reserves, not the market price of SDX at the time. The deal "shows how small cap and private company might value their assets in a merger," he said.

The country might be becoming more stable, with the military squashing opposition and economy starting to stabilise. "It is likely to lead to more M+A in Egypt over the coming years," he said.

Transaction metrics

Before the oil price crash, production assets were valued on their "PV10 of the 2P reserves" (the present value of the future cash flows of their 2P oil and gas reserves using a 10% annual discount rate) using a $90 long term oil price.

Today's bidders are using larger discount rates, and the current Brent oil futures curve shows a long term price of just $50 per barrel. "In distressed situations buyers will only pay ground floor terms", he said.

Finding and development costs

It is possible to estimate the finding and development costs per barrel, by adding up the proven reserve discoveries over the past 5 years and dividing that by the exploration and development costs incurred.

Typically oil majors have historic finding and development costs of $20 to $70 a barrel, with the high end of the range being for expensive deepwater projects, he estimates.

As a rule of thumb, if an oil major can buy proven reserves on the equity market for less than $30 a barrel, it would be cheaper to buy on the equity market than developing it themselves, he said.

If they can acquire contingent (unproven) resources for under $10 a barrel, it would be cheaper to acquire rather than finding the resources themselves, he said.

Valuations

Dr Amor has analysed the valuations of mid cap and junior production companies operating in Africa. This analysis "suggests most African companies are well undervalued by the market at present," he said.

As an illustration, Africa Oil's stock prices rose by 30 per cent the day that its transaction with Maersk Oil was announced. Tullow Oil's shares rose 5 per cent (Tullow shares the licenses).

Having said that, "given the limitations of per BOE metrics, you can't draw firm conclusions from just these plots," he noted.

"Also a company isn't a good target just because it's cheap," he said. "A target needs to fit with the buyer's strategy, reinforce the buyer's capabilities, perhaps address some of the buyers' shortcomings and provide synergies with current operations."

Who will buy?

Dr Amor suggests that oil majors might look to pick up African acreage through acquisition of large cap or mid cap players, in the way that Shell picked up assets in East Africa through its acquisition of BG.

Private equity vehicles have raised a lot of capital over the past few years and haven't used much of it. "They are well placed to come in," he said.

"I believe Asian energy companies will also continue to look at East African gas assets. The gas resources are so large they are hard to ignore."

Meanwhile, "lowly leveraged E+P companies will remain active, while the highly leveraged will retreat."

"Indigenous Nigerian companies that have taken part in a lot of International Oil Company (IOC) divestitures over the last few years will likely want to digest, and perhaps refinance, their recent purchases before returning to the M&A market," he said.

"Exxon, Chevron and CNOOC have extremely low leverage. They are well placed to take advantage of any distressed assets." The independents "by and large have pretty high gearing already and don't have the same balance sheet strength to make acquisitions," he said.

Low oil prices

Low oil prices tend to discourage the sale of assets, and companies tend to pull in discretionary spending, he said.

But low oil prices can stimulate mergers and acquisitions, because management are focussed on cost cutting and looking for synergies. There are benefits from merging both large and small companies.

"The thing that stops small companies from merging is generally management concerns, addressing the soft issues of who will do what, and who won't have a job at the end of it," he said.

"What we need for more transactions to take place is a less volatile oil price. That will allow current gap between buyers and sellers valuations expectations to narrow."

Financing Nigerian companies

One audience member asked if the indigenous Nigerian companies receive equity from foreign oil companies, would they still get the benefits of being indigenous.

Dr Amor said that this has already happened, for example Eland Oil and Gas raised capital in London markets.

However the question is perhaps moot because London markets are not interested in financing oil and gas companies at this point.

"Look at the share price of SEPLAT, that's not been a happy experience for investors," he said. "Institutional investors are pretty fed up of losing money on O+G, they're all pretty much underweight oil and gas.

"If the oil price turns, there'll be a rush back and anything is possible. If the oil price stays where it is I think it will be difficult to raise money.

Indigenisation

One audience member asked whether Dr Amor saw a wider trend to give blocks to indigenous (local) companies at preferential rates.

"There's no doubt the two major African counties, Angola and Nigeria, want to indigenise their businesses," he replied. "The problem is neither Sonangol nor the state company in Nigeria has the expertise to operate in technically challenging geologies".

"In Nigeria onshore it makes sense, it's technically relatively simple. The key risks that you need to manage are actually surface issues, such as local population expectations and government relations. Nigerian companies are probably better at that then western companies".
"If you're licensing out deepwater offshore blocks off Angola I'm not sure that's true."

Oil price

Dr Amor added some remarks on the oil price in his talk, since it was a topic of great interest to attendees.

At a $30 oil price (as it was at the time of the conference), about 10 per cent of non OPEC supply is cash flow negative in terms of just operating costs, he said. "I don't think prices can stay down here for more than a few months. If they do, then some of that supply will get shut in."

At the time of the conference (Jan 2016), long dated Brent contracts were trading for around U$50 per barrel. This price represents the markets best guess at the long-term mid-cycle price of oil. "I don't think that's likely. I think that's far too pessimistic," he said. I believe the long-term mid-cycle price of oil should be more like $75 per barrel.

You can actually make an estimate of how much it costs to meet the world's oil demand, and use this to estimate where the oil price should actually be.

Microeconomics tells us that in order to maintain oil supply over the long term, the price should equal the marginal full cost of supply.

Dr Amor has analysed data in US GAAP accounts, covering the "majority of largest publicly traded companies, and estimates that in 2013 the marginal full cost of oil supply was around $100 per barrel.

Since many of the accounts were submitted, many service company costs have fallen around 50 per cent, which has led some people to estimate that the marginal cost of supplying oil has dropped to $50.

But in dropping their prices by 50 per cent, service companies aren't pricing on their full cost of supply, but their variable cash cost of supply.

"Their through cycle costs will also have to be priced on their full cost of supply. That's more like a 25 per cent fall, not the 50 per cent in the market today. So the long end of the curve should still be about $75," he said.

Somalia – a big new opportunity?

Somalia is largely unexplored for oil, is arguably becoming safer, and there's a license round coming up in 2017. Spectrum has been analysing seismic and potential field data to see where the opportunities might be

Somalia might not be a holiday destination, but Spectrum has considered it secure enough to send staff out there for nine years and recently acquiring seismic surveys, said Jake Berryman, exploration advisor with Spectrum.

He was speaking at the Finding Petroleum forum in London on Jan 25 2016, "Finding Oil in Africa".

Somalia is just coming out of 20 years of civil unrest and has a "bright and prosperous future," he said. "The area has a new found stability and security."

"The area is largely under explored. For 20 years people stayed away because of civil unrest," he said.

Any oil produced could be shipped to European markets via the Gulf of Aden, the Red Sea and the Suez Canal.

There is a Somali "diaspora" which spread around the world during the war, and is now returning home with skills developed abroad and money, he said.

In recent years, oil explorers have also become increasingly interested in the East Coast of Africa where there have been a large number of gas discoveries and a few oil discoveries recently, he said.

Spectrum has been working with a 2014 data set to try to work out where the opportunities might be.

In 2014 a large seismic survey was acquired without any security incidents, and the company is now acquiring a large in-fill and enhanced survey, he said.

History

There has been exploration going on in the region since 1956, with the first well, Dagah Shabel, discovered in 1959. It proved the existence of Jurassic petroleum system, and led to more drilling.

After that, 37 per cent of the wells in Somalia were drilled on the basis of surface outcrops or 'bumpology', rather than any seismic data, and the other wells were drilled on very low resolution seismic, he said.

From 1969 to 1977, a military regime aligned with the Soviets was in control. "Not a lot of exploration drilling was undertaken at this stage," he says.

This was followed by the civil war and Somalia became known as a failed state.

In 2000, the situation started to improve with the establishment of a Transitional National Government.

Recent developments

A petroleum law was passed in 2007 and over the past few years, "the safety and stability in Somalia has improved, offshore investment has improved, the "diaspora" is returning bringing skills, money and a thirst for development, and the area is largely underexplored," he said.

"There's a license round coming up in 2017.

Spectrum's analysis of the 2014 seismic data shows "large structural and stratigraphic traps," he said.

Mr Berryman's talk included a description of some of the most prospective geological features in Somalia, as interpreted on the new seismic dataset and shared in public for the first time.

Looking at offshore Madagascar

Madagascar is an interesting region geologically, but very underexplored. TGS has been analysing the data.

Ben Sayers, Project Developer with TGS Geophysical Company, presented some of TGS's work doing a full geological and geophysical evaluation of the entire offshore western margin of Madagascar, from the Ambilobe Basin in the north to the Cap St. Marie Basin in the south.

He was speaking at the Finding Petroleum forum in London on Jan 25 2016, "Finding Oil in Africa".

Madagascar is currently re-evaluating its petroleum code, with a licensing bid round "hopefully coming next late this year or early next," he said.

But at the moment, "all of the offshore basins are either entirely undrilled or very sparsely drilled, the potential is untested," he said.

Only 11 wells have been drilled offshore in Madagascar so far, and none in water depths of over 50 m. There is also an onshore heavy oil play, which proves the existence of a working hydrocarbon system. The total offshore basins cover over 590,000 km^2 altogether.

TGS is currently working on an integrated interpretation of all of its data, including 2D seismic data, gravity and magnetic data, to be published shortly in a report.

Based on the work so far, "Oil mature source rocks with reservoirs at drillable depths are considered to be present, in all offshore basins" he said.

The study is based on interpreting 50,000 km of multi-client 2D seismic gathered by TGS (some in partnership with BGP, along with potential field data (gravity and magnetic), and data from 98 wells (of which 11 are offshore), with an aim to help understand the prospectivity of all offshore sedimentary basins, and identify new frontier exploration targets.

The Morondava Basin is covered by a 10 x 10 km seismic grid, and the others roughly 25 x 25 km.

One oil industry client, who was familiar with the seismic picture of the North Sea Brent Oil field (which contained 3.5bn barrels of oil), saw parallels with the seismic image of the Ambilobe North Basin, offshore North West Madagascar.

So perhaps there could be parallels in the reservoirs as well as the seismic image.

Madagascar has an interesting tectonic history. It was previously attached to Somalia on Africa's East coast, with (what became) India attached to the Eastern side of Madagascar, and what became the Seychelles nestled in between in the north.

The rifting started in the late Jurassic period, with shallow marine conditions opening up, good for depositing organic matter, with the open-ocean starting to open during the Cretaceous.

The breaking up of the micro-plates caused a great deal of rifting, tilting, compression and uplifting, which makes for interesting geology. "There are many attractive structural and stratigraphic play types," he said.

Note – the TGS talk contained a large amount of geological description which is very difficult to cover in a report of this type, but the high resolution video and pdf slides are available to download on the Finding Petroleum website.

Watch Ben's talk on video and download slides at **http://www.findingpetroleum.com/event/35f2d.aspx**

List of attendees 'Finding African Oil', The Geological Society, London, January 25, 2016

Stuart Amor, Analyst
Christian Richards, Director, ACGeo
Christian Bukovics, Partner, Adamant Ventures
Duncan McSorland, Business Development Manager Aker Solutions
Alec Jones, Aker Solutions
Andrew Pink, New Ventures Project Advisor, Anadarko
Alan Perkin, Consultant, Artamo Energy Services Limited
David Craik, Consultant, Atlaslocal
Philip Leijten, Front End Development Manager, BG Group
Nicola Adams, Exploration Manager,BP
Sean Goodman, Geophysicist, Bridgeporth
Jonathan Watson, Geophysicist, Bridgeporth Ltd
Bryn Austin, Director & Geological/Geophysical Consultant, Brynterpretation Ltd
Robert FE Jones, Director, Caithness Petroleum
Nick Pillar, Manager of Geophysics, Canadian Overseas Petroleum Ltd
Sean Barber, Business Development Manager, Cereno
James Andrew, Busines Development Manager, EAME CGG
Jodie Hunt, Marketing Geologist, CGG
Mustafa Elsherif, Sales Manager, CGG
Siebe Breed, Structural Geologist, CGG - NPA Satellite Mapping
Tim James, Principal Economist, CGG GeoConsulting
Alex Vines, Research Director, Chatham House
John Glass, Consultant Geologist, Cloverfield Consulting Ltd
Craig Lindsay, Director, Core Specialist Services Limited
Dan Kunkle, Director, Count Geophysics
Hugh Ebbutt, Senior Adviser, CRA Marakon
Hugh Ebbutt, Associated Director, CRA Marakon
Meg Nicolaysen, Critical Resource
Alexandra McKenzie, Artist, Digital Energy Journal
Stephen Norman, Business Development Manager, DNV GL
Chris Anderson, Marine Sales Manager, Dolphin Geophysical Ltd.
Howard Davies, Business Dev Manager, DownUnder GeoSolutions
Toya Latham, Drilling Info
Tom Richards, Senior E&P Analyst, Africa Drillinginfo
Chad Barnes, Upstream Analyst, Energy Industries Council
Martin Riddle, Technical Manager, Envoi
Mark Stanley, EPI
Mark Lonergan, Senior Business Development Manager, EPI Ltd
Charles Line, New Opportunities Supervisor, East Africa, ExxonMobil
Karl Jeffery, Editor, Finding Petroleum
Richard McIntyre, Sales Manager, Finding Petroleum
Avinga Pallangyo, Conference Coordinator, Finding Petroleum
Salar Golestanian, Managing Director, Finity Asset
Jon Baston-Pitt, Business Development, Europe & Africa, Fugro
Robert Hawkins, Director of Project Management, Fugro
Andrew Shrager, Geodynamics Worldwide
Bryan Moseley, Geologist
Martine Davis, Senior Sales Executive, Getech
Michael Clutterbuck, Development Geologist, Global Energy Consultants
Duncan Clarke, Chairman of the Board, Global Pacific & Partners
Richard Inibi, Geophysicist, GXT
Simon Berkeley, Principal, Halliburton
Amy Taylor, Sr. Product Specialist, Halliburton
Colin Saunders, Senior Regional Geoscientist, Halliburton - Neftex Exploration Insights
Wally Jakubowicz, Managing Director, Hampton Data Services
Robert Ward, Advisor, HESS
Tim Gibbons, Managing Director, Hoolock Consulting
Lawrence Jackson, Senior Account Manager, IHS
Samuel Edwards, IHS
Bani Norouzian, Business Development Manager, IHS Energy, IHS Global
Tony Younis, Exploration Manager, Impact Oil
Michael Doherty, Chairman, Impact Oil & Gas Limited
Rob Jones, Independent consultant
Mark Jones, Business Development Manager, E&A INTECSEA
Max Peile, Senior Consultant, IPA Advisory
Harry Harrison-Sumter, Sales Executive, ITE
Frances Leon, General Manager, Africa Oil & Gas, ITE Group Plc
Johnson Obembe, International Consultant, ITE Group PLC
Ritchi Wayland, Exploration Manager, JKX Oil & Gas plc
Toni Gaudelli, Senior Account Manager, LandMark
Ewan Whyte, Business Development Manager, LR Senergy
David Peel, Technical Director, Lukoil
Geoff Chambers, Senior Geophysicist, Lukoil
Joshua Graham, Geologist, Lukoil
Kai Gruschwitz, Senior Geophysical Advisor, Lukoil
Gerrard Spear, GeoScience Director, Lyme Bay Consulting Ltd
Amrit Brar, Marketing and Sales Manager, Lynx Information Systems
Brian McCleery, Director, M2C Energy Advisers
Robert Palfrey, Managing Director, Minerva SRM
Robin French, Senior Advisor, Mitsubishi Corporation
Joseph Woodward, MSc Petroleum Engineering Graduate
Chris Willcox, Regional Geoscientist, Neftex
David Gonzalez, Managing Partner, Net Brains
Shah Jahan Khandokar, Associate, Norton Rose Fulbright
Jodie Cocker, Remote Sensing Geologist, NPA Satellite Mapping
Alan Williams, Oil & Gas Manager, NPA Satellite Mapping
Helen Turnell, Principal Consultant, NR Global Consulting Ltd
Tony Renton, Founder, Oil and Gas London
Emmanuel Pettinotti, Geoscientist - Tertiary Team, Ophir Energy plc
Peter Dolan, Co-founder & Advisor, Ophir Energy plc
Paul D 'Arcy, Director, Technical Services, Europe, Africa, CIS & Middle East, Paradigm
Robert Parker, Consultant, Parker
Temitope Adeyinka, Energy Analyst/Economist, Petroleum Development Consultants
David Sendra, Associate Consultant, Petrophysical Consultant
Barry Wood, Director/Owner, PetroQuest International Ltd
Jamie Main, Director, PGI
Patrick Coole, Geoscientist - Dedicated Resource for MC Africa, PGS
Rob Holden, Senior Sales Supervisor, MultiClient Africa, PGS
Anthony Williamson, Senior Sales Supervisor, PGS
Sergey Palenov, Sales, PGS
Susanne Lehndorfer, Operations Geophysicist, PGS
Matt Tyrrell, Principal Geoscientist, PGS
David Pratt, New Ventures Manager, PGS
Steve Pitman, VP Corporate Marketing, PGS
Mike James, Business Development Manager, Marine Contract, Africa, PGS
Denis Potapov, SCRM Manager, PGS
Mark Martin, Vice President MegaSurveys, PGS
Frederic Yeterian, Director, Philax Resources, (EMEA) Ltd
Peter Jeans, Geologist, PJ Exploration Ltd
Christian Fenwick, VP New Ventures, EAME Polarcus
David Contreras, Gegional Geoscience Manager, Polarcus
Charlie Pembroke, Risk Consultant, Protection Group International
James Page, BDM, PVE Consulting
Aisha Sanda, PVE Consulting
Peter Elliott, Consultant, PVE Consulting Ltd
Josh King, Analyst, RAB Capital
Mike Rego, Managing Director, Rego Exploration (Oil & Gas Consultancy Services)
Nick Bright, Retired
Alastair Bee, Partner, Richmond Energy Partners
Andreas Exarheas, Assistant Editor, Rigzone
Samira Melloul, Manager, RJ Energy / PEL
Martin Smith, Business Development Manager, Operations, RPS Energy
Norrie Stanley, Chairman, RPS Energy
Janice Weston, Principal Advisor, RPS Energy Ltd.
Kevin Dale, Exploration Advisor, New Ventures Sasol E & P International
Jerome Foreman, Principle Geoscientist, Sasol Petroleum
Jeremy Lynch, Senior Geophysicist, SCDM Energy
David Webber, Seismic Operations Supervisor Sceptre Oil & Gas
Terry Devine, Assetr Development Manager, Schlumberger
Graham Pritchard, Principal Geologist, Serica Energy
Ralph Stone, Principal Geoscience Manager SOCO International plc
Glyn Roberts, Director, Spec Partners Ltd
Gareth Morris, Account Manager, Spectrum
Debbie Sewell, Multi Client Sales Manager, Spectrum
Hannah Kearns, Geoscientist, Spectrum
Inangporn Intawong, Spectrum
Jake Berryman, Exploration Advisor, Spectrum GEO
Ian Setterfield, Spectrum Geo
Anna Marszalek, Geoscientist, Spectrum Geo Ltd
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Duncan Rushworth, Vice President of Business Development, Svenska Petroleum Exploration
James Bull, Geologist, Taipan Resources
Markus Krieger, Managing Director, TERRASYS Geophysics
Roel Dirkx, Interpretation Geophysicist, TGS
Ben Sayers, Project Developer, TGS
Adam Sparks, TGS
Sadiqah Kasir, Geophysicist, TGS
Jennifer Halliday, Geophysical Manager, GPS TGS
Richard Cooke, Interpretation Geophysicist, GPS TGS
Nigel Quinton, Director of Exploration, Tower Resources plc
Steven McTiernan, Director, Tullow Oil plc
Alec Robinson, President & CEO, Valient Energy
Stewart Walter, Africa New Ventures Manager, WesternGeco
John Wood, Consultant Geophysicist-Geosciencetist, Wood Geoscience Limited
Andrew Gilmore, Business Development Manager Wood Group Mustang
Chris Gumm, Automation Business Development Wood Group Mustang
Alexander Burnett, SSA Data Analyst, Wood Mackenzie
Alwyn Vear Geoscience and Exploration Manager, Woodside Energy UK

What did you enjoy most about the event?

"Quality of content. Why change a winning formula?"
Chris Gumm, WoodGroup

"The presentations by PGS, TGS & Spectrum were very interesting. Having visited Madagascar several times, I was particularly interested in the TGS data."
John Glass, Cloverfield Consulting Ltd

"Chatham House presentation - availability of senior person from Chatham House."
Matt Tyrrell, PGS

"There was a particularly good mix of attendees and the discussions (during the breaks) were good."
Ritchie Wayland, JKX Oil & Gas plc

"Listening to the wide range of presentations - as an upstream explorer I relish all types of interdisciplinary inputs."
Bryn Austin, Brynterpretation Ltd

"The political review of the present situation."
Barry Wood, PetroQuest International Ltd

"The quality, technical content and the smooth delivery of the presentations. The conference was short and concise and did not drag on."

"Gaining a much deeper knowledge of the politics, cost, seismic date and the challenges in general the industry faces moving forward in Africa."
Sean Barber, Cereno

"An interesting mix of political, business & geoscience (to start) and subsurface data offering."

"All speakers were clear and fluent; the service contractors are best when they stick to the technology & data."

"I most enjoyed Patrick Coole's presentation and the findings using the seismic data over the open blocks in Cote d'Ivoire."

"Good talks, great atmosphere, good networking opportunity."

"I loved the fast-paced Madagascar presentation at the end, it really gave the lunchtime discussions a bit of energy."