

Mexico Series Challenges in Deepwater Mexico

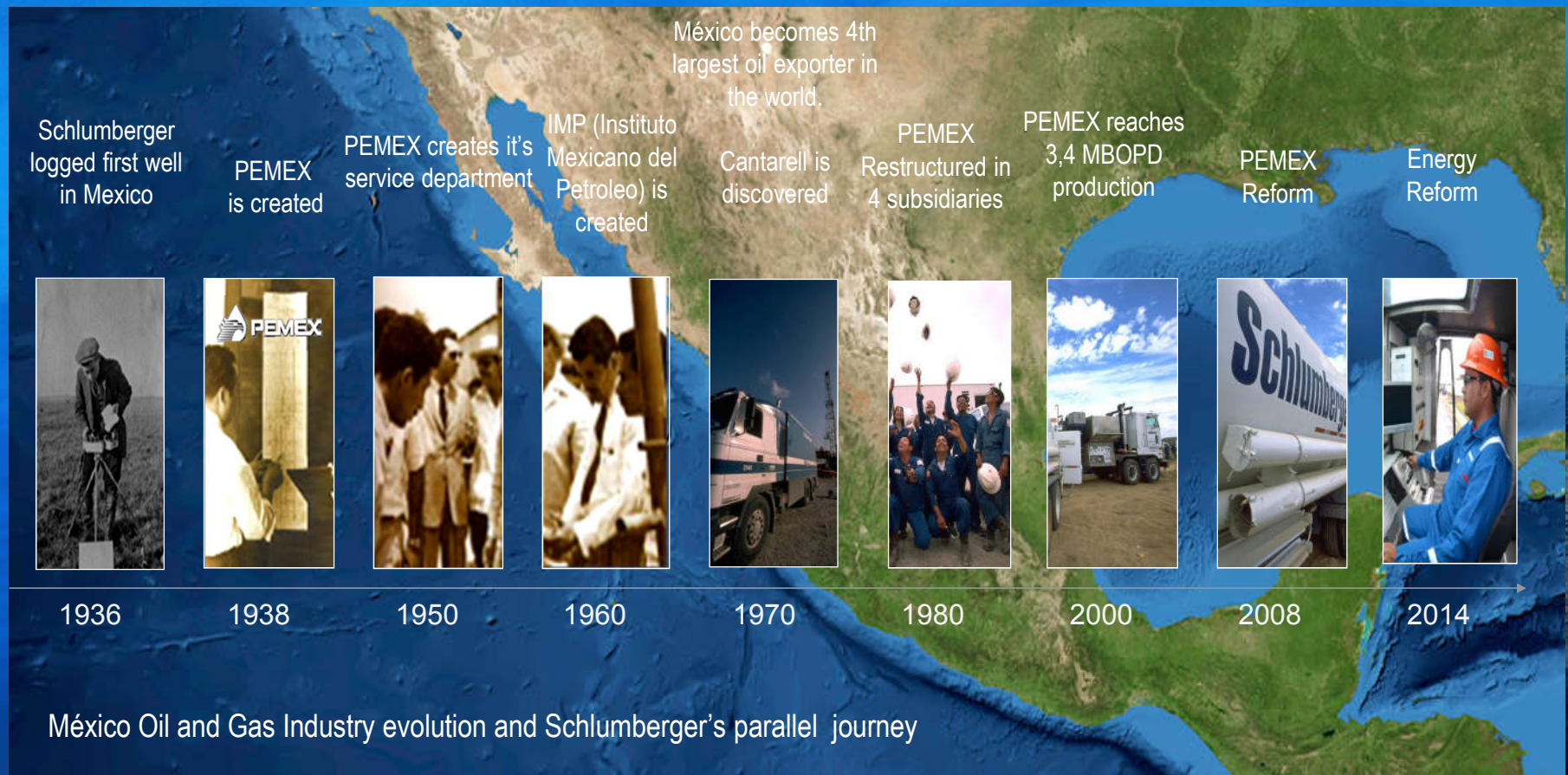
Chris Garcia
Mexico International Account Director
and Deepwater Adviser
January 19, 2015
Houston, Texas



MEETING MEXICO
Onshore and Offshore Challenges

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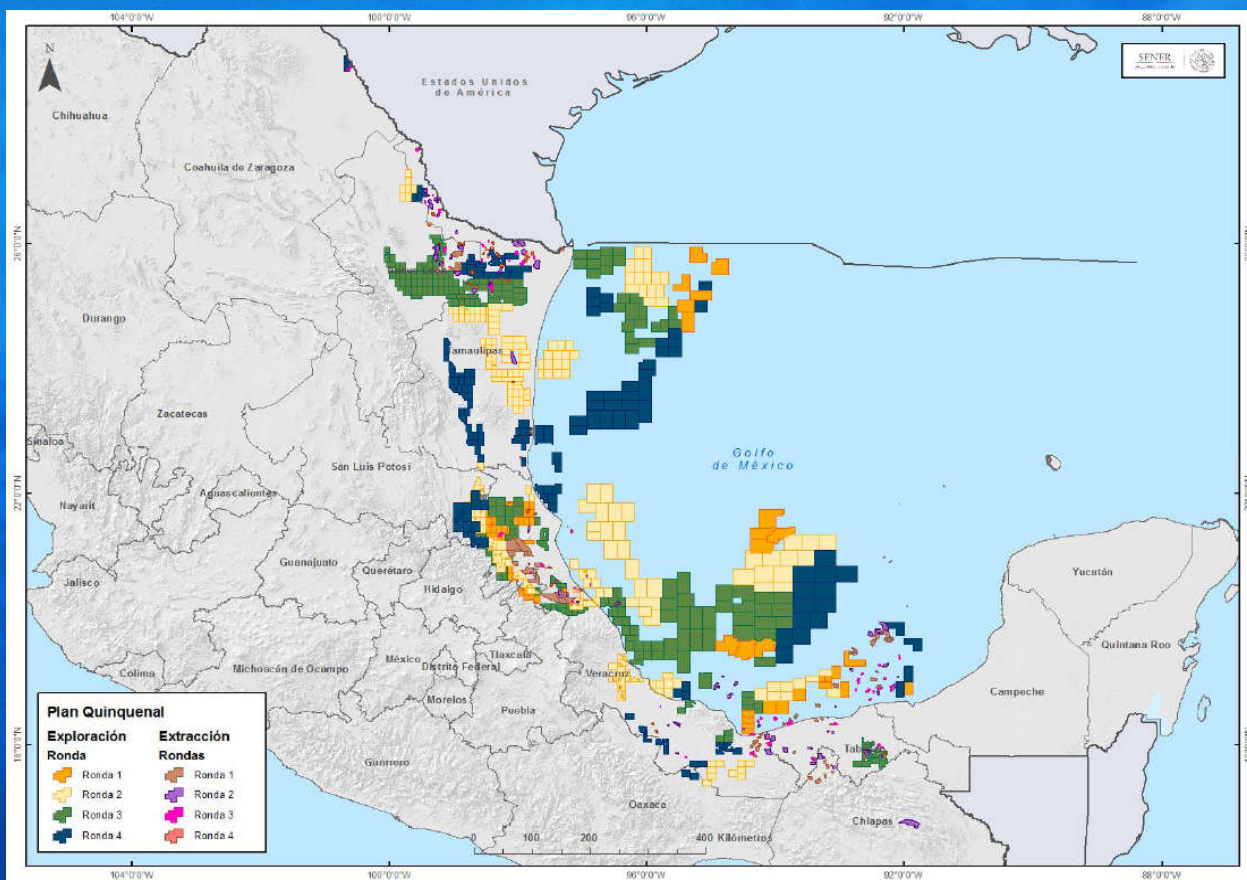
80 Years of continuous operations in México



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CNH 5 Years Rounds Plan (2015-2019)



Areas / Fields	Play Type
244	Exploitation (Extraction/Production)
379	Exploration Conventional
74	Burgos
67	Tampico Misantla
43	Veracruz
54	South East Basins
141	Deep Water (10 in Round 1)
291	Exploration No-Conventional
61	in Round 1
914	Total in 5 years

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CNH Round 1.4 Deepwater

Dec 17, 2015: Opened DW Rounds

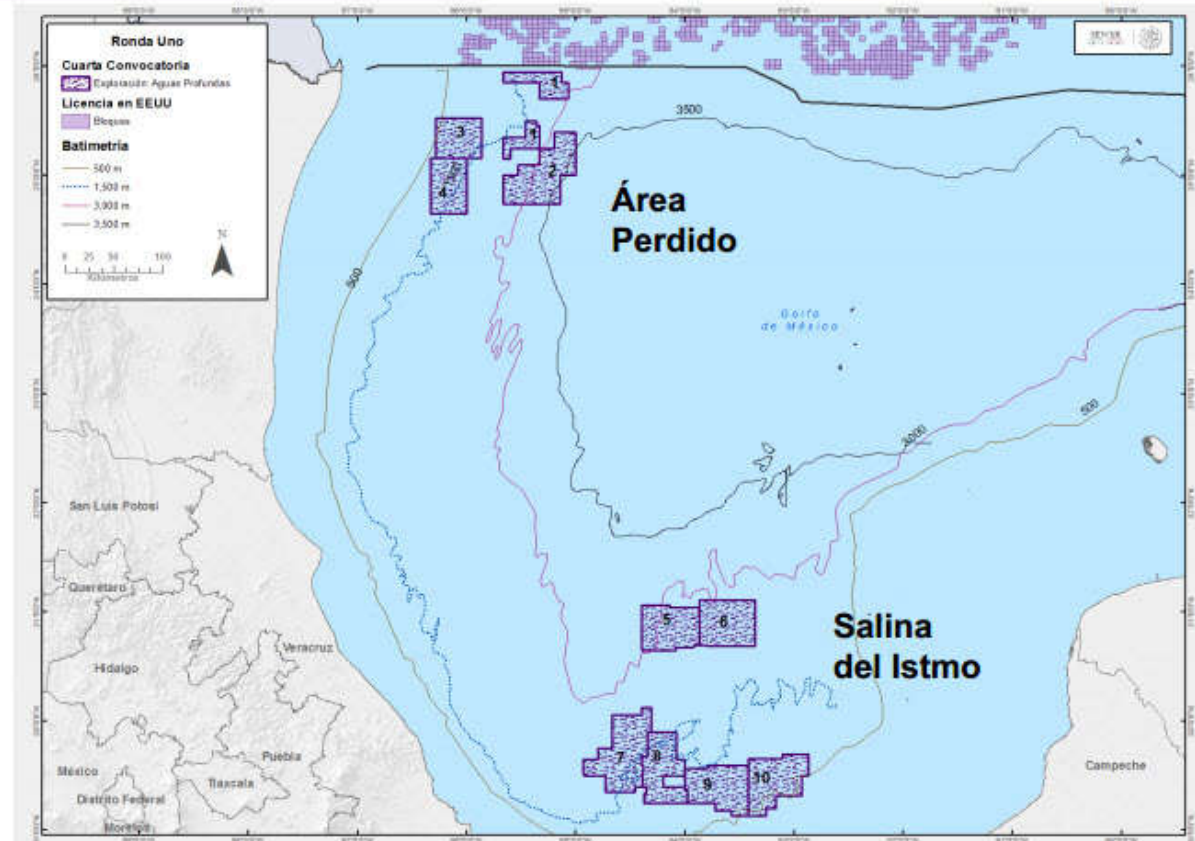
10 blocks in Perdido and Salina de Istmos Region

Jan 6, 2016 Access to Data Room

Aug 24, 2016, announce pre-qualified companies

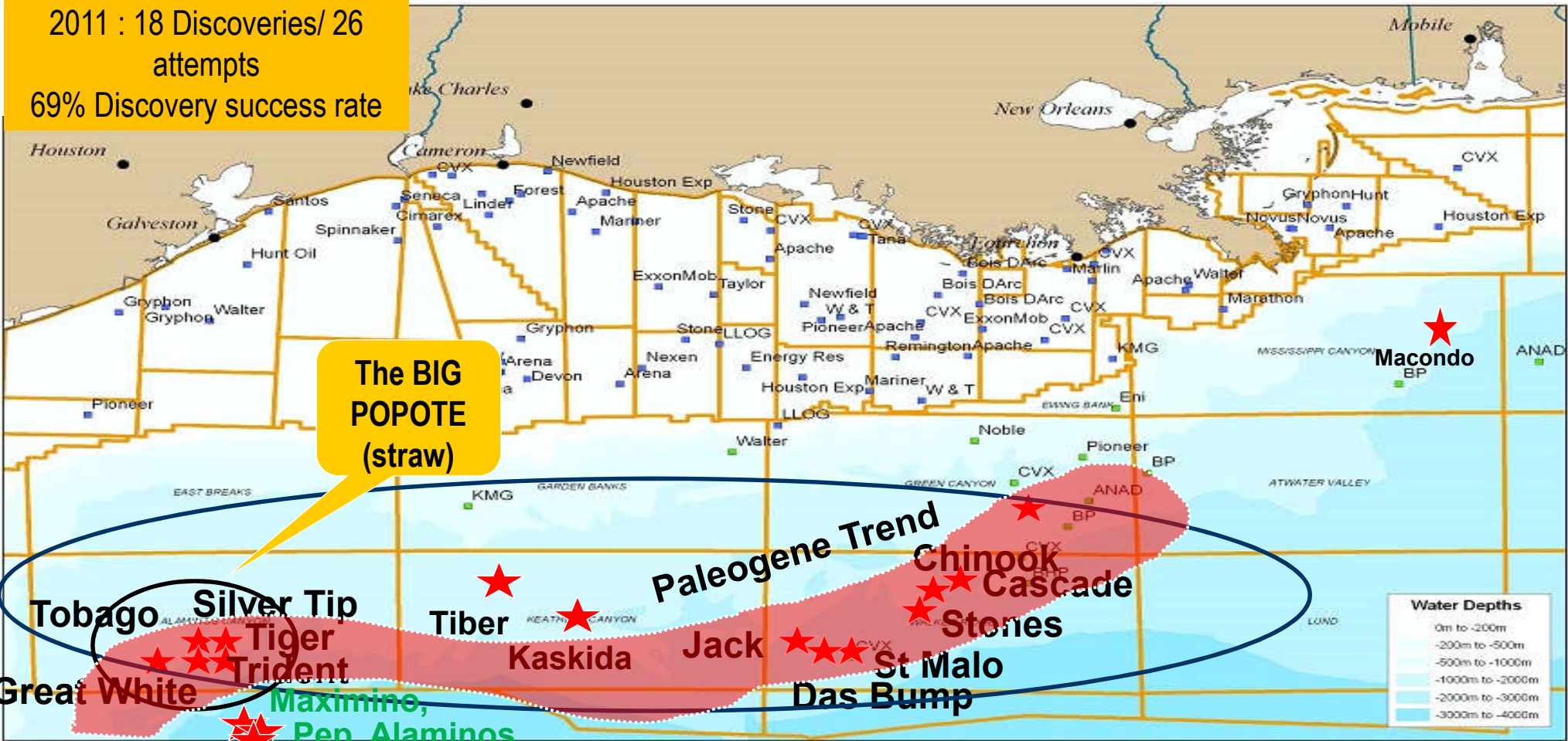
Q4 2016, announce winners

ÁREAS CONTRACTUALES CUARTA CONVOCATORIA



Known Pre-Miocene/Paleogene Discoveries and Paleogene Trend Gulf of Mexico as of August 2006

2011 : 18 Discoveries/ 26 attempts
69% Discovery success rate



The BIG POPOTE (straw)

Tobago
Silver Tip
Tiger
Trident
Great White
Maximino,
Pep, Alaminos

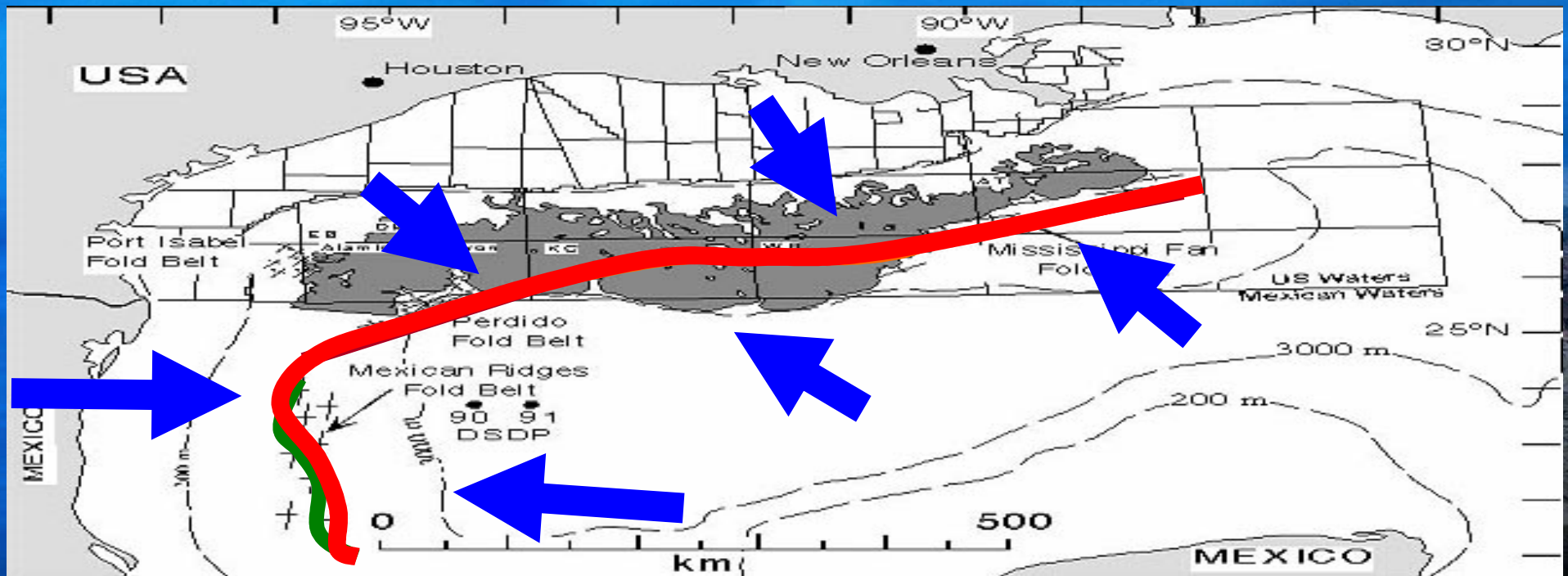
Paleogene Trend
Chinook
Cascade
Stones
St Malo
Das Bump

Macondo
BP

Water Depths	
0m to -200m	(Lightest blue)
-200m to -500m	(Light blue)
-500m to -1000m	(Medium blue)
-1000m to -2000m	(Dark blue)
-2000m to -3000m	(Very dark blue)
-3000m to -4000m	(Darkest blue)

Source: John R Dribus, SLB + MMS

Gulf of Mexico Deep-water Fold Belts and the Central Gulf Salt Sheet



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CHALLENGES

Source: Modified from Rick Kear, 12/2004

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Mexico Deepwater Basins Regional Technical challenges

Perdido Priority #1: specific challenges

1. Ultra deepwater depths >2900 m (+9500 ft)
2. Shallow geohazards very eminent
3. Logistics challenged-no infrastructure
4. Pore pressure uncertainty (abnormal pressures and strong pore pressure regression)
5. Loop currents and hurricanes
6. Subsea (sand control completions)
7. Paleogene (lower Tertiary) very low recovery factors <low teens %

Oreos Priority #2 : specific challenges

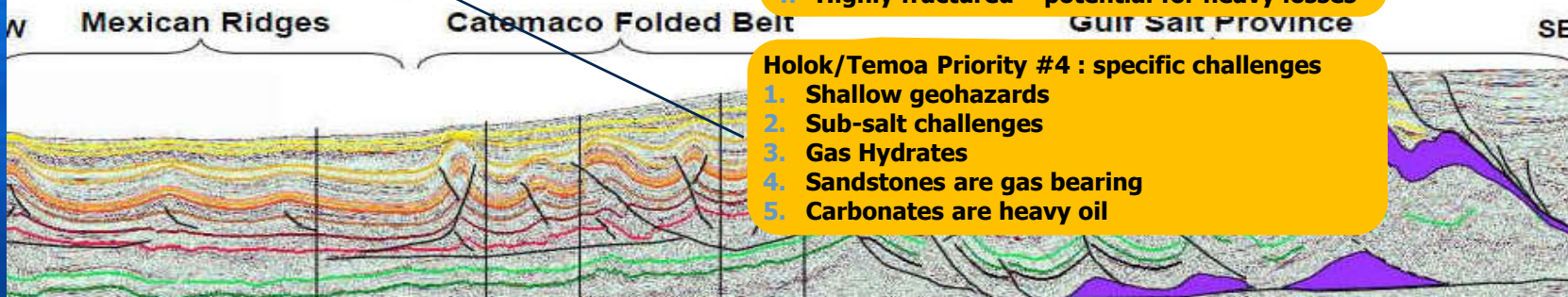
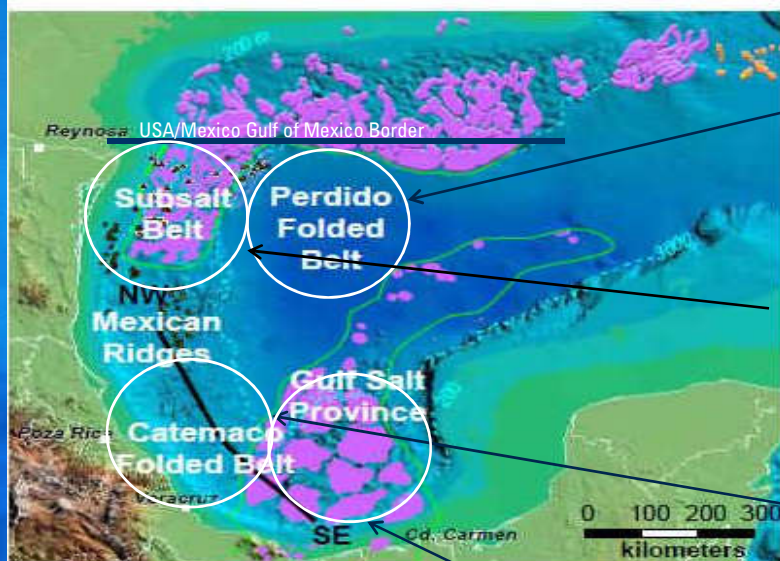
1. Same as Perdido
 - Salt exit hazard uncertainty
 - Salt creep, geomechanical uncertainty
2. Sub-salt drilling hazards

Catemaco Priority #3 : specific challenges

1. No salt, Water depth less extreme
2. Pore pressure uncertainty
3. HP HT wells
4. Highly fractured – potential for heavy losses

Holok/Temoa Priority #4 : specific challenges

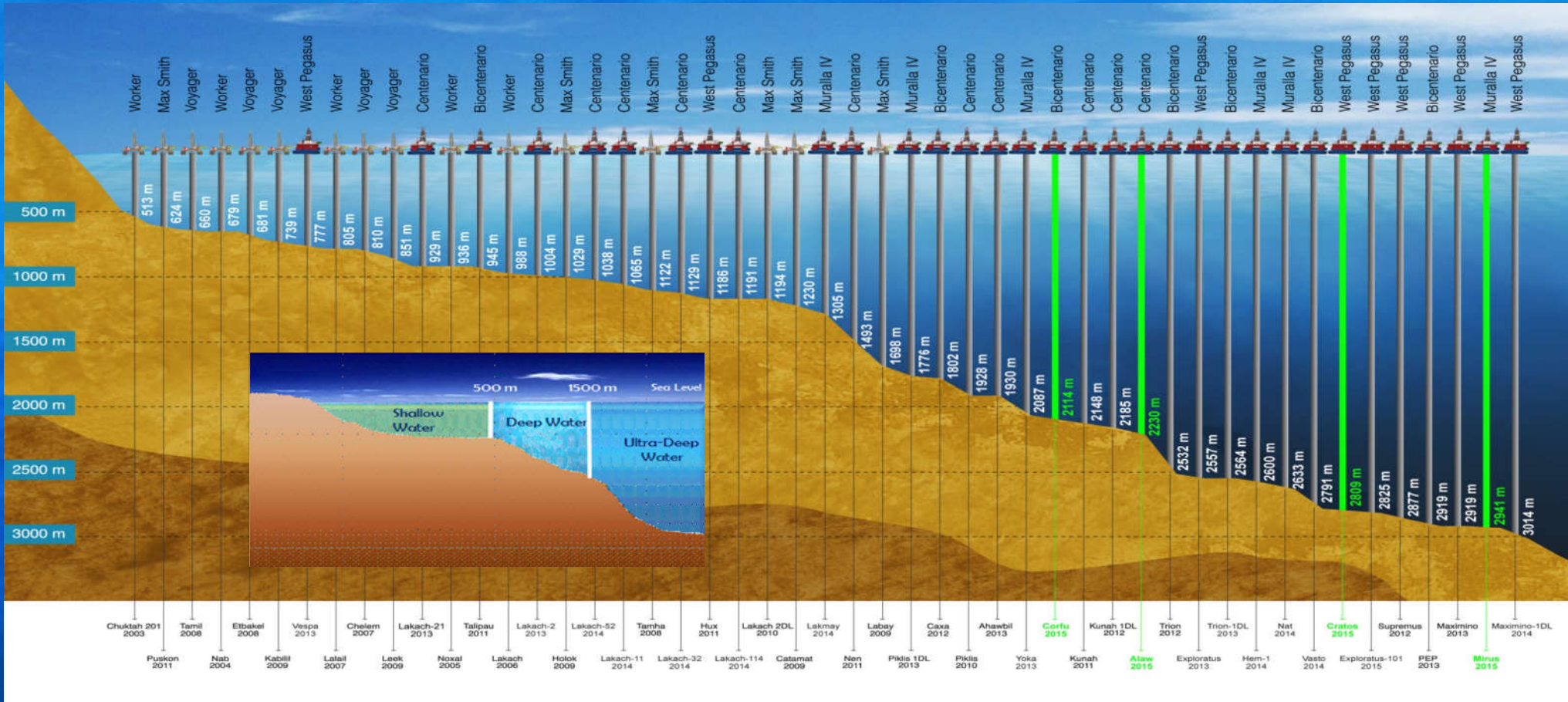
1. Shallow geohazards
2. Sub-salt challenges
3. Gas Hydrates
4. Sandstones are gas bearing
5. Carbonates are heavy oil



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Mexico's DW & Ultra DW Wells



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Onshore and Offshore Challenges

From 2003 to 2015, Mexico drilled 52 deep and ultra-deep-water wells in water depths ranging from 512 m to +2,900 m

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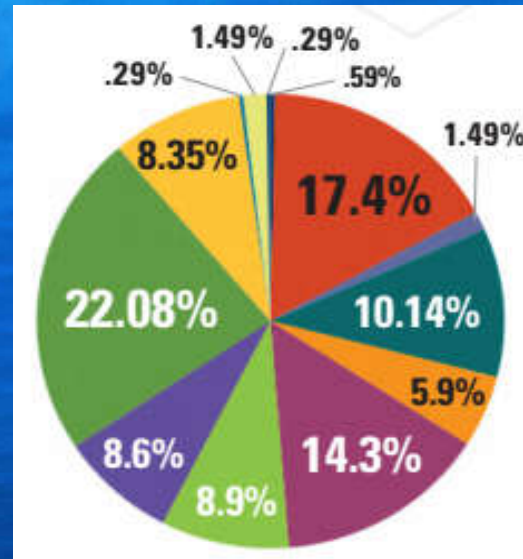
Mexico Oil and Gas People and Services

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CHALLENGES

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Our Mexico Workforce

Hiring, training, development and retention of the best talent where we work



PetroTechnical Engineers 1st quarter 2015

Primary Domain

- Asset Technical Team Leader
- Drilling and Well Engineering
- Economics and Risk
- Geology
- Geomechanics
- Geophysics
- Information Engineering
- Petrophysics
- Production and Completion Engineering
- Reservoir Engineering
- Reservoir Fluids
- Surface Production Facilities and OPS
- Well Placement

350

Mexico Offshore

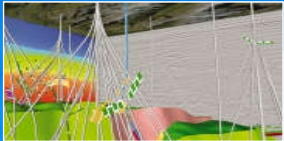
- 1200 employees
- 20 nationalities
- 180 International Staff

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Onshore and Offshore Challenges

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Schlumberger – Mexico portfolio



Reservoir Characterization

- WesternGeco Land & Marine Seismic
- Wireline Logging
- Testing Services
- Schlumberger Information Solutions
- Petro Technical Services



Drilling

- Smith Bits & Advanced Technologies
- M-I SWACO
- Geoservices
- Drilling & Measurements
- Drilling Tools & Remedial Services
- Dynamic Pressure Measurement
- Integrated Project Management



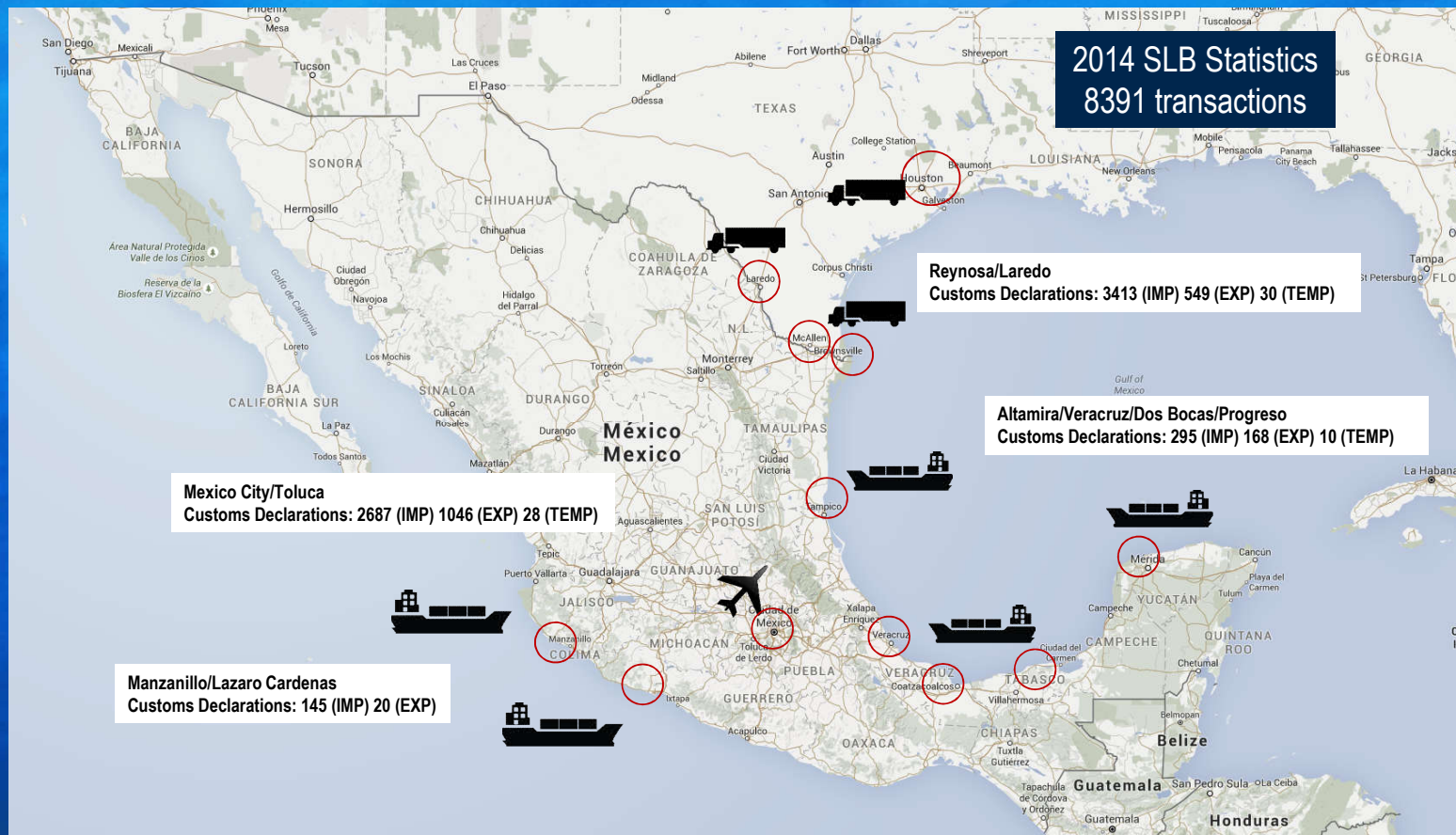
Reservoir Production

- Well Services (Cementing, Stimulation)
- Well Intervention (Coiled Tubing, Slickline)
- Completions
- Artificial Lift
- OneSubsea
- Schlumberger Production Management

All SLB Services are available in Mexico with relative easy access to North America resources

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Mexico Trade & Customs



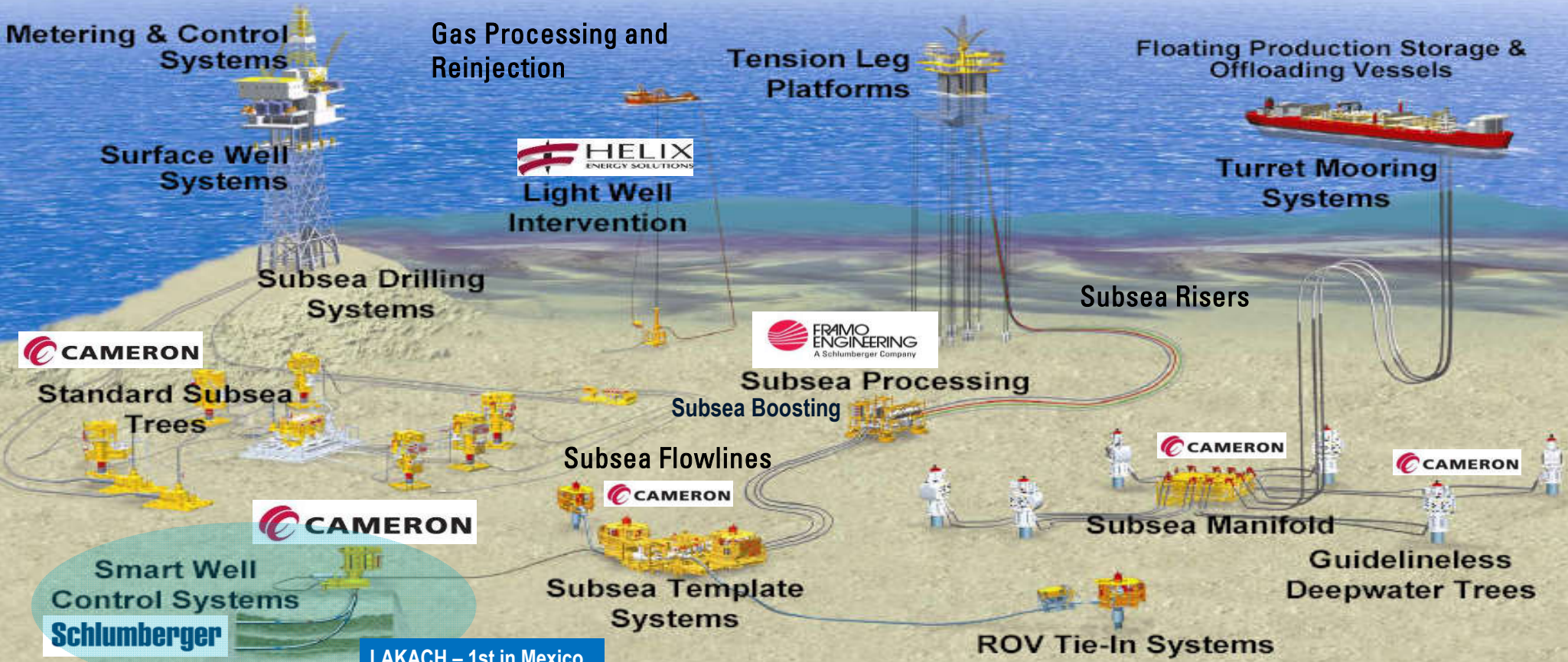
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www.sat.aduanas.gob.mx

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What is Mexico missing?



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LAKACH – 1st in Mexico
Deepwater Subsea Gas
Development

Schlumberger

The image features a deep blue background with a circular inset on the left showing an offshore oil rig. In the foreground, two workers wearing white hard hats and safety glasses are visible. The background also shows a cross-section of geological layers, likely representing an oil reservoir. The overall theme is offshore oil infrastructure.

Mexico Offshore Infrastructure

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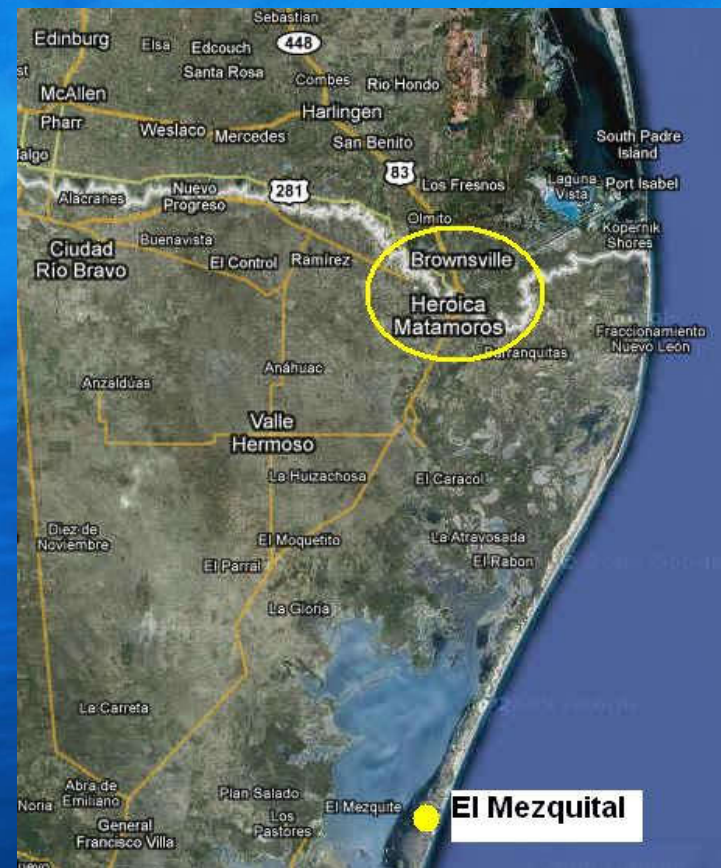
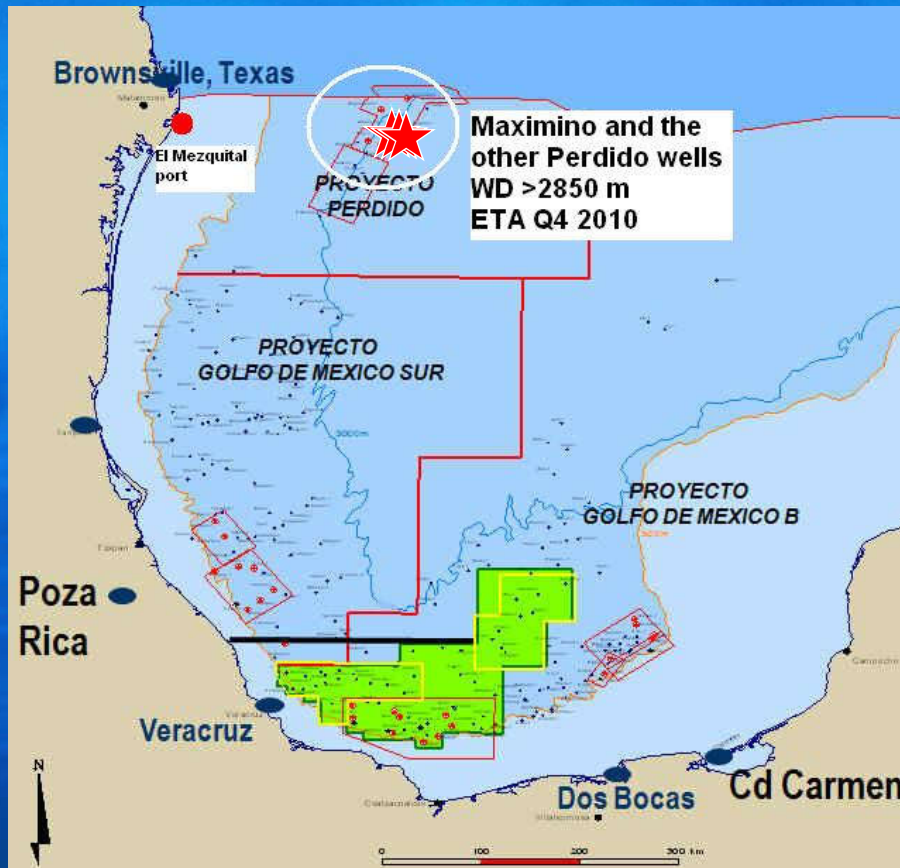
Mexico – Location of SLB Operational bases and Ports



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Onshore and Offshore Challenges



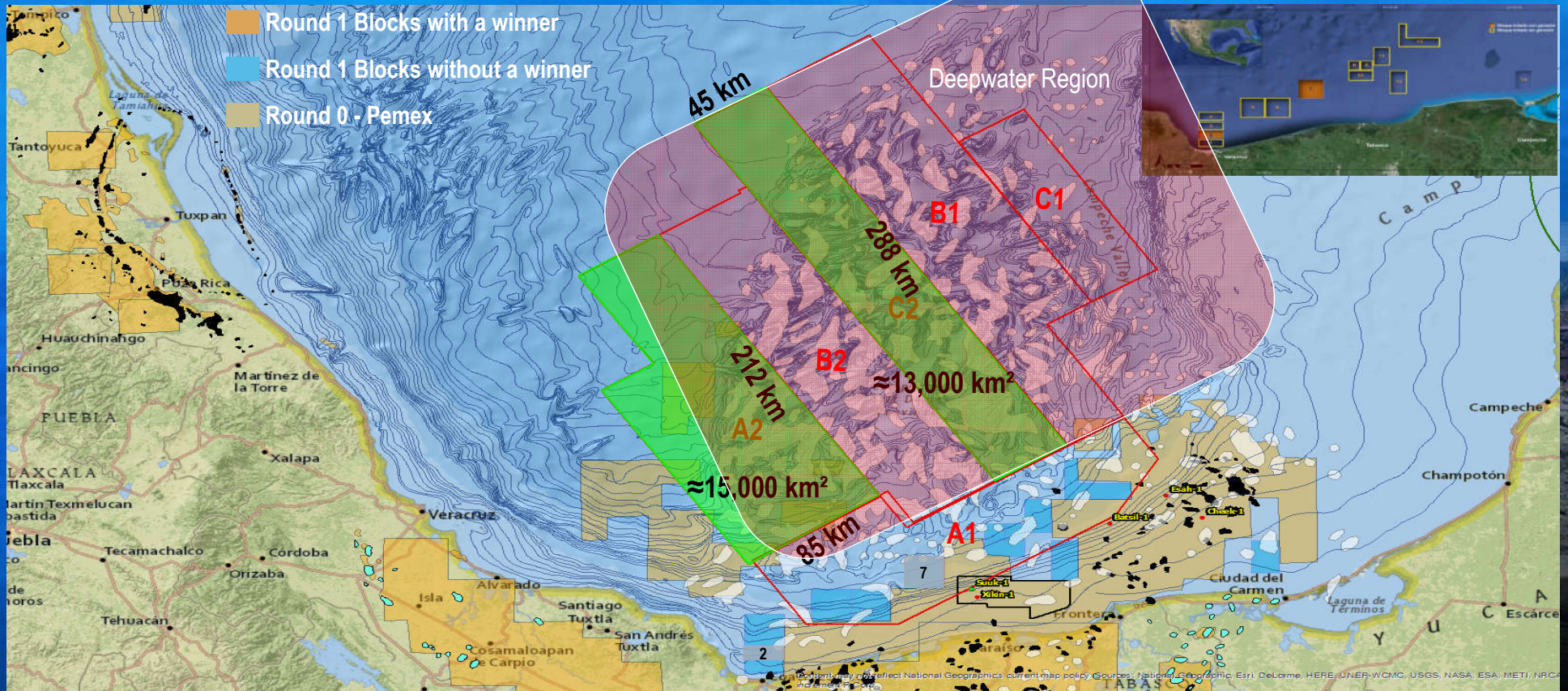
Future Potential Port/Base in the North Region



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Campeche Region Multiclient Seismic Acquisition (Shallow and Deepwater)



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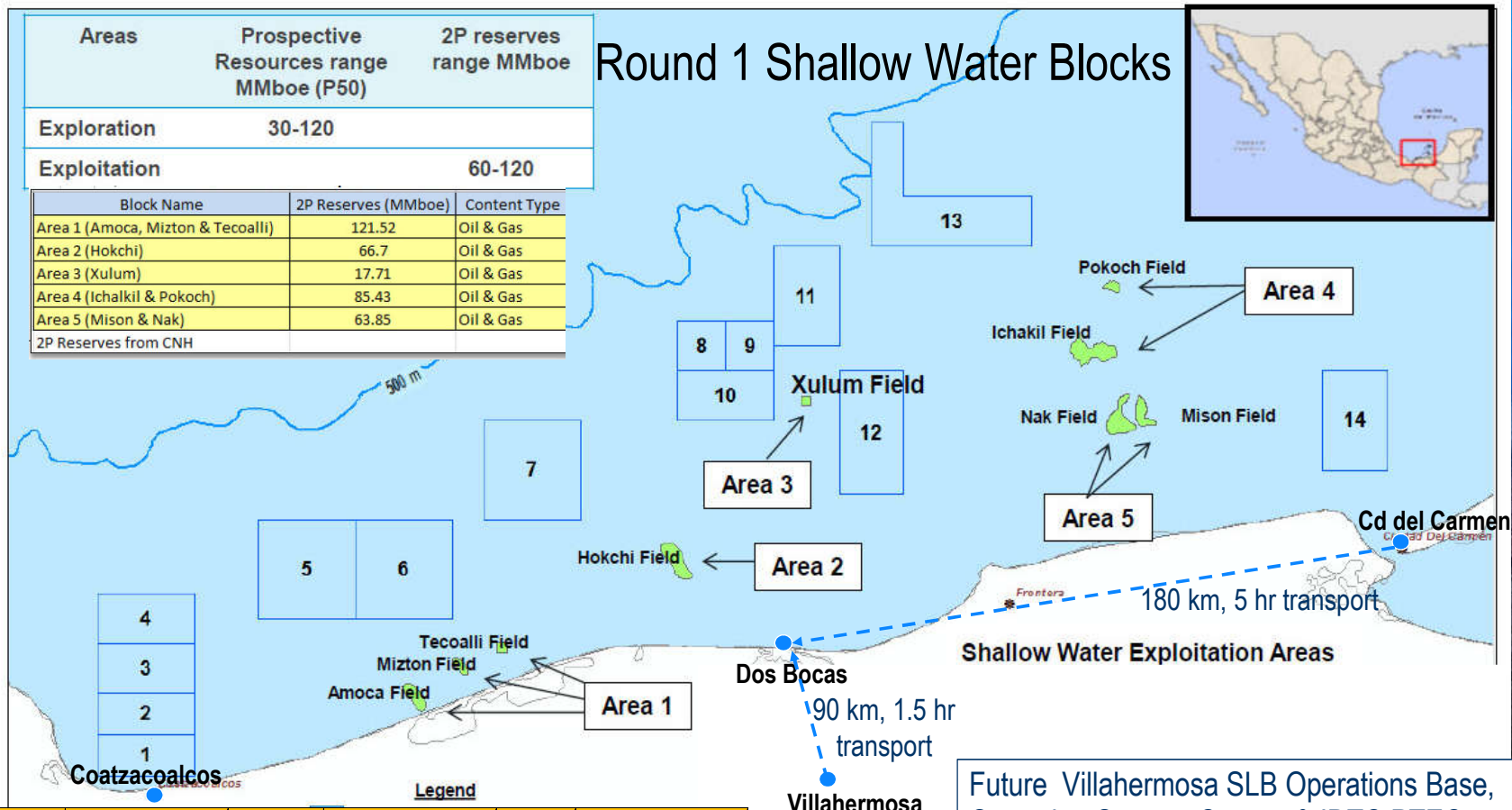
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Phase One Shallow water

Round 1 Shallow Water Blocks

Areas	Prospective Resources range MMBoe (P50)	2P reserves range MMBoe
Exploration	30-120	
Exploitation		60-120

Block Name	2P Reserves (MMBoe)	Content Type
Area 1 (Amoca, Mizton & Tecoalli)	121.52	Oil & Gas
Area 2 (Hokchi)	66.7	Oil & Gas
Area 3 (Xulum)	17.71	Oil & Gas
Area 4 (Ichalkil & Pokoch)	85.43	Oil & Gas
Area 5 (Mison & Nak)	63.85	Oil & Gas
2P Reserves from CNH		



Future Villahermosa SLB Operations Base, Operation Support Center, & IDTC PTEC (Integrated Drilling Technical Center)

Port name	Draft in the port to dock side	Port security	Airport	Air type	Helicopter	Hotel Availability	Personal Risk level	SLB facilities
Cd del Carmen	4.1 m, anchorage point = 12.5 m	Port entry gate	CME (Carmen)	Daily Natl and Intl Flights	CME airport	Mutiple large chain hotels	Low	Large SLB Operational presence
Coatzacoalcos	10-10.5 m	Port entry gate	MTT	National only	MTT airport	at least 3 major hotels	Medium	Only Western Geco Boats present
Dos Bocas	6.1 m (to be dredged to 9.75 m in July 2015)	Port entry gate	VSA (Villahermosa) 90 km away	Daily Natl and Intl Flights	located at Dos Bocas Port	Holiday Inn Express, Baez Hotel, Hampton Inn (Construction)- all located in Paraiso (<5 km from port)	Low	MI & WS Stimulation plants, SLB support office in Paraiso, Lots of room to expand





Security

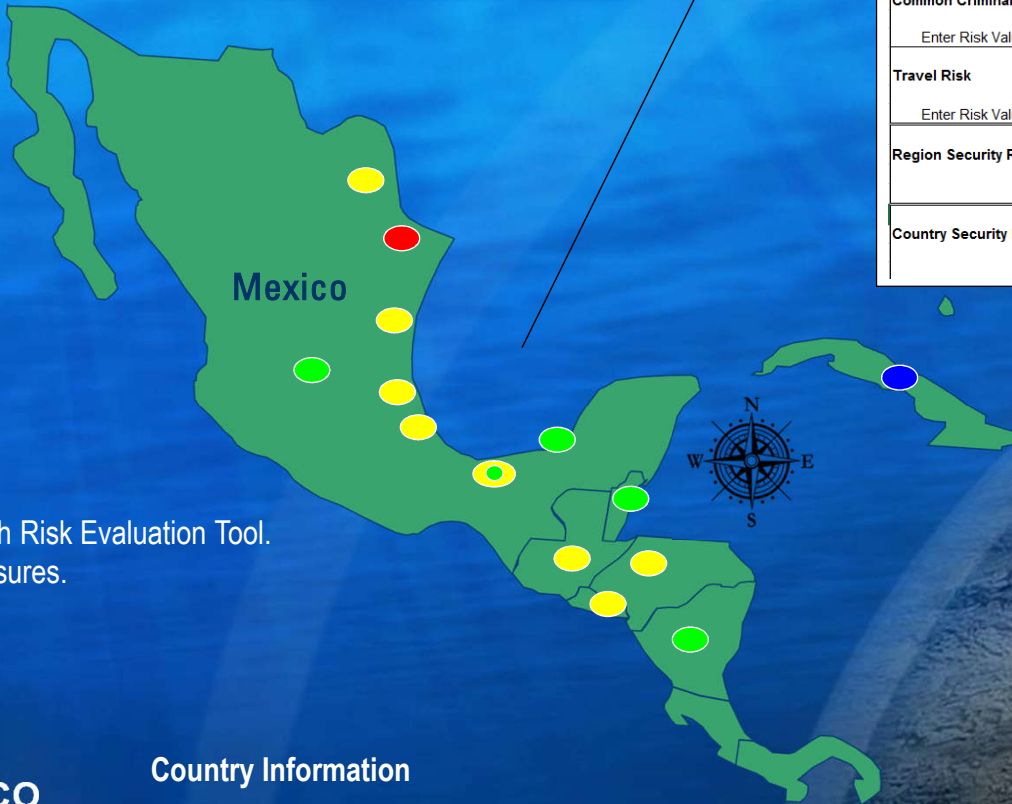
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RISK LEVELS STATUS

BLACK	EXTREME:
RED	HIGH:
YELLOW	MEDIUM:
GREEN	LOW:
BLUE	INSIGNIFICANT:



Country Security Risk Evaluation						
Enter name of Country :	Mexico-MXE-Poza Rica					
Enter number of Regions:	3					
Enter names of Regions :	Poza Rica	Papantla	Coatzintla	Tihuatlan		
Armed Conflicts	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level
	Low	Low	Low	Low		
Enter Risk Values for Regions:	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value
	-3.0	-3.0	-3.0	-3.0		
Common Criminality Risk	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level
	Medium	Medium	Medium	Medium		
Enter Risk Values for Regions:	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value
	-8.0	-7.0	-7.0	-7.0		
Travel Risk	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level
	Medium	Medium	Medium	Medium		
Enter Risk Values for Regions:	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value
	-5.0	-5.0	-5.0	-5.0		
Region Security Risk Level	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level	Risk Level
	Medium	Medium	Medium	Medium		
Enter Risk Values for Regions:	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value	Risk Value
	-5.3	-5.0	-5.0	-5.0		
Country Security Risk Level						Risk Level
						Medium
						Risk Value
						-6.8

Example of Poza Rica location

1. Define Risk Level through Risk Evaluation Tool.
2. Implement Security Measures.
3. Follow up

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Country Information

Cuba, Guatemala, Mexico, North, Mexico, Veracruz State, Mexico, Rest of, Mexico, Monterrey, Mexico, Tampico, Mexico, Tabasco State (field), Mexico, Ciudad del Carmen, Mexico, Poza Rica, Mexico, Veracruz City, Mexico, Villahermosa city (non-field), Mexico, Paraiso city, Central America



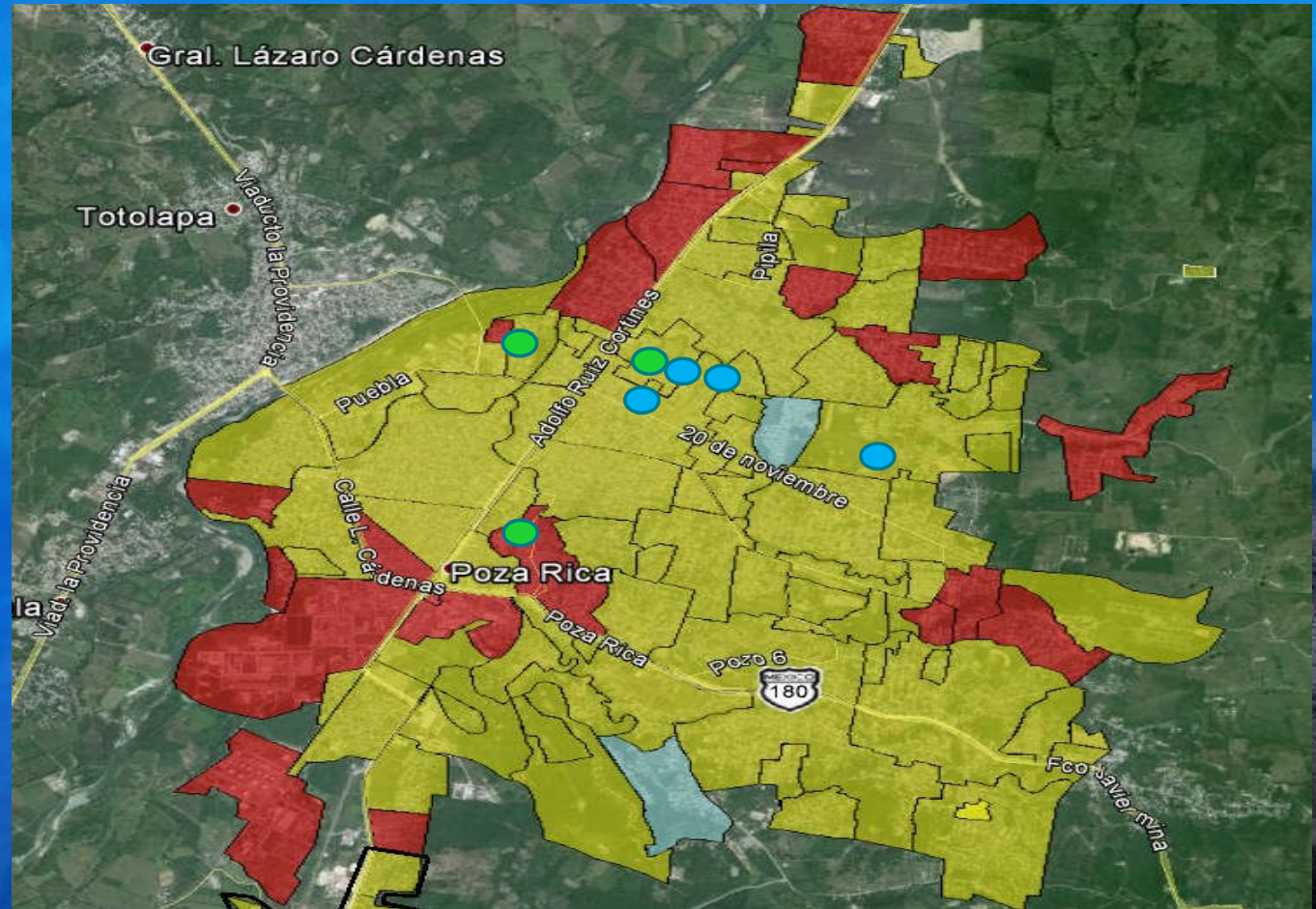
Mapped Risk Areas In Poza Rica



Col. Villa las Flores, Infonavit Las Gaviotas, La rueda, Independencia, Prensa nacional, Lázaro Cárdenas, Las vegas, Nacional, Los Laureles, Arroyo del maíz, Insurgentes I, II, Ignacio Zaragoza, Las granjas, Laredo, Flores Magón, Ampliación Morelos, Complejo Pemex, Pescadería y Mercado, Cementerio, Infonavit Coatzintla, José Ma Morelos y Pavón, Kawatzin, Faja de Oro, Troncones y potreros



Col. Lomas residencial, Poza de cuero, Reforma, Circulo Michoacano, Mecánicos de piso, Santa Emilia, Los sauces, Manuel Ávila C. Sector popular, Jesús Reyes H., San Felipe, Reyes Heróles, La Ceiba, Palma sola, Magisterio, Oscar torres P., Hidalgo, Las palmas, Ejido Arroyo del maíz, Arroyo del maíz, Santa fe, Residencial Floresta, Benito Juárez, Chapultepec, Santa Regina, Jardines de Santa Elena, Tepeyac, Parcela 14, Ignacio de la llave, 27 se Septiembre, Tajín, Obras Sociales, Chapultepec, Agustín Lara, Yanga, Del sol, Bella vista, Rafael Hdez., Azteca, Morelos, Villahermosa, Obrera, Fco. I. Madero, Miguel Hidalgo, Anáhuac, La valentina, Petromex, Las Huastecas, Aviación vieja, Militar, La Herradura, Revolución, El Vergel, 10 de abril, La barita, 5 de mayo, División de Oriente, Salvador Allende, Plaza Gran Patio, Col. Lomas del río, México, Cazonas, Nuevo progreso, Valdivia, Sta. Elena, San Román, 5 de Febrero, Heriberto Kehoe, Petrolera, Medias Lomas, Loma alta, Loma bonita.





New Multi Client Seismic Programs for Exploration offshore Mexico

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Onshore and Offshore Challenges

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Mexico Multi Client Portfolio

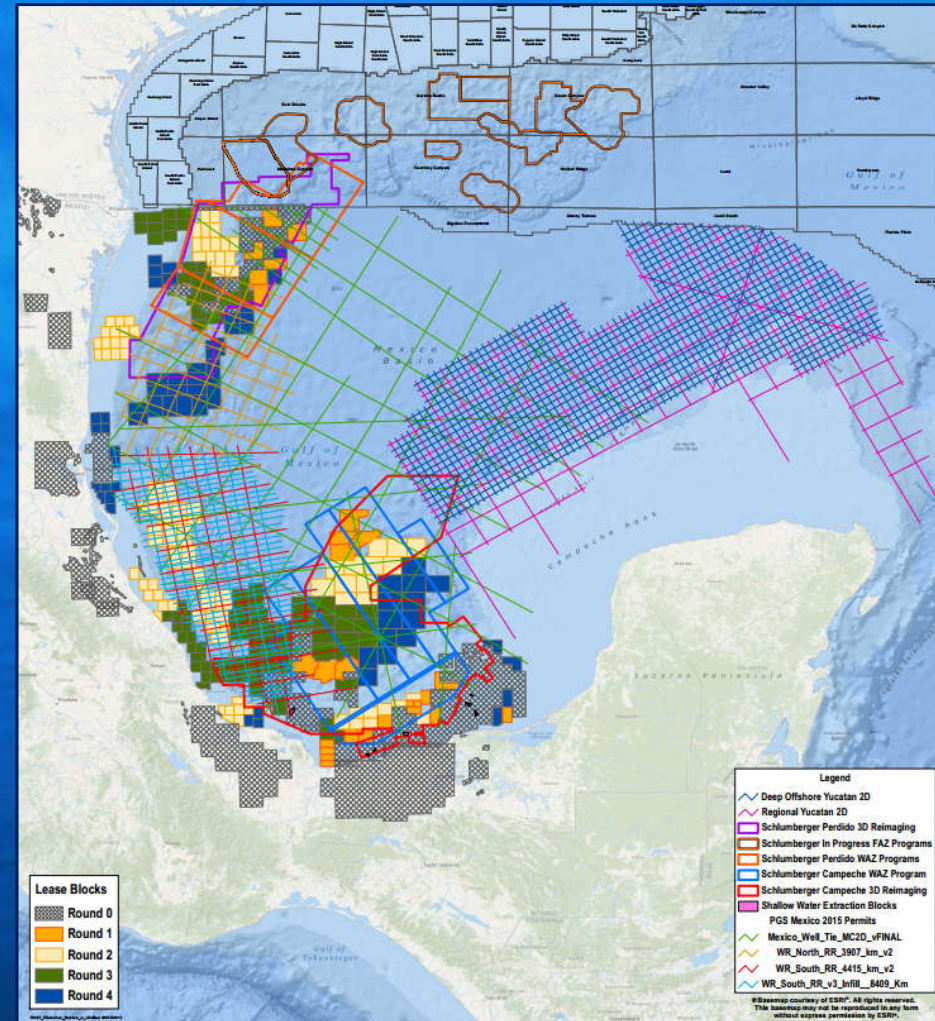
High end portfolio designed to address different imaging challenges in Mexico

Schlumberger Multiclient portfolio provides the largest and most comprehensive seismic program in Mexico

Our program covers the offshore Yucatan platform, the deep waters of the Campeche Escarpment; the highly prospective corridor of Comalcalco and **Salinas Del Istmo basins**, the Mexican Ridges; and **Perdido basin**

■ Our projects:

- Campeche 3D WAZ (ongoing)
- Perdido 3D WAZ
- Campeche Re-Imaging
- Perdido Re-Imaging
- Campeche-Yucatan Regional 2D – JV with PGS & SpectrumGeo (ongoing)



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Campeche WAZ Program

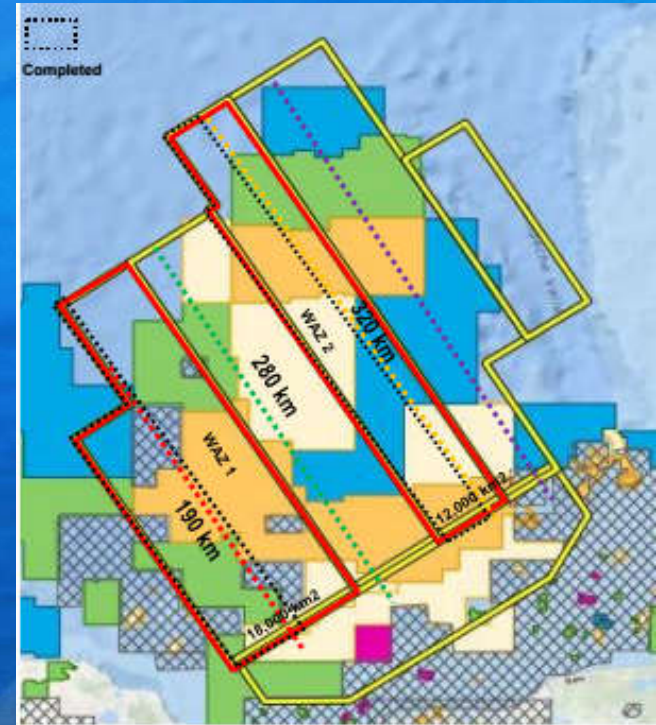
Campeche WAZ Acquisition: 75,000 km² of WAZ 3D seismic data.

Campeche WAZ 1 acquisition started on July 28, 2015 and expected completion in Feb 2016

- Pre-stack fast track products will be delivered in two phases: first phase by end of 2015 and second phase 6 weeks after last shot point

Campeche WAZ 2 expected completion in December 2015

- Pre-stack fast track product will be delivered 6 weeks after last shot point
- Full broadband RTM image delivered 10 months after end of acquisition



	2015						2016																					
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec										
Fleet 1	Campeche WAZ 1 Acquisition						Fast Track A		Fast Track B		Full Processing																	
Fleet 2	Campeche WAZ 2 Acquisition					Fast Track													Full Processing									

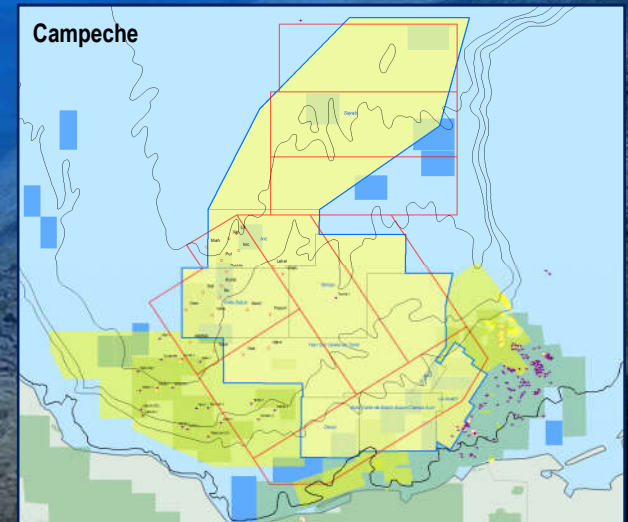
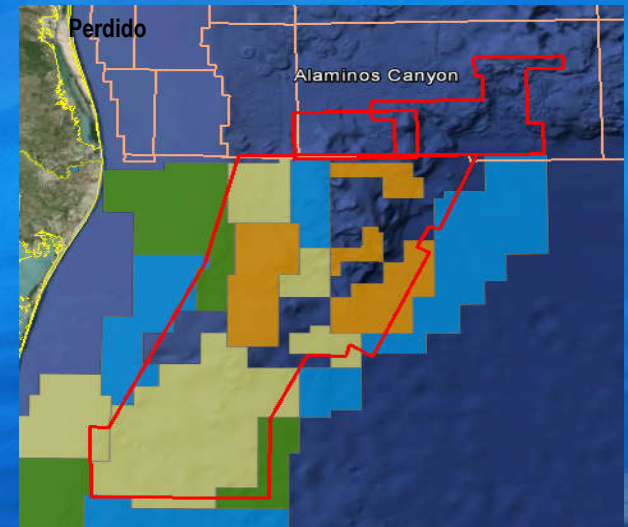
Multi-Client Re-Processing Existing 3D Seismic

Perdido Re-imaging: 46,000 km² of WAZ and NAZ

- Tie the US GOM Alaminos Canyon protraction area to the offshore Mexico Perdido by incorporating existing NAZ and WAZ seismic surveys, over an area of 46,000 sq km.
- Existing legacy fast track volume (delivered upon signature of the licensing agreement)
- Re-Imaging Fast Track, Final RTM Image volume raw & with filtering and scaling, Final velocity model & salt horizons

Campeche Re-imaging: 60,000 km² of 3D seismic data to cover deep and shallow water blocks

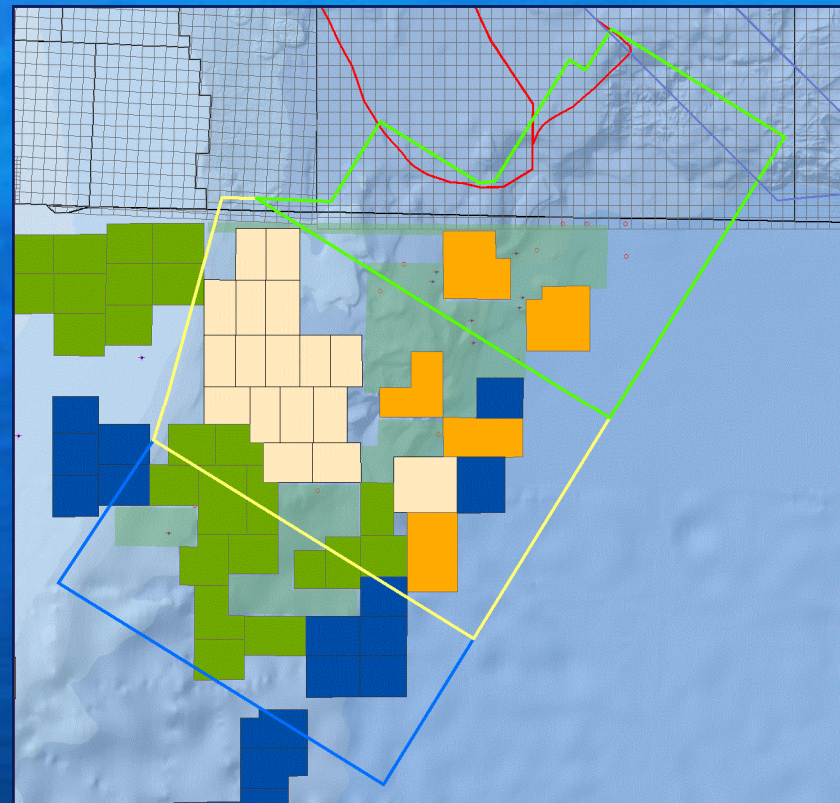
- Consistent data after 6 weeks of CNH data delivery
- Final product (Kir & RTM) after one year



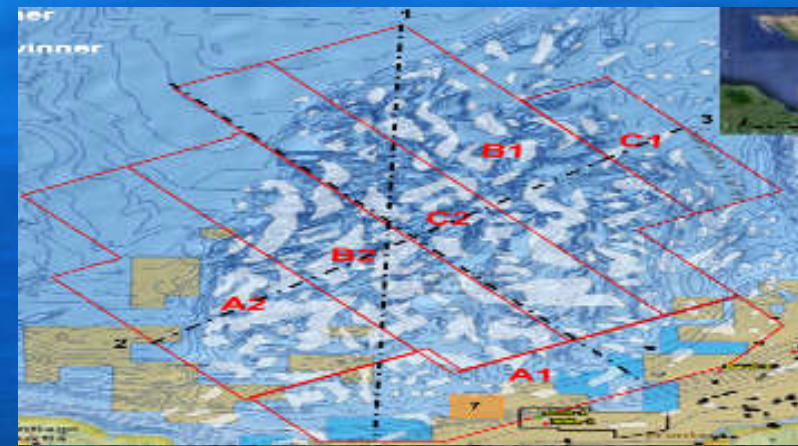
Perdido WAZ Program

Perdido WAZ Acquisition: 45,000 km² of WAZ/FAZ 3D seismic data.

- Permit in process with CNH
- To be acquired in 3 phases covering most of the 5 year plan blocks
- Acquisition across the border into Alaminos Canyon to produce a uniform and contiguous product



Sea Floor Elevation Profiles Campeche Shallow water blocks



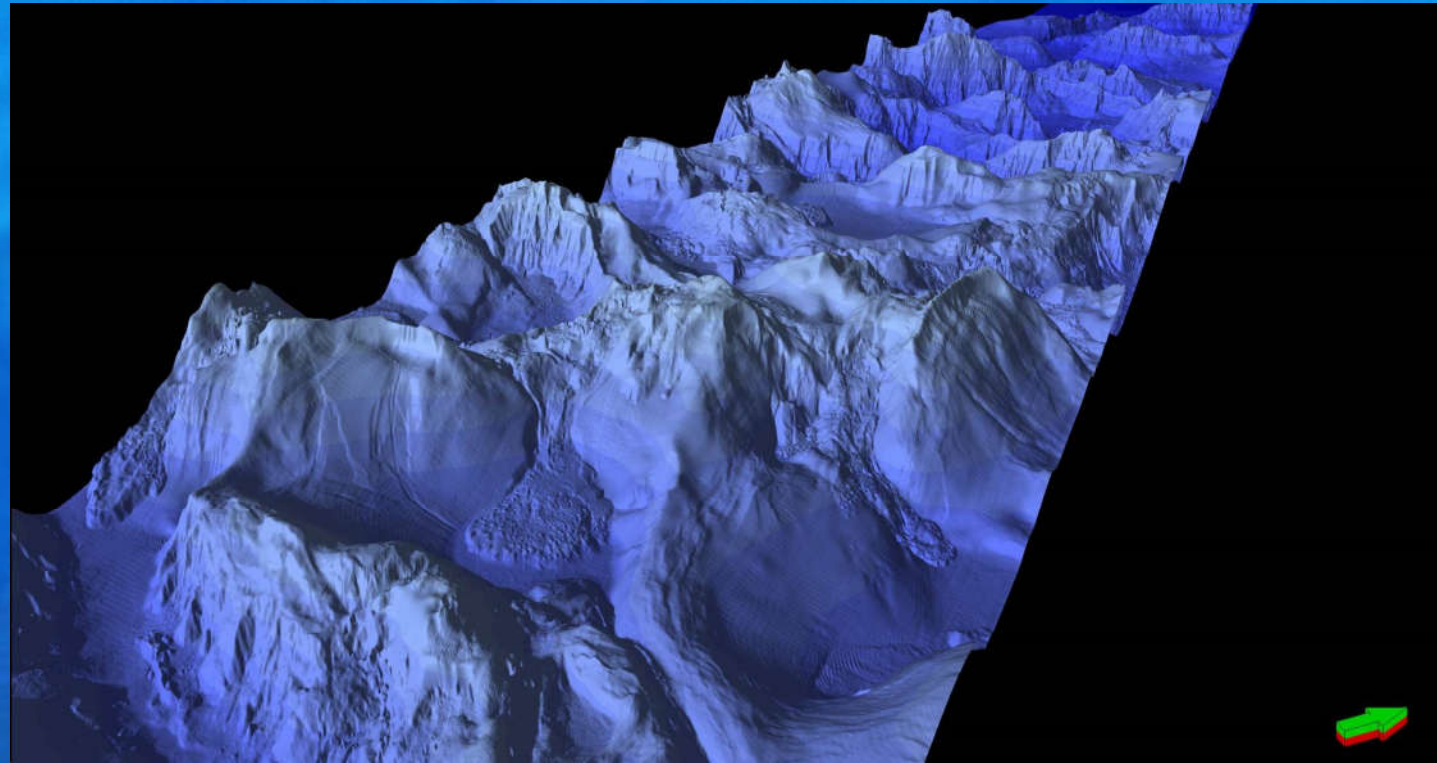
Proprietary Schlumberger color seismic processing technique (isochroma)

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Onshore and Offshore Challenges

Linear WAZ Geometry & Shallow Hazard Cubes

- Linear WAZ Geometries enable illumination of complex salt bodies and sub-salt features
- Geohazard cube can be generated out of these WAZ data.



Highly Rugose sea floor

Deepwater GOM USA and Deepwater Mexico Reference material

NOTE: MUST REGISTER FIRST

The screenshot shows the Schlumberger website at www.slb.com/deepwater. The navigation bar includes links for Services & Products, About Us, Investors, Newsroom, HSE, Careers, Alumni, and Resources. The Resources link is circled in red. Below the navigation bar, there is a search bar and buttons for Contact Us and Register. The main content area features a sidebar with a list of technical challenges, including Deepwater Operations, Project Readiness, Define the Prospect, Deepwater Drilling Performance, Reservoir Characterization, Deepwater Completions, Deepwater Production, Flow Assurance, Unconventional Resources, Heavy Oil, Enhanced Oil Recovery, and Exploration. The main content area displays an article titled "Deepwater Operations" with tabs for Overview and Background. The article text discusses deepwater activity on the increase and includes sections for Project Readiness and Define the Prospect. A red box highlights a technical paper titled "Overcoming Exploration and Drilling Challenges in Deep and Ultradeep Water in the Perdido Fold Belt, Mexico" with a corresponding image of a wellbore and a link to read the technical paper.

- Enter Deepwater Mexico for GOM USA articles or
- Enter Deepwater Pemex for Mexico articles

Resources
Case studies
Industry articles in
SEG, AAPG, SPE,
SPWLA, IADC, OTC
etc

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Thank You

Questions

Chris Garcia
garciac@slb.com

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You are here: Home > Services & Products > Technical Challenges > Deepwater Operations

Services & Products

Technical Challenges

- Deepwater Operations
- Project Readiness
- Define the Prospect
- Deepwater Drilling Performance
- Reservoir Characterization
- Deepwater Completions
- Deepwater Production
- Flow Assurance
- Unconventional Resources
- Heavy Oil
- Enhanced Oil Recovery
- Exploration
- Geomechanics
- High Pressure, High Temperature
- Carbonate Reservoirs
- Real-Time Operations

Deepwater Operations

Overview | **Background**

Deepwater activity on the increase

Deepwater exploration and development present a range of challenges, from working environment, defining prospects, constructing wells, to maintaining production and optimizing recovery. A selection of the challenges faced and how Schlumberger helps customers address them follow.

Project Readiness

Project readiness evaluation and deepwater technical competence are just two of the key elements in ensuring a deepwater project is ready to achieve its objectives.

Deepwater People | Project Preparation | Service Integration | Project Execution

Define the Prospect

Using a suite of complementary exploration techniques, processes, and interpretation workflows to locate the most promising deepwater prospects, evaluate the risk, and plan operational windows.

Illuminate Complex Structures | Seismic Interpretation | Pre-Drill Reservoir Properties | Pre-Drill Pore Pressures

Deepwater Drilling Performance

Techniques to predict hazards, and plan drilling and casing parameters. Proven drilling technologies and processes to improve recovery ratios and keep surprises—and the downtime and costs they bring—to a minimum.

Optimize Well Placement | Drilling Navigation using Seismic | Managing Geomechanics Risks in Deepwater Drilling | Deepwater Drilling Fluids & Solids Management | Deepwater Cementing | Contingency Well Planning

Reservoir Characterization

Improving reservoir characterization and knowledge management with 3D modeling of seismic and drilling data, formation evaluation logs, and well test data.

Petroleum System Evaluation | Evaluate Reservoir Quality | Establish Compartmentalization | Characterize Reservoir Fluids | Flow Testing

Deepwater Completions

A completion configuration designed for the long term is crucial for efficient

Overcoming Exploration and Drilling Challenges in Deep and Ultradeep Water in the Perdido Fold Belt, Mexico

Read how the challenges of drilling at 10,000-ft water depth were overcome with innovative solutions—planned and executed using Schlumberger technologies—and processes—fulfilling exploration and drilling objectives. [Read the technical paper](#)

Deepwater Operations Add USD 17.8 Million of Value

Directional, MWD, and LWD services drill and evaluate eight Gulf of Mexico wells with 99.8% efficiency. [Read case study](#)

Schlumberger