Why Mexico is an ‘amazing opportunity’

Sierra Oil and Gas – Mexico's first independent

Getech – Understanding tectonic processes offshore Mexico

Spectrum – modelling seismic with oil seeps

TGS – combining seismic, multibeam, piston coring and geochemical analysis
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Finding Oil and Gas in Mexico

Finding Petroleum held a half day forum in London on Sept 17 2015 looking at the business opportunities for oil and gas companies in Mexico.

Our opening speaker was Read Taylor, Upstream Executive Director with Sierra Oil and Gas, the company which formed a consortium which was the only winner in Mexico’s first bid round, held in July 2015.

Mr Taylor was followed by speakers from seismic processing and interpretation companies Getech and Neflex, then seismic acquisition companies Spectrum and TGS, explaining the best ways oil and gas companies can understand the petroleum geology of Mexico.

Mexico is an enormous oil and gas province, with production both onshore and offshore, including the 37bn barrel Cantarell Field, one of the largest oilfields in the world, which produced 2.1m bopd in 2003.

The Mexican oil and gas industry was nationalised in 1938, so the only oil and gas company allowed to operate in the country was PEMEX. But in recent years, the government decided to change tack, because it thought inviting foreign oil majors into the country would help it stem declining production rates.

The Mexican government set a high price for companies to come in – one of the onerous requirements was for a ‘letter of credit’, or a bank guarantee, that the company would be able to pay the government for the oil it produced. For a bank to make this guarantee, money needs to be reserved in advance for this purpose – in addition to funds required for setting up operations. This all gets very expensive.

The first bid round covered 14 blocks, all in shallower waters. Only 2 of these were ultimately awarded, both to a consortium of Sierra Oil and Gas, Talos Energy of Houston, and Premier Oil.

Mexico is currently making plans for two more bid rounds, and may include some of the blocks not taken up in the first round in these. The government may need to reduce its acceptance criteria in the next round so that more bids get accepted. Mexico announced a 5 year plan in 2015, covering 560 different opportunities.

Finding Petroleum’s Forum “Finding Oil and Gas in Mexico” was held in the Geological Society, London, on September 17, 2015, supported and sponsored by TGS, Getech, Neflex Exploration Insights, Spectrum and EPI.

Also speaking at the conference was Helen Smyth, geological consultant with Neflex, on “enhancing exploration concepts – a Mexico case study” (video and slides were not released).

The full agenda, and available videos and slides, is online at www.findingpetroleum.com/event/77048.aspx.
Sierra – “Mexico is an amazing opportunity”

Following government reforms, Mexico is one of the most exciting places for the oil and gas industry in the world, said Read Taylor of Sierra Oil and Gas.

The Mexican government put its first 14 blocks out to tender with an auction in July 15, and only 2 blocks were awarded, both to the Sierra consortium.

Sierra Oil and Gas is getting a lot of press attention, since it is the only company which has blocks in Mexico, Mr Taylor said.

Opportunities

A starting point to understanding opportunities in Mexico could be to say that “[Mexican state oil company] PEMEX is good at finding big fields and not very good at maintaining fields,” Mr Taylor said. “They had not been very successful across a very broad opportunity set in any secondary recovery [such as enhanced oil recovery].” This comes from being the only explorer and developer in a country with an extensive petroleum opportunity.

The average recovery rates (oil recovered divided by oil thought to be in place) is below 20-30 per cent in most areas.

In other words, perhaps the biggest opportunities are for companies and individuals who are good at keeping old fields running, particularly in techniques like enhanced oil recovery.

And in comparison with other parts of the world, “Mexico is clearly underexplored and underdeveloped.”

The deep water offshore exploration blocks for example look particularly attractive to companies who are already active in US waters of the Gulf of Mexico, because they have some understanding of the geology, and when they need equipment and vessels, they can just “float it over from Houston,” he said.

And you might not need to “float it over from Houston”, Mexico has a great service industry to support oil and gas operations, including all the main service companies, and casing providers. Costs are going down in today’s market, with a 12,000ft offshore well in shallow water costing around $18-25 m at the moment for some of the areas, he said.

In terms of geology, comparing US Gulf of Mexico opportunities to other areas in the Mexican Gulf of Mexico opportunities “is not an apples to apples comparison,” he said. “The play types are close but not the same thing.”

Mexican reforms

The oil and gas sector is just one of the areas of the Mexican economy currently under reform. Other areas are electricity generation and oil and gas transmission, Mr Taylor said.

Mexico is also reforming the institutions, including environmental, regulatory, and financial, which oil and gas companies need to deal with regularly.
Finding Oil & Gas in Mexico

This means that many of the institutions are not yet well established, and their requirements are not fully clear. They are writing many of the regulations and requirements over the last few months and currently,” Mr Taylor said.

When it comes to drilling, there are 13 different regulatory institutions in Mexico involved, he said.

The people who work in these Mexican government departments are “the sharpest people you will ever meet, very highly educated. Some of the best people, most flexible people.”

But developing the requirements “is a huge (task) issue for them, they are working 24-7,” he said.

**Fields on offer**

The Mexico government has a five year plan to release acreage to oil companies by auction, starting from May 2015 when the plan was announced. It covers 560 different opportunities in total.

This includes fields which were big producers once, but production declined, and PEMEX did not manage, or did not have the capital to try, to halt the decline using secondary recovery methods.

There are also appraised fields which haven’t been developed, as well as raw exploration opportunities.

“We are very interested in many of these opportunities,” he said. Preparing for the second and third bid rounds “keeps us very busy.”

PEMEX is gradually releasing all of its data, and it will soon be available in bulk.

The offshore oilfields are in the Gulf of Mexico, off Mexico’s Eastern coast. Roughly speaking you can expect to find gas and condensate to the north, oil (including unconventional) to the middle and ‘big oil’ in the south, he said. The famous Cantarell field is in the south.

Around 80-90 blocks are likely to be released in the Sureste basin in the Southern waters, the location of the Chicxulub meteorite crater (the one thought to have killed the dinosaurs).

There are two main play types’ offshore sandstone and carbonates. “In some of the areas it’s a big Gulf of Mexico sub salt like province,” he said. “There’s many structures which haven’t been drilled. These are some of the richest source rocks I’ve ever seen, this is a very rich hydrocarbon province.”

The deeper carbonate reservoirs included in the first bid round, are “PEMEX’s bread and butter,” he said. “We were one of the few people who understood that.”

Another interesting area is Tampico-Misantla, mainly onshore in North East Mexico. “Halliburton is doing horizontal wells and fracking,” he said. “It’s a silty complex reservoir. Probably next year there’ll be some exploration acreage offered. There’s a range of opportunity.”

There could be deeper unconventional oil and gas resources, but “at these prices it’s not really do-able,” he said.

Sierra anticipates that the fourth bid round will include deepwater blocks. “There’s a lot of companies waiting for that,” he said. “We will not be engaged in that.”

Altogether you could say that Mexico has opportunities for companies with a wide range of technical competences. “It has something for everybody,” he said.

**Contracts and bidding**

The cost of bidding, some of the early issues with the opening of the market and the low price environment we are now in means a new entry into Mexico is “a problem for a lot of people,” he said.

As part of your bid, you need to provide a ‘letter of credit’, a document from a bank guaranteeing the full expenditure of the work program you have bid. If you fail to spend the money then the government will receive it. Some form of guarantees is quite common around the world but normally in the form of a Bond. “That was real burden for a lot of people,” he said. “No-one wants to put money off their balance sheet in a letter of credit and then explore.”

It works out that you need to have around $1.2bn on your balance sheet as part of the qualification process to bid to do offshore exploration blocks in Mexico. That kind of money can’t be raised by a typical London AIM (Alternative Investment Market) listed company, it needs to come from private equity or larger independents and NOC’s, he said.

The Mexican government offers a “production sharing contract”, where you give the Mexican government a percentage of your oil revenues. Whether you win the bid depends 90 per cent on how much of the oil revenue you are prepared to share with the government, and 10 per cent on how much you commit to investing beyond the minimum work program.

For one higher risk moderate water depth exploration block for example the government was asking for 50 per cent minimum government take. “I think it was too high.”

The contract further requires an ‘R’ factor, where the government receives an increasing royalty rate as the ratio of cumulative receipts (from petroleum sales) to cumulative expenditures changes (ie when you have spent less than you receive). In other words, the higher returns you make from the oil, the bigger chunk of it the government takes.

“It takes out the upside incentive for the contract. It is not something most oil companies like or appreciate in higher risk exploration areas.”

However for subsequent bidding rounds, “they have improved it,” he said.

Another difficult issue with bidding is restrictions on changes to consortia, which means that once you have decided which partners you will submit a bid together with, you cannot change your partner for that entire bid round. “You sign up months in advance, and that’s the guy you go to the dance floor with,” he said.

This limits your options, and puts a limit on the number of companies who can survive up to the bid round, he said.

In bids in other countries, it is typical for partners to continue doing new deals with each other in a hotel room upstairs right up to the last minute.

When putting the contract together, the government team went around the world and tried to incorporate the best features in the contracts...
Finding Oil & Gas in Mexico

from other countries. “They created a good world class contract,” Mr Taylor said. “It has all the basic things you would expect.”

Having more data would be very useful to oil and gas companies, he says. The government has a 5 year plan to auction blocks, “we know things are coming, we do know that acreage will be offered, but the timing could slip here or there a little bit.”

For certain onshore areas, which are not so well explored, the government will need to develop a different system, to encourage oil and gas companies to risk money on exploration, he said.

For example it will be complex for the government to work out how to incentivise development to the unconventional assets. “That's going to be a tough one,” he said. “It’s hard to be the first guy in an unconventional play in an emerging market due to needing to get the cost efficiencies right find the right high quality services and getting extensive areas from which to then explore and develop, etc.”

Mr Taylor says he hopes the terms will improve in subsequent rounds. “Over the six months from when reform was announced to [accepting] bidding data they made three important iterations to the contract. There was a positive step.”

“I think the local group there in Mexico suggested 110 changes. Half of those are significant. Comisión Nacional de Hidrocarburos (CNH) seems to be listening to industry and accepting many of the suggestions,” he said. “They want to be successful. They’ve done some positive moves.”

Sierra Oil and Gas

Sierra screened over 330 fields, covering 43,000 wells and 12 main basins, as part of its initial research.

Sierra’s working process has been like a funnel, taking a large number of assets and reducing them to a few it feels most confident in.

For onshore fields, security has been a major screening criteria. “There’s a lot of places where you don’t want to do business well known and publicised - drug problems, crime problems. Operations however have been going on for over a hundred years onshore and in most areas it’s manageable. It’s not a perfect world by any sense of imagination and importantly HSE and security risk are important criteria for our investments.”

Sierra raised a total of about $1.2bn from energy investment company Riverstone, EnCap and I2, he said.

At the time Riverstone was looking for an investment opportunity in Mexico. “All of these people had been in Mexico trying to find a management team,” he said. “We showed up at the right time in a high price oil environment with the right story.”

Sierra receives funding from a public trust in Mexico, Fideicomiso Irrevocable No. F/175992, a Mexican pension fund, which was recently acquired by Blackrock.

Since it is funded by private equity, “we have different needs and drivers in our company. There is a focus on high value generation, high quality projects including fields and we have to be very selective in our capital deployment vs other peers in Mexico which have endless budgets,” he said.

The current oil price environment has discouraged many people from participating. “People are rationalising their own portfolios, thinking, ‘do we really want to go to Mexico relative to their existing projects and portfolio.’

Since Sierra Oil and Gas was established with the sole purpose of being active in Mexico, “we didn’t have that problem,” he said. “It’s an opportunity for us to buy at the bottom of a market cycle.”

The first bidding round was for 14 blocks, all in shallower waters, nearby wells had already produced oil.

30 companies had initially shown interest, 9 companies ultimately participated in the auction, but successful bids were ultimately made for only 2 blocks out of 14 on offer, both to a consortium of Sierra, Talos Energy of Houston, and Premier Oil.

Some blocks had no offers, and other blocks had offers which were below Mexico’s minimum requirement for profit sharing.

Sierra spent 18 months preparing for the first bid round. The two blocks it bid for (and won) have prospects of 100 to 200m barrels.

Sierra is close to being ready to drill one [of the two blocks] right now,” he said. This block has good seismic indications, giving more confidence that the high potential oil prospect is where it is expected to be. This reservoir is “shallow enough, thick enough,” he said. “There’s good confidence in 3D [seismic] data.”

The other block will probably be drilled around early 2017.

“It was a very close and tight bid round,” he said.

Technology

There would be a lot of value from doing new surveys with 3D seismic, and using modern processing techniques, particularly for looking under salt. “It hasn’t been done extensively yet, PEMEX as the lone company in previous years hasn’t had the capital and had many other opportunities to consider,” he said.

There might be big opportunities with horizontal wells, fracking, and enhanced oil recovery. For enhanced oil recovery, “there’s very little CO2 in the country - they desperately need CO2 injection,” he said. “They do very little water flood, they’ve tried nitrogen.

Being local

You can’t run a Mexico oil company in London, he said. “I wish you could but you can’t. You need to be down there just like any other international destination, be in daily conversations with the government. It is just like anywhere, you need to be there, you need to be on the ground.”

Speaking Spanish is very important. Sierra Oil and gas employs mainly highly qualified nationals he said.

To understanding the petroleum geology offshore Mexico, it is first useful to gain an understanding of plate motions, said David Sagi, structural geologist at Getech, speaking at the Finding Petroleum forum in London on Sept 17, “Finding Oil and Gas in Mexico”.
Dr Sagi was the Project Leader on the team writing Getech’s 2015 Regional Report on the Tectonic Evolution of Mexico. The report models the evolution of the basin, including the mapping of crustal types, structural and sedimentary features.

A good plate model can help you to locate accommodation space for sediment deposition, and, ultimately, the formation of oil bearing source rocks. It can also show where oil may have migrated to, and trapped, he said.

Different crustal types will allow for different heat flows from the Earth’s interior, leading to different temperatures in the reservoir and different likelihoods of the temperature windows for oil formation to be present.

Describing the plate evolution has been a challenge. “There’s a lack of easy-to-recognise fracture zones, which makes the geometry very difficult to establish,” he said.

In other regions it is often possible to see fracture zones in the bathymetry. It works like this for most of the Atlantic Ocean, he said. But in the Gulf of Mexico, there is a thick layer of sedimentary rocks overlying the oceanic crust, which means that the crust can’t easily be imaged by most geophysical surveys.

Magnetic surveys of the seafloor can sometimes show up ‘anomalies’ in the crust; these are related to the reversal of Earth’s magnetic field and can be correlated with other geological data to understand the age of the oceanic crust, although magnetic surveys have been made factors such as thick sediments and low field amplitude make it difficult to reliably identify the anomalies, he said.

The most useful offshore dataset was gravity data, which was reprocessed in-house. This was combined with onshore satellite data imagery (Landsat) and SRTM (Shuttle Radar Topography Mission) data. The report also combined 3rd party seismic and well data. The company also has a global plate model, going back to the Early Permian era (~300m years ago). Any regional plate models need to be consistent with the global model. This is a good way of testing new regional plate models, he said.

Getech creates ‘crustal architecture grids’ illustrating important properties of the crust. It models the depth-to-basement, depth-to-Moho and, consequently sediment thickness and crustal thickness.

The analysis starts with the theory that the Gulf of Mexico has developed by rifting between North America and the Yucatan Peninsula. The questions are in which direction and when has this occurred? Four different plate models were considered.

Model 1 is a “translational-rotational model”, with curved fracture zones, and with a pole of rotation east of Florida. With this model, “the Gulf of Mexico opens in a rotational manner,” he said. “We get a transform margin in the southwest corner of the Gulf and passive margins in Yucatan and along the Texas and Louisiana coasts.”

Model 2 (illustrated above) is a purely translational model, with the Gulf of Mexico opening by the NW-SE movement of Yucatan, developing transform margins on the northeast and southwest, and passive margins on the northwest and southeast Gulf.

Model 3 has the Gulf opening in a rotational manner, with a pole of rotation to the southwest, in the Pacific.

Model 4 has a pole of rotation in Western Cuba, with tight curved fracture zones in the East, and the Maya Block (Yucatan Peninsula) rotating counter clockwise. After oceanic crust forms in the Gulf of Mexico a passive margin develops along the southern US Coast and northern Yucatan, whereas a transform margin develops along mainland Mexico.

By checking the regional models against Getech’s global model, it was possible to eliminate models 2 and 3, he said. There was not enough space at the right time for such deformations. On the other hand, model 1 and 4 are fairly similar.

The next step was to look at gravity data, to see if there are any gravity anomalies which might point out fracture zones, that align with the ‘flowlines’ of the proposed plate models.

“We tested a range of poles of rotation, to see if we can get any flow lines that match up,” he said. The best fit between gravity anomalies and flowlines had a pole of rotation around the western tip of Cuba.
Spectrum – seismic modelling with oil seeps

To find oil in the pre-salt deep offshore Mexico, you can combine improved imaging predicted by seismic reverse time migration (RTM) modelling with oil seep data from satellite imagery, says Spectrum’s Karyna Rodriguez

Oil seep studies can be a great complement to seismic interpretation in finding oil and gas, said Karyna Rodriguez, Director of Geoscience with Spectrum, speaking at the Finding Petroleum Sept 17 2015 London forum, “Finding Oil and Gas in Mexico”.

Spectrum is looking for supporting data which suggests there might be a field similar in size to the Cantarell field, one of the largest oilfields in the world.

Ms Rodriguez previously worked for PEMEX for 20 years. From a geologist’s point of view, it was a great place to work, she said. “There were no competitors, we had access to the whole database, all the seismic, all the wells,” she said. The biggest challenge was that “sometimes you had people keeping information in drawers.”

PEMEX held a one year campaign in the year 2000, to try to identify exploration opportunities, and the geoscience team identified over 3,000, she says. “I was able to see, look and value and peer review each one of those. That was a great time.”

The two techniques together could be used to help find oil in the deep offshore Mexico Campeche-Yucatan basin, where the reservoirs are pre-salt, she said.

In the seismic you can see “hints of faulting” in the pre-salt, she said. “So we could potentially have a presalt syn-rift section.”

Seismic survey

Spectrum is collaborating with PGS and Schlumberger in the Gulf of Mexico, to acquire a multiclient 2D seismic survey, starting in May 2015. The survey was designed to fill in areas between existing 3D data, she said.

The area extends from the Perdido Fold Belt in the North to the Yucatan Platform and deep offshore Yucatan. It aims to provide a seamless data set which can be used to understand the whole Gulf of Mexico.

It has acquired 80,000km of long offset broadband seismic so far. “I’ve seen the quality of some of that data, it’s really impressive,” she said.

It was a lot easier to record seismic in May than it is now, she said, with a lot of seismic recording going on, causing interference.

Before doing the seismic acquisition, Spectrum did extensive reviews of the existing regional data, to try to identify how it would be able to image traps and seals. This included an analysis of existing seismic data using reverse time migration.

It was important to know if it would be possible to image the pre-salt without compromising the imaging of the post salt section, she said.

To get the best image, the fold (number of seismic records covering each point of subsurface) should be as high as possible, and the record length should be as long as possible, in order to image as deep as possible, right down to the basement. The deepest basement to image is approximately 18km.

The forward modelling parameters used a 25 Hz maximum frequency, 15 seconds record length, 12 km maximum offset, 20 km depth and 250 m shot spacing.

Oil seep studies can be a great complement to seismic interpretation in finding oil and gas, she said.

Campeche-Yucatan basin, where the reservoirs are pre-salt, she said.

“Some geologists and geophysicists came up with interpretations where I thought, ‘no way’ then I was proved wrong by successful wells,” she said.

“If only those geophysicists who worked with that data set had access to the data we can now produce. Instead of 3,000 opportunities we’d have 6,000 opportunities,” she said.

Mexico has had two record breaking wells. The Cerroazul well, drilled in 1916, gushed for 260,000 barrels in 24 hours, and produced 57m barrels by 1921. The Cantarell field came online in 1976, and peaked production in 2003 with 2.1m bopd, she said.

Considering both of these wells came online in a year ending with a 6, perhaps 2016 will be a good year for another giant Mexican well, she joked.

Geology of offshore Yucatan

Offshore Yucatan has both ‘subsalt’ reservoirs, and ‘presalt’ reservoirs. The difference is that the subsalt sediment is beneath allochthonous salt, which means the salt originated at a distance from its present position. It wasn’t necessarily deposited before the salt was (ie earlier in time).

The presalt off Yucatan has ‘analogues’ (similarities) with presalt plays in Brazil and also off West Africa.

Development of presalt reservoirs can take time. Consider that Brazil’s oilfields are producing 800,000 bopd from presalt, 8 years after the first oil discovery, and 15 years after the first licensing round.

To image subsalt below the allochthonous (moved) salt, you have to image the shape of the salt, which can be tricky.

The basement rock is slightly downward dipping, and covered with shallow marine or transitional deposits (presalt) which “we expect will contain both source and reservoir rocks,” she said. This has never been drilled. The salt was deposited 161m years ago.
The high fold means you get a lot more resolution, and a lot more horizons, she said.

The final data acquisition parameters included continuous recording, with a record length of 15 s, streamer length of 12 km and shot point interval of 25 m. Spectrum used a maximum offset of 12 km. It would be hard to survey with a longer offset due to feathering (when the streamer moves sideways from the towing direction due to currents) and drag (negative frictional forces). “There are a lot of currents in this area,” she said.

Oil seeps

Meanwhile oil seeps can be a very useful indicator of oil. The giant Cantarell field was originally discovered in 1961 by a fisherman (named Cantarell) who reported finding “very annoying seeps in his fishing nets,” she said.

Cantarell was first drilled in 1976, with the additional help of some seismic data. It is estimated to have the third highest oil in place in the world, and is the tenth largest producing field in the world, she said.

“In Mexico, oil slicks have proved a very good indication that we have an active hydrocarbon system that is producing oil,” she said. “Therefore we use this to guide us in our study.”

Oil slicks can be detected by satellite because they are smoother than the surrounding water, and so appear dark, with light being absorbed rather than reflected.

If there is absolutely no wind, both water and oil have the same smoothness and appear dark. But if the sea is rougher, then light from the sea is backscattered towards the satellite.

If the sea is very rough, then the surface oils are broken up by waves, and so the oil reflects light as well.

So to see slicks you ideally need a slight wind, with a rough sea surface but smooth slick surface.

If slicks are persistently in the same part of the ocean that can indicate a working hydrocarbon system (slicks which are not repeated could be oil illegally dumped from vessels).

Spectrum identified over 700 slicks which could indicate an oil reservoir, using data gathered by Landsat satellites (owned by NASA). “This satellite data has largest spatial and temporal coverage of any satellite data set over 30 years,” she said.

Spectrum has analysed oil slicks around the world, but “we have never seen more than in Mexico,” she said. “We have never had more confidence in slicks than here.”

In order to use slick data to determine if there is a working hydrocarbon system, Spectrum wants to ensure that the oil slicks are present in different times of the year and different years during the past 30 years.

Correlating slicks and seismic

The next stage is to try to correlate the slick with the seismic data to see if there is a possible source for the oil in the subsurface.

It proved particularly helpful to look for diapirs on the seabed, a geological structure where a mobile and deformable material is forced upwards into brittle overlying rocks (quoting Wikipedia), creating a dome.

There was a strong correlation between the presence of slicks clusters on the sea surface, and diapiric features on the seabed, she said.

At the diapirs, the salt is thinning out (allowing oil to enter the seabed). The salt provides a migrating platform (for oil to find its way upwards), she said.

In the carbonate regions, the slicks were related more to basin bounding faults than to diapirs, she said. Some of these basin bounding faults can be seen on a gravity map.

Spectrum has done similar work in the Western Mediterranean, between Spain and France, finding a relationship between salt structures and slicks, with slick data from optical satellite data.

It is “a direct analogue of what’s happening in deep Yucatan area,” she said. “We have the salt and we have the source rock.”
TGS – Gigante: the first step to getting a comprehensive view of the Gulf of Mexico

Seismic company TGS has started work on its ‘Gigante’ project, to get a comprehensive view of the subsurface beneath all Mexican waters

Seismic company TGS has started its ‘Gigante’ project to get a comprehensive understanding of the subsurface beneath Mexican waters, using 2D seismic data, seabed sonar with seabed rock analysis. It aims to put together a large structural interpretation. Gigante is Spanish for ‘gigantic’.

“We are very excited about our program,” said Chris Corona, Director of Latin America with TGS, speaking at the Finding Petroleum London forum on September 17, “Finding Oil and Gas in Mexico”.

“The whole goal is to try to put a picture together of an entire basin, that's what we're striving for. We think what we're planning to do will tie the overall Mexico basin together.”

The survey will record various grids from 5km x 5km to 24km x 24km with 5 vessels using consistent acquisition and processing parameters across the Mexican Gulf of Mexico. It will also tie into TGS’ Deepwater data in the US Gulf, and extends into the Caribbean.

All blocks covered in upcoming rounds will be surveyed with a 5km x 5km grid, apart from one block which is in waters too shallow for a seismic vessel.

TGS is unable to reveal who exactly is sponsoring the work “but we have a good range of national oil companies (NOCs), international oil companies (IOC’s) and large independents,” he said.

Currently there is a great deal of 2D seismic data of the waters recorded by Pemex, but it has all been recorded in different ways and at different times.

“To have a data set with consistent parameters across the board, it goes a long way,” he said.

Some people are sceptical of the value of 2D, when there is so much 3D available, he said. But the answer is that 2D can cover a wider area with less cost. “2D was first a tool to understand the geology, and now it’s a tool to decide where you want to buy your 3D,” he said.

TGS will add in structural interpretations, gravity and magnetic data, bathymetry data and pore data.

It aims to do interpreted products in time with the relevant bid rounds, and do further iterations of the seismic interpretation as the velocity data improves. The aim is to complete processing in the third quarter of 2017.

The data is being recorded by four vessels, operated by Seabird. The fourth vessel started in mid-September. A fifth vessel will join in mid-November / early December. Acquisition is expected to be completed in the second quarter of 2016, “probably April”.

A company called “Oro Negro” (black gold in Spanish) will manage the Multibeam/Coring/Geochemical study.

The bathymetry survey, acquired by Fugro, will cover almost the same area as Gigante, 620,000km in depths greater than 750m, this survey started in October 2015.

TDI Brooks will take ‘piston cores’, which are basically samples of rock from the seabed, maximum penetration through the rock of 20m. It aims to take 1,000 ‘piston cores’, and do more advanced studies of around half of those. This is expected to be complete by November-December 2016.

Seismic Interpretation

TGS will undertake a stratigraphic and structural interpretation of the region using the Gigante 2D seismic, piston core, multibeam and gravity and magnetics data, delivering horizons, faults and a regional report, said Alex Birch-Hawkins, a geophysicist with TGS.

It aims to tie at least 10 seismic horizons with data from around 60 wells offshore Mexico, as well as data from US Gulf of Mexico wells and seismic surveys that tie the Gigante survey. “That will be critical in increasing our confidence of the interpretation,” he said. “It’s pretty structurally complex, so it’s going to be a challenge.”

TGS has already interpreted the first line, which runs through many interesting structural provinces - the Perdido fold belt, the deepwater Mexico basin, through the Campeche Basin and onto the Yucatan platform, he said.

There is uncertainty over the age of the various horizons at this time, he said.

“Interpreting this section is very challenging. But we have already begun to identify interesting features on the data.”

There is an interesting unit visible on the TGS data at the base of the Campeche Escarpment which has been interpreted as salt. It is also known that the Chicxulub impact crater lies approximately 150km east of this line, generally accepted as the cause of the Cretaceous-Paleogene extinction event, he said. The resultant radial deposition of a carbonate breccia from this bolide impact is geologically interesting as it is known to form good quality reservoir elsewhere offshore Mexico (the Cantarell Field, for example) so we are excited to learn more about the distribution of this unit.

TGS are currently interpreting the fast track PSTM data in order to assist with building geologically-constrained velocity models and to develop the interpretation product.

Further information about TGS’ Gigante project is online at www.bit.ly/TGSGigante
List of attendees 'Finding Oil & Gas in Mexico',
September 17, 2015

Evi Otoo, Senior Geoscientist, Hugh Ebbutt, Associated Director, A.T. Kearney
Christian Bukovics, Partner, Adamant Ventures
Paul Murphy, Key Account Manager, Oil & Gas Division, Airbus Defence and Space
Christian Richards, VP Sales EAME, ARKeX
Anne-Marie Liszczycy, Geophysicist, ARKeX
David Craik, Consultant, Atlaslocal
Iain Poole, Barnett Waddingham LLP
Philip Leijten, Manager Group Strategy, BG Group
Eilidh Simpson, BG Group
Sarah Brazier, Geophysicist, BG Group
Sean Goodman, Geophysicist, Bridgeport
Bryn Austin, Director & Geophysical Consultant, Brynterpretation Ltd
Will Jeffery, Senior Offshore Interpreter, CGG
Jo Firth, Senior Geophysicist, CGG
Mustafa Elsherif, Sales Manager, CGG
Siebe Breed, Structural Geologist, CGG - NPA Satellite Mapping
Roger Doery, Consultant
Dan Kunke, Director, Count Geophysics
James Rosshire, Industry Executive, Oil & Gas, Dassault Systemes
Richard McIntyre, Sales Manager, Digital Energy Journal
Brian Donnelly, Consultant Geophysicist, Donnelly
Faye Glover, Data Analyst, Drillinginfo
Darren Jones, Data Analyst/Cartographer, DrillingInfo
Chad Barnes, Upstream Analyst, Energy Industries Council
Esther Dowling, Consultant, Energy Intelligence Group
Martin Riddle, Technical Manager, Envoi
Jerry O’Donnell, Business Development Manager, EPI Group
Greg Daniel, Marine Operations Manager, EPI Limited
Avinga Pallangyo, Conference Coordinator, Finding Petroleum
Karl Jeffery, Editor, Finding Petroleum / Digital Energy Journal
Kevin Lawes, Seismic Processing Manager, GeoGuide Consultants Ltd
Terry Quinn, Head of Marketing - EAME, Geokinetics Processing Inc.
Jim House, Director, GeoSeis Ltd
Stephen Shorey, General Manager, Geotrace
David Sagi, Structural Geologist, Geotech
Chris Boot, Business Development, Geotech
Tori Springer
Lottie Adams, Halliburton
Richard James, Halliburton

Helen Smyth, Halliburton
Norman Hempstead, Director, Hempstead Geophysical Svs
Carlos Bellorin, Principal Analyst, IHS
Adrian Heaford, Senior Geologist, IHS
Karen Sherry, Sales and Marketing Manager, Ikon Science
Paul Main, Business Manager - Research, Infeld Systems
Bob Lambert, Founder, Ipx Energy Ltd
Sarah Tavella, Kallanish
Richard Handley, Account Manager, Landmark Software
Ewan Whyte, Business Development Manager, LR Senergy
Alan Wilson, Geologist, LR Senergy
Rolmys Espinoza, Senior RE, LR Senergy
Alberto Ariasola, Lead Structural Geologist, LR-Senergy
Amrit Bhar, Marketing and Sales Representative, Lynx Information Systems
Charles Speh, Managing Director, Milestone Exploration Limited
David Weeks, Geoscientist, Neflex
David Bamford, Director, New Eyes Exploration Ltd
Shah Jahan Khandokar, Associate, Norton Rose Fullbright
Santiago Ross, Associate, Norton Rose Fullbright
Claire Wilby, Associate, Norton Rose Fullbright
Tom Lindley, Associate, Norton Rose Fullbright
Patricia Prato, Norton Rose Fullbright
Elisa Weatherly-Godard, Associate, Norton Rose Fullbright
Nick Prowse, Partner, Norton Rose
Jodie Coker, Remote Sensing Geologist, NPA Satellite Mapping
Helen Turnell, Principal Consultant, NR Global Consulting Ltd
Tony Renton, Founder, Oil and Gas London
Vitaliy Yurchenko, VP Sales and Marketing, ORG Geophysical
Robert Parker, Consultant
Andrew Foulds, Director, Petrazfi Ltd
David Sendra, Associate Consultant, Petrophysical Consultant
Iain Brown, PGS
Jamie Knobs, Economics Advisor / Senior Geologist, Premier Oil
Richard Dolman, Lead Geophysicist
New Ventures, Premier Oil
Aruna Mannie, Senior Exploration Geoscientist, Premier Oil
Andrei Belopolsky, Brazil Exploration Manager, Premier Oil
Tim Davies, Global Portfolio & NV Manager, Premier Oil
Josh King, Analyst, RAB Capital

Mike Rego, Managing Director, Rego Exploration (Oil & Gas Consultancy Services)
Robert Snashall, Consultant, RGPConsult
Robert Stevens, Richmond Energy Partners
Alastair Bee, Partner, Richmond Energy Partners
Andreas Exarheas, Assistant Editor, Rigzone
Robert Waterhouse, Director, Rosha Resources Ltd
John Simmons, Principal Advisor, RPS Energy
Martin Smith, Business Development Manager - Operations, RPS Energy
Martin Lester, Technical Director, RPS Energy
Norrie Stanley, Chairman, RPS Energy
Juan Botillo Perez, Exploration Technical Manager, Sasol
Jerome Foreman, Principle Geoscientist, Sasol Petroleum
David Webber, Seismic Operations Supervisor, Sceptre Oil & Gas
Colin Clarke, Team Lead Subsurface, Senergy
Read Taylor, EPV, Sierra Oil & Gas
Hannah Kearns, Geoscientist, Spectrum
Karyna Rodriguez, Director of Geoscience, Spectrum
Anoop Pandey, Spectrum
Jake Berryman, Exploration Advisor, Spectrum ASA
Howard Nicholls, Geophysical Advisor, Spectrum Geo
Kieran King, Spectrum Geo
Ian Setterfield, Spectrum Geo
Stacey Quares, Strategic Fit
Daniel Barnes, Consultant, Strategic Fit
Tim Gibbons, Manager of Business Development, TGS
Damian Dowling, Business Development Manager, Imaging, TGS
Dario Chisari, Interpretation Geophysicist, TGS
Alex Birch-Hawkins, Geophysical, TGS
Jan Gromotka, Advanced Processing Geophysicist, TGS
Chris Corona, Director of Latin America, TGS
Cian O'Reilly, TGS
Roberta Masotti, Senior Geophysicist, TGS
Steve Bottomley, Director, Upstream Consultants Limited
Alec Robinson, President & CEO, Valient Energy
Chris Gunn, Business Development Manager - Automation Business Unit, Wood Group Mustang
Alwyn Yar, Geoscience and Exploration Manager, Woodside Energy UK
Clive Abel, Process Consultant, WorleyParsons
Ben Couzens, Seeking New Opportunities, www.CV.Couzens.biz
What did you enjoy most about the event?

All of it. Great presentations which, I am sure by design, covered the topics well, with enough overlap to make each relevant to the other.

The talks from Sierra, Spectrum and TGS were of particular interest and I found them quite informative. With a good crowd of people and a full library of exhibitors, it turned out to be a worthwhile event. Terry O’Donnell, EPI

Good mixture of commercial and technical information. Mexico is very interesting given it’s resources and opportunities.

Subjects and quality of the talks about amazing basins.

Finding out more about the potential resources of Mexico, and the associated geology and locations. Meeting other participants. Iain Poole, Barnett Waddingham

Quality of presentations, opportunity to network.

Christian Bukovics
Partner, Adamant Ventures

Highly informative, very telling the number of attendees interested in Mexico.

Stacey Quarles,
Strategic Fit