



Exploration

North America & Brazil

Creating the future

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Repsol YPF

Houston Investors Field Trip

December 2008

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Exploration North America & Brazil

BRAZIL: SANTOS, CAMPOS, E. SANTOS BASINS

- PRODUCTION : 13,500 BOE/DAY
- 24 BLOCKS (12,410 km²)

GOM

- PRODUCTION: 2,500 BOE/DAY
- 74 BLOCKS /OCS (1,850 km²)

ALASKA: CHUKCHI AND BEAUFORT

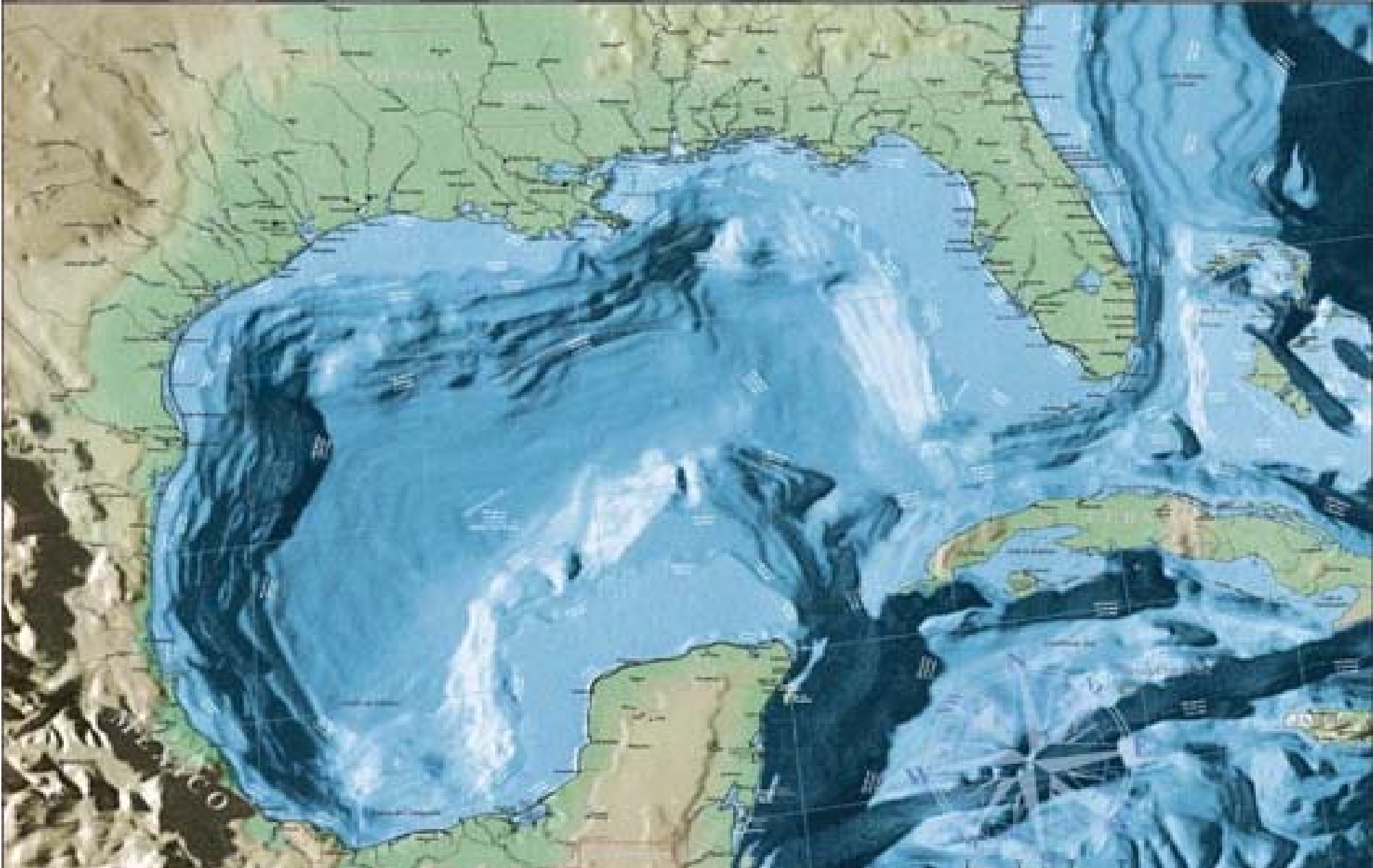
- 164 BLOCKS/OCS (4,100 km²)

CANADA: JEANNE D'ARC BASIN

- 3 BLOCKS (3,937 km²)



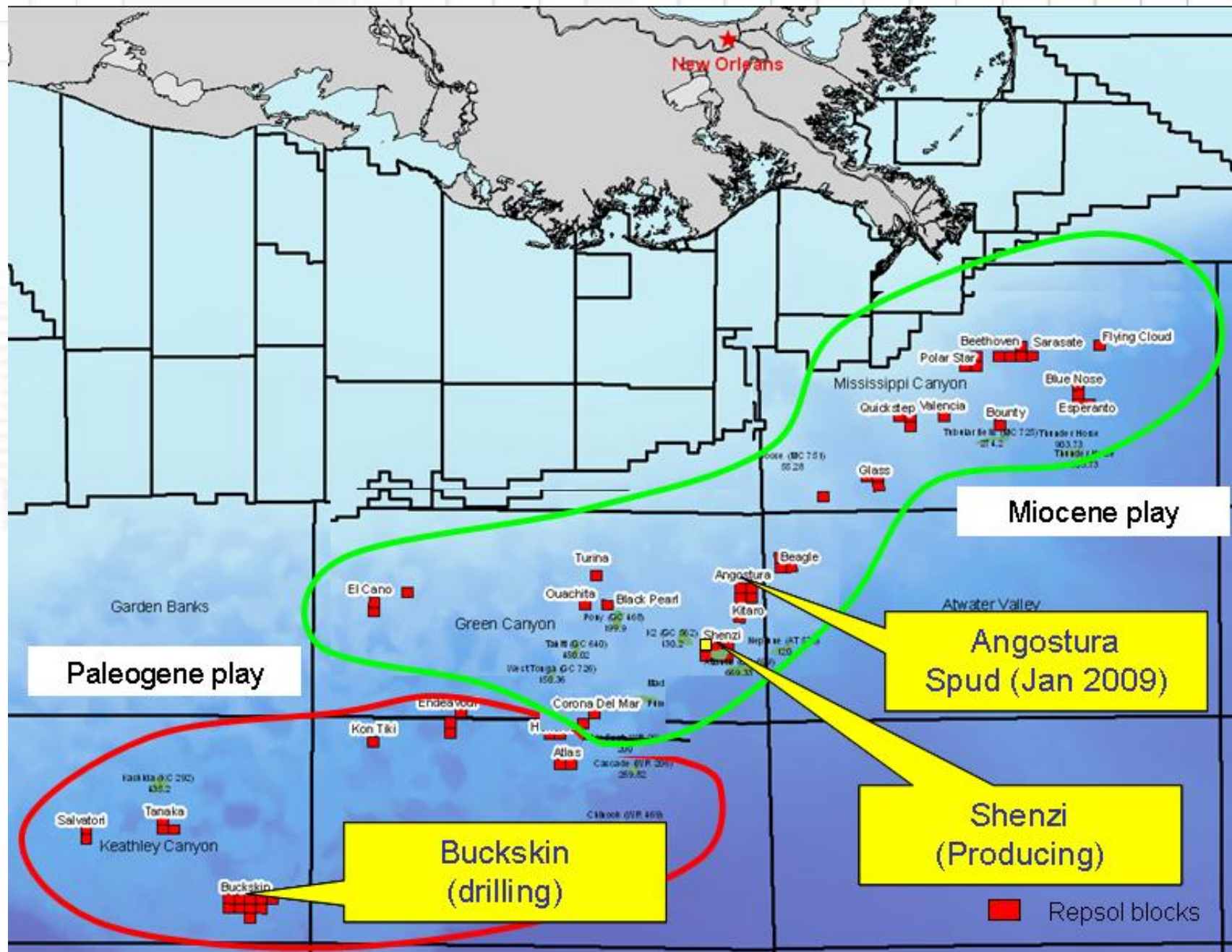
GOM Exploration



Repsol portfolio main characteristics

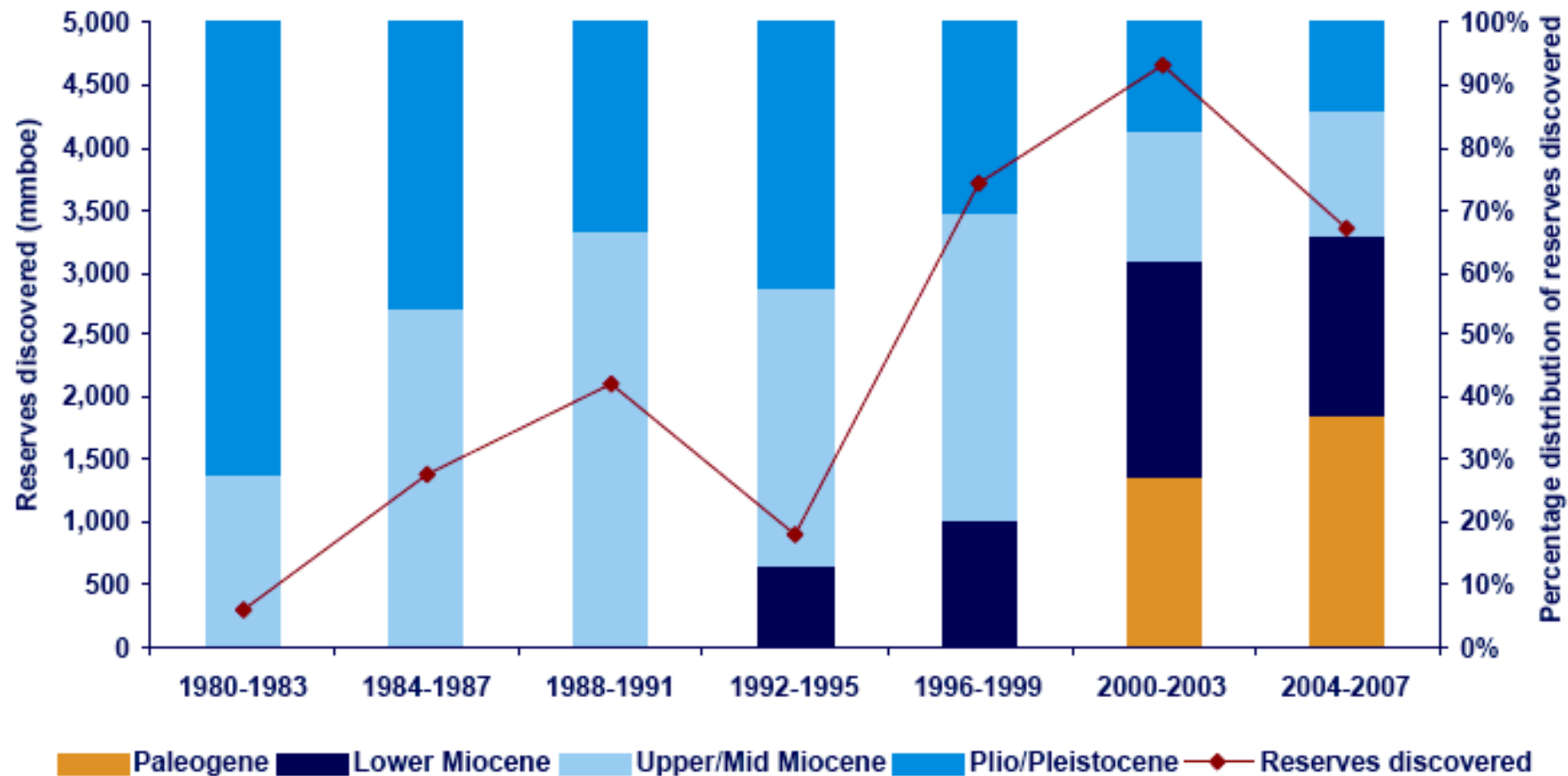
- **The Repsol portfolio is focused on Paleogene and Miocene turbidite sands**
- **73 blocks presently leased**
 - **27 blocks target the Paleogene as the main objective**
 - Baja (1996) – First Paleogene well in deep water
 - Trident (2001) – First oil discovery
 - Great White (2002) showed much better Rock Properties
 - Cascade (2002) – First discovery in Walker Ridge
 - **46 blocks target the Miocene as the main objective**
 - Mickey (1990) – Established presence of deepwater subsalt Miocene sand
 - Mad Dog (1999) – First Miocene deepwater subsalt discovery
 - Auger Deep (2000) – Extended Miocene play into Garden Banks
 - Thunder Horse (2000) – Gulf of Mexico's first giant oil field

GOM Exploration: location map



Way Paleogene and Miocene?

As the shallower plays matured, deeper, more challenging plays offered materiality

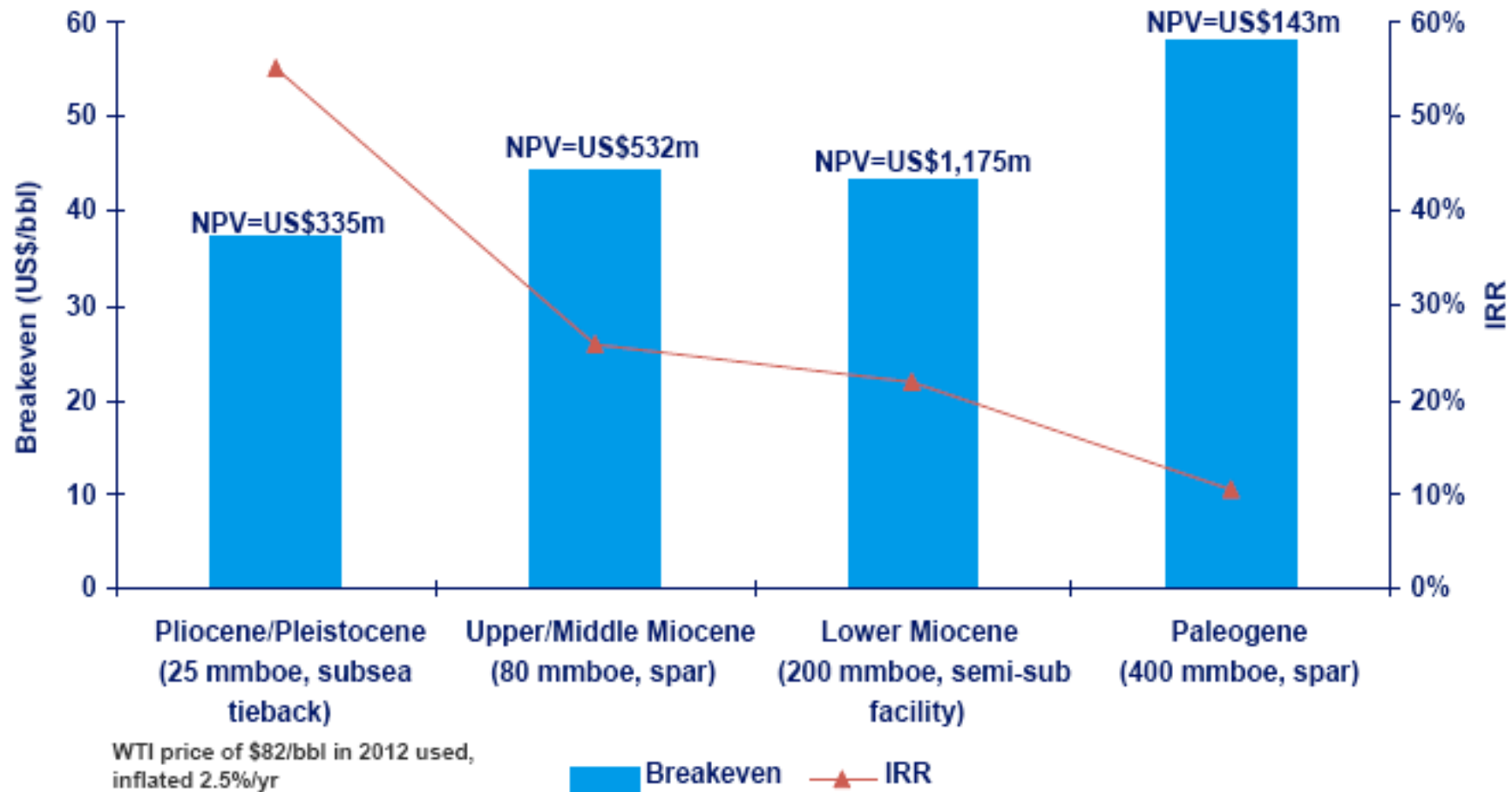


Source: Wood Mackenzie

Way Paleogene and Miocene?

Deeper plays have more marginal economics, but potentially greater rewards

Economic indicators of hypothetical discoveries

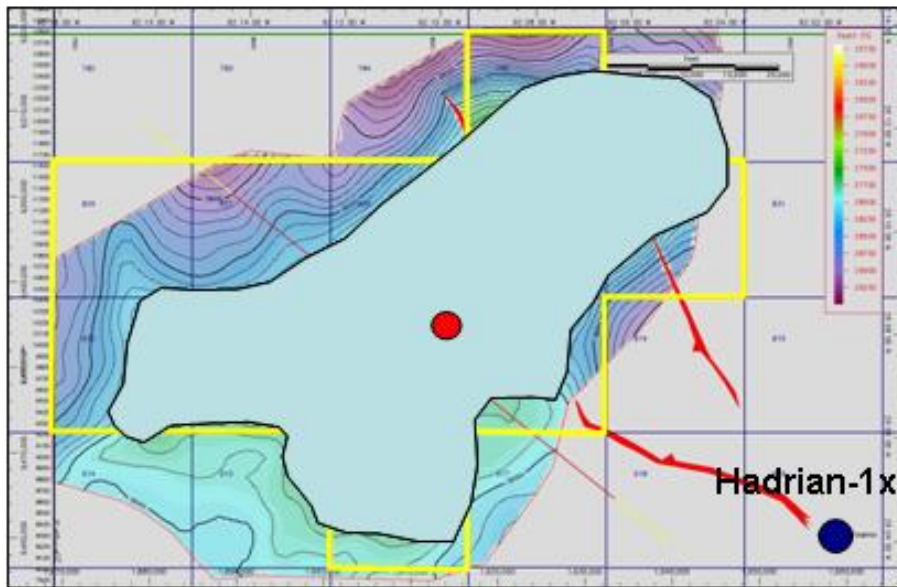


Source: Wood Mackenzie

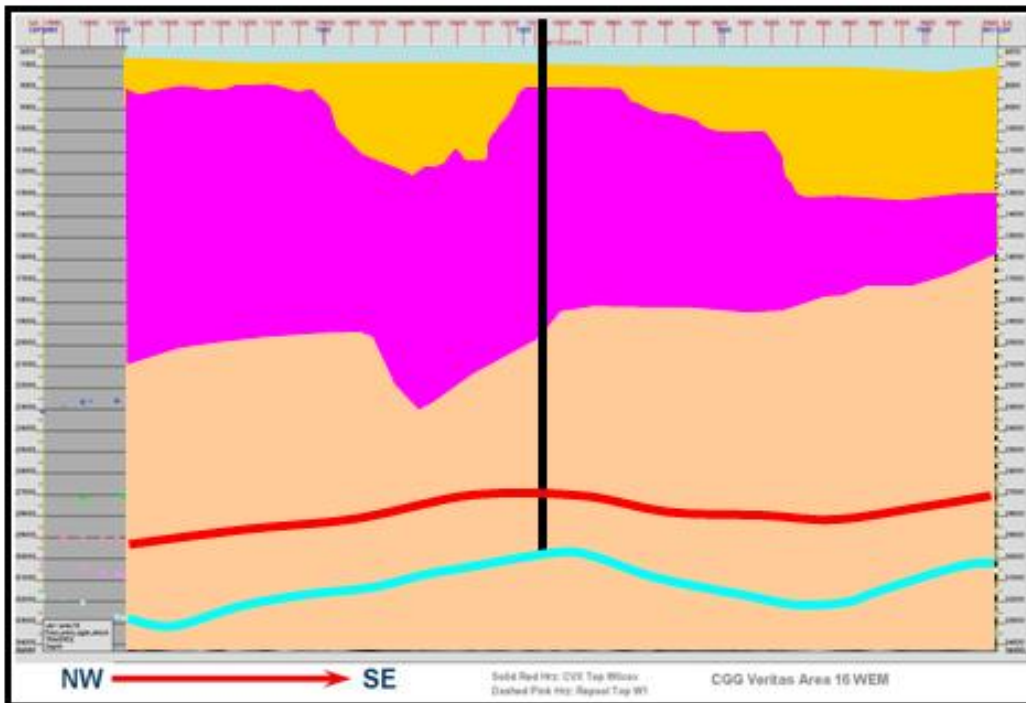
Paleogene-general information

- Water Depth 5,000 – 10,000'
- Deep Water sands deposits
- Reserves per Disc. 100-600 MMBOE
- Wildcat success rate - 65%
- Reservoir Presence is not considered a Risk AT ALL
- Reservoir depth 12,000 – 35,000'

Buckskin Prospect



- Repsol 12.5% operator, CVX 55% , Samson 12.5%, Maersk 20%
- WD: 6,6978'
- Objective: Eocene-Paleocene Wilcox Fm.
- Trap: 4 way clousure
- Status: drilling



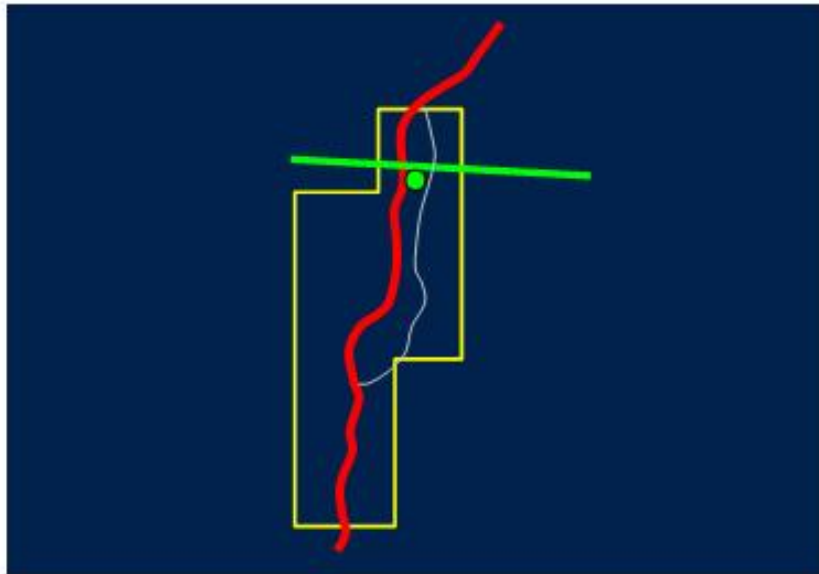
2010130 KC76 13178 CHEVRON 100%	2015130 KC77 20488 SHELL 100%	2016130 KC78 24756 HUNT OIL 100%	2018031 KC79 23788 HUNT OIL 100%		2008130 KC81 20180 UNOCAL 100%	2009130 KC82 132478 UNOCAL 100%	
2010130 KC76 13178 BP 100%	2016030 KC78 24756 HUNT OIL 100%			2011130 KC79 24238 CHEVRON 100%	2012130 KC79 24238 CHEVRON 87.5% REPSOL 12.5%	2013130 KC79 24238 CHEVRON 100%	2013130 KC79 24238 CHEVRON 100%
2014030 KC84 22481 CHEVRON 50% UNOCAL 50%		2016031 KC86 20472 CHEVRON 87.5% REPSOL 12.5%	2016031 KC87 20188 CHEVRON 87.5% REPSOL 12.5%	2013130 KC88 20181 CHEVRON 87.5% REPSOL 12.5%	2013130 KC89 20181 CHEVRON 87.5% REPSOL 12.5%	2013130 KC90 20181 CHEVRON 87.5% REPSOL 12.5%	2013130 KC91 22320 CHEVRON 100%
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		2009130 KC84 22480 CONOCOPHILIPS 100%	2009130 KC85 10758 CONOCOPHILIPS 100%	2010030 KC86 34875 CHEVRON 87.5% REPSOL 12.5%	2016031 KC87 21471 CHEVRON 100%	2016031 KC88 21488 PETROBRAS 100%	2009130 KC89 22188 EXXONMOBIL 50% PETROBRAS 25% ENI 25%
2011130 KC86 24732 BP 50% CHEVRON 50%	2011130 KC87 24732 BP 50% CHEVRON 50%	2009130 KC88 24732 CONOCOPHILIPS 100%	2009130 KC89 24732 CONOCOPHILIPS 100%			2016031 KC82 41888 PETROBRAS 100%	2009130 KC90 22188 EXXONMOBIL 50% PETROBRAS 25% ENI 25%

Miocene Trend



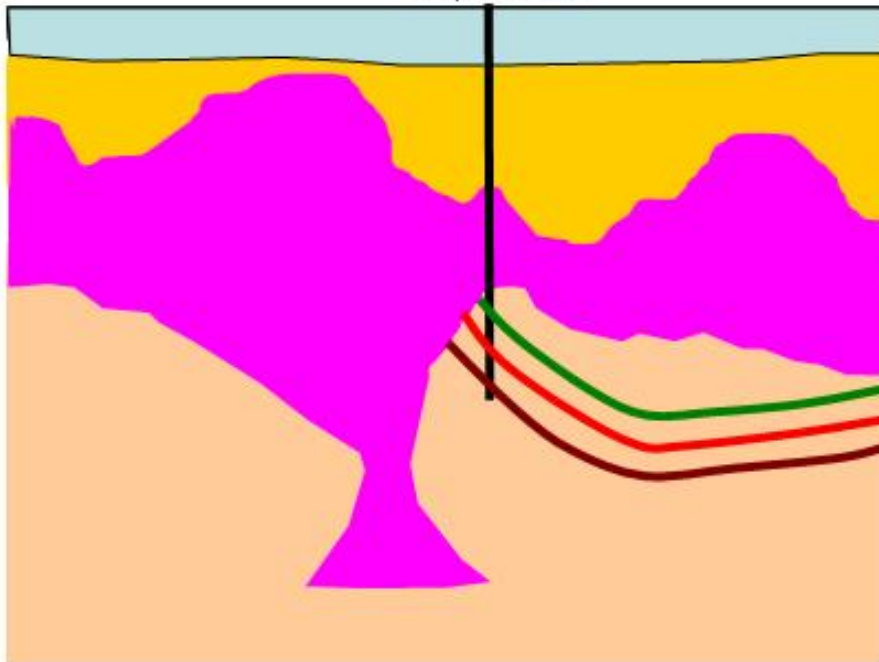
- Water depth 1,500' – 7,500'
- Deep water turbidite sands
- Reserves per discovery range from 30 to 1200 MMBOE
- Wildcat economic success rate is 35%
- Reservoir depth is 12,000' – 35,000'
- Play is expanding to the west and south into subsalt

Angostura Prospect



- Repsol 40% operator, CVX 40%, Maersk 20%
- WD: 3,400' PTD: 30,000' TVDSS
- Main target: Miocene
- Trap: 3 way against salt
- Spud date: first quarter 2009

Proposed Loc

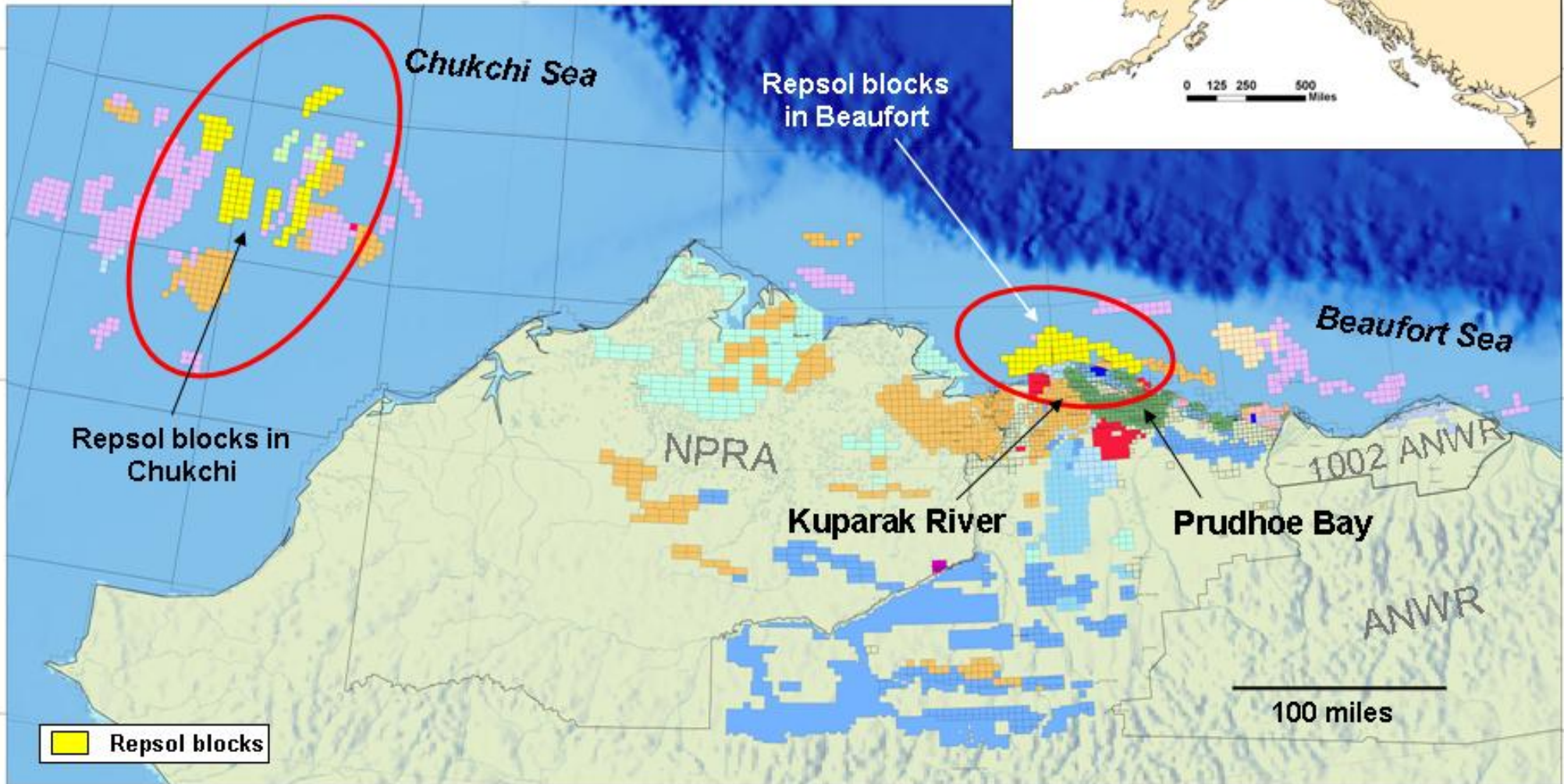


Alaska Exploration

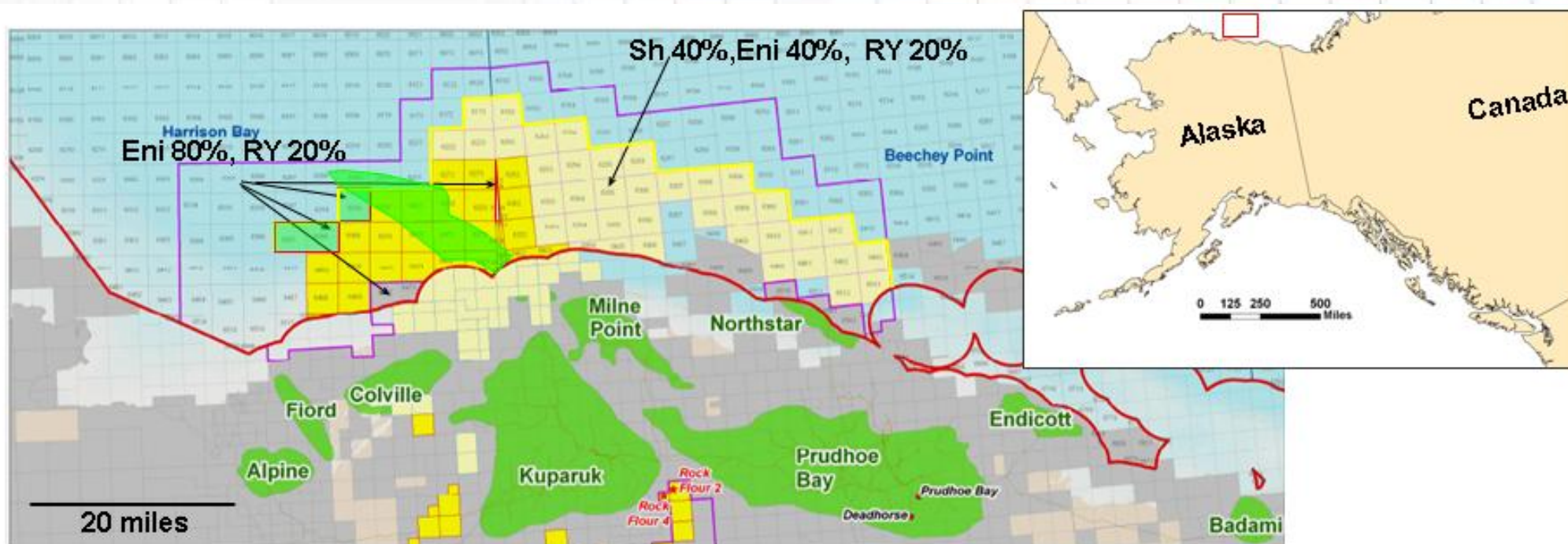


Alaska Exploration: location map

- 93 blocks 100% in Chukchi Sea
- 71 blocks 20% in Beaufort Sea
- 64 blocks Shell 40% (op), Eni 40% and RYPF 20%
- 7 blocks Eni 80% (op) and RYPF 20%

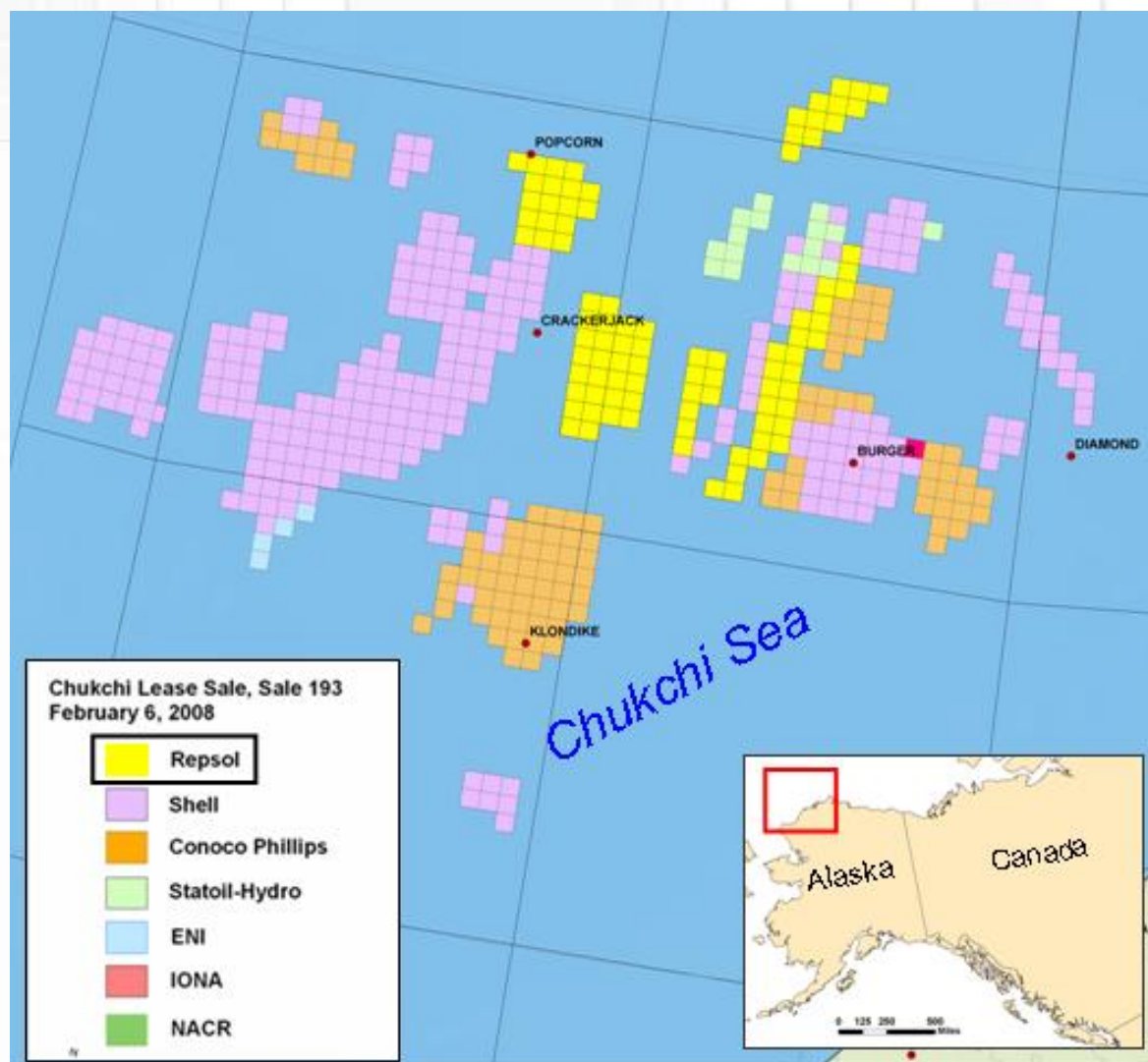


Repsol Joint Venture Acreage: Beaufort Sea



- Repsol's Non-Operated Acreage in the Beaufort Sea sits in federal waters immediately offshore of one of the world's most prolific petroleum provinces.
- Alaska's North Slope (source – (2005) Houseknecht and Bird, USGS Professional Paper, 1732-A) :
 - ~ 15 BBO produced from seven unitized fields, 12 BBO from Prudhoe Bay
 - ~7.1 BBO, 36.2 TCF, remaining reserves for these accumulations
 - At least an additional 27 oil and gas accumulations known outside unitized fields
 - Proven HC's occur in Mississippian through Cretaceous carbonates and clastics
- The partnership is pursuing a full inventory of leads and prospects representing extensions of concepts proven onshore

Chukchi Sea: an opportunity in an underexplored Arctic Basin



- 5 Wells were drilled from 1989 to 1991. One GAS/CONDENSATE DISCOVERY (BURGER, 14 TCFG&724 MMBC*) and 4 wells with GAS and OIL SHOWS by Shell, Chevron and the Conoco & Elf JV.

A PROVEN PETROLEUM PROVINCE WITH MULTIPLE HC SYSTEMS.

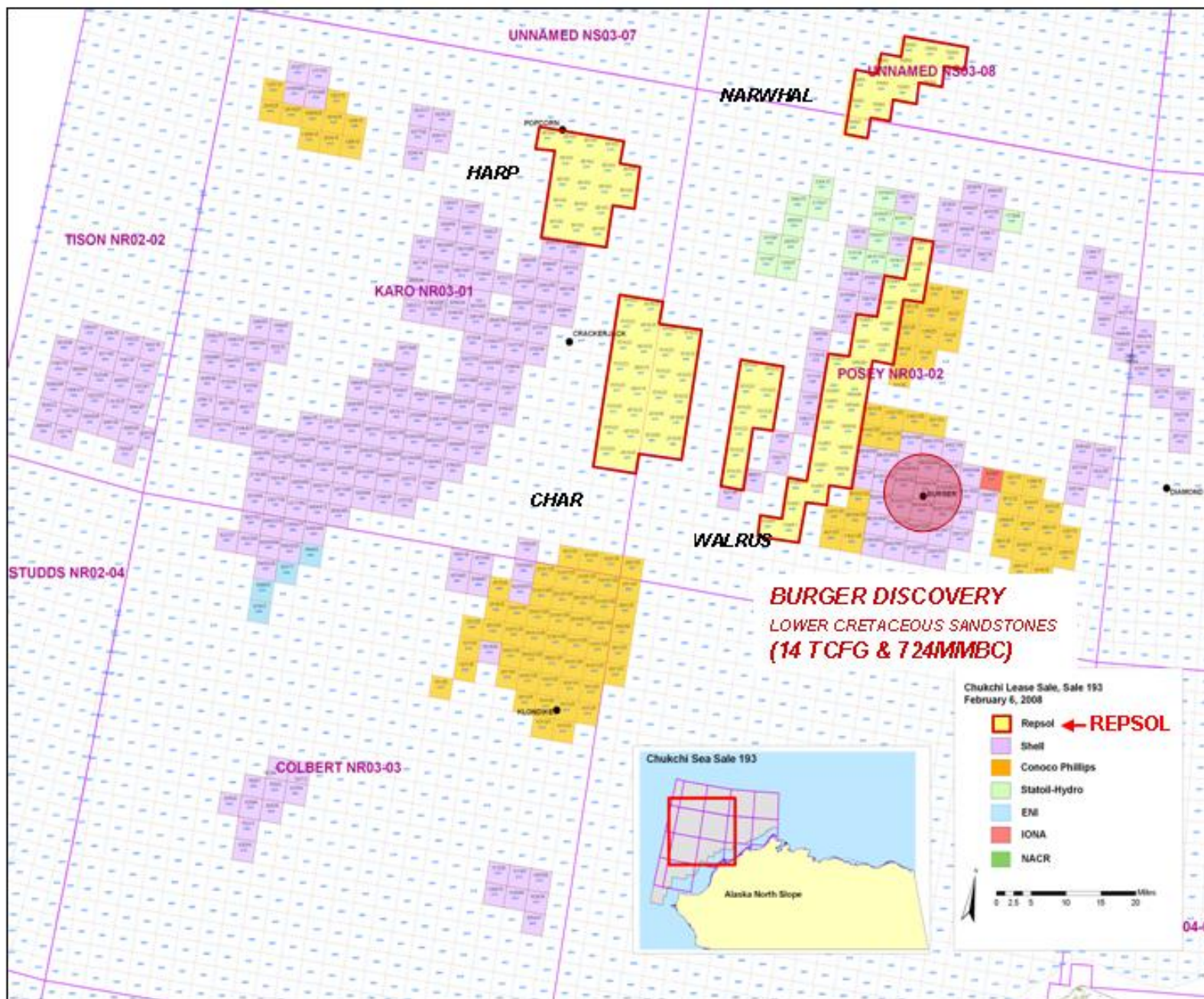
- 1995 MMS assessment calculated mean recoverable oil reserves of 13 billion barrels**
- Water depths vary from about 32 ft to approximately 232 ft
- Other major players include Shell, ConocoPhillips, StatOil Hydro, and Eni

NOTES

* MMS data from 2004 "Economic Study of Burger Gas Discovery, Chukchi Shelf, Northwest Alaska", W. Sherwood & J. Craig

** Sherwood et al., 1995 USMMS

Location Map: Repsol blocks



- Paleocene Play with low risk for reservoir presence and large upside potential to be confirmed with 3D seismic.
- High potential for deeper “traditional” plays, like the lower cretaceous Burger Discovery, from Mississippian to Upper Cretaceous.
- Opportunity for stacked objectives

Canada Exploration



Towing icebergs out of
drilling site way in
Jeanne d'Arc Basin

November 18th, 2008

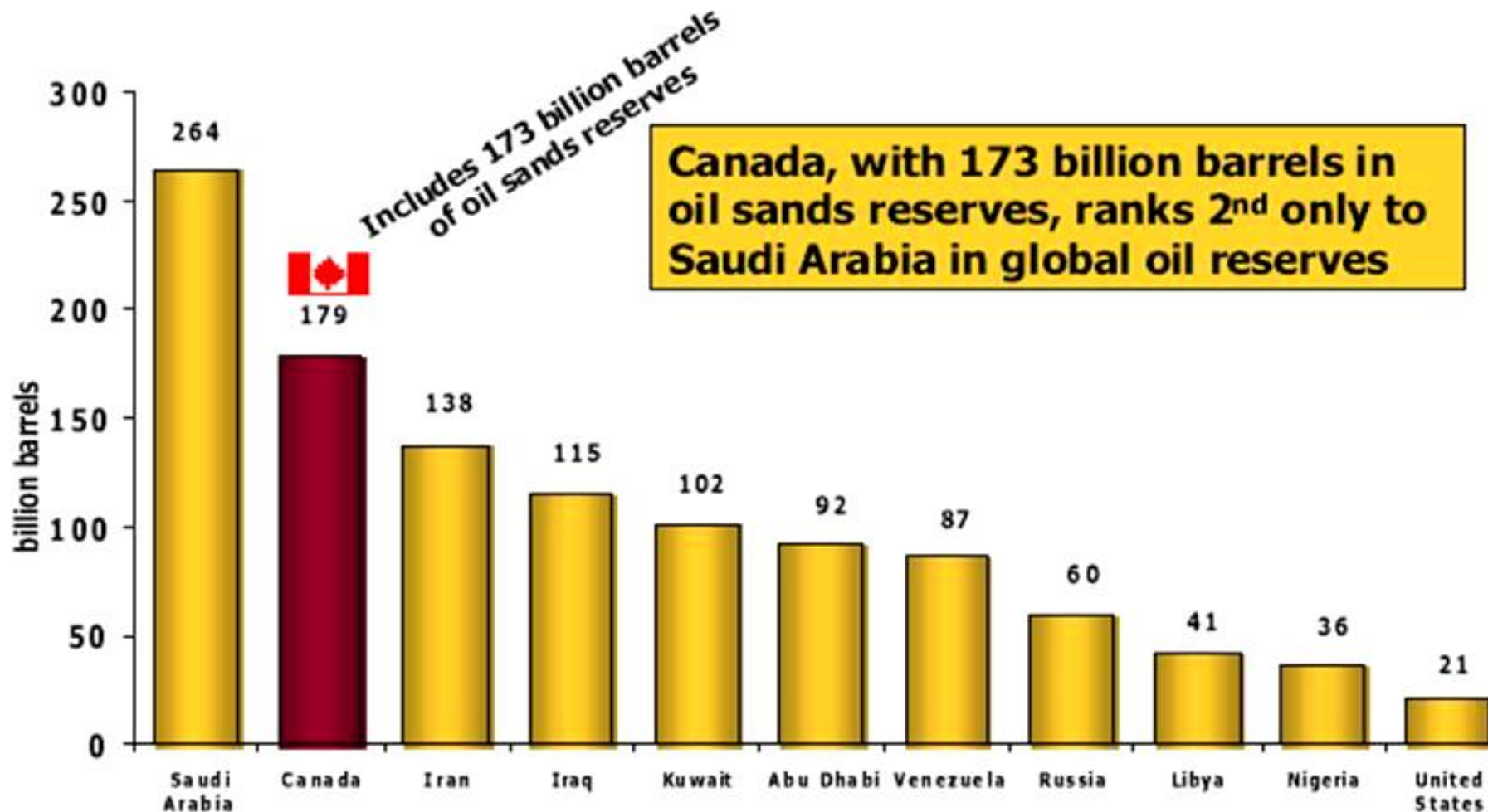
Repsol successfully bid for exploration rights in Canada's Newfoundland and Labrador Offshore Area....

Repsol successfully bid for three blocks, two in Central Ridge/Flemish Pass and one in the Jeanne d'Arc Basin....

Why Canada?



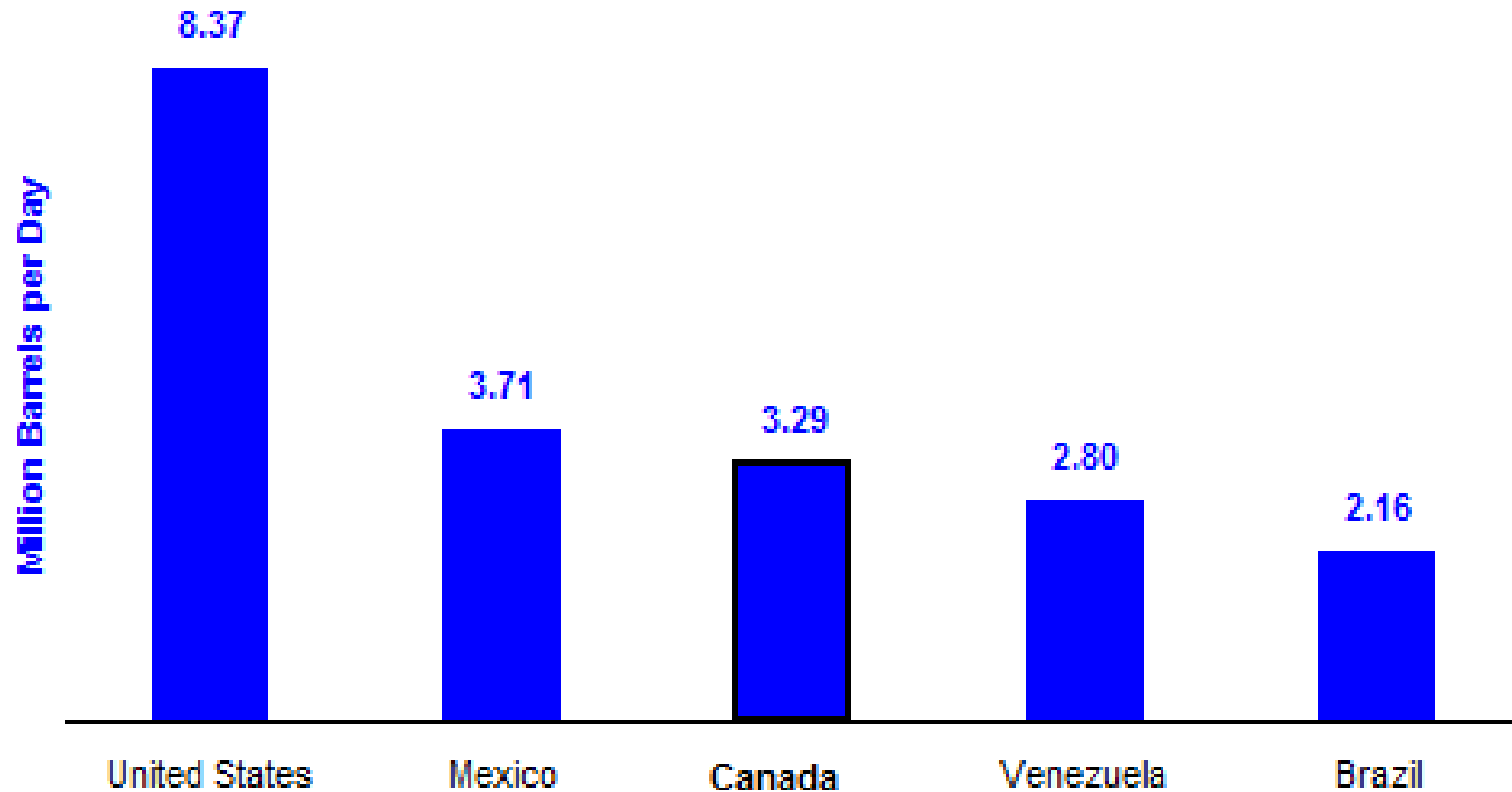
Global Crude Oil Reserves by Country



Why Canada?



Top Western Hemisphere Oil Producers, 2007



Source: EIA International Petroleum Monthly

Canada estimated oil reserves

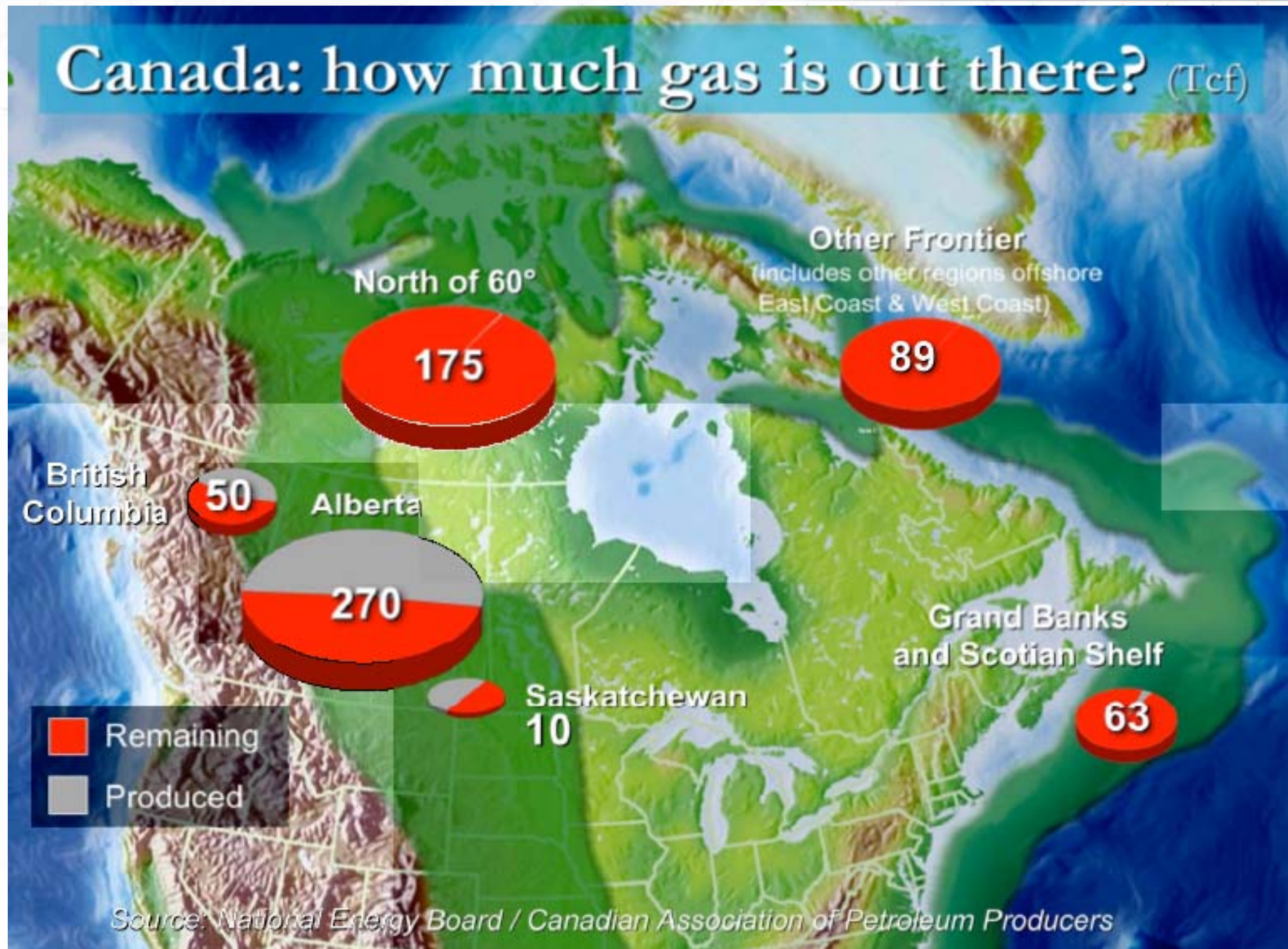


Canada: how much oil is out there? (Bbbls)

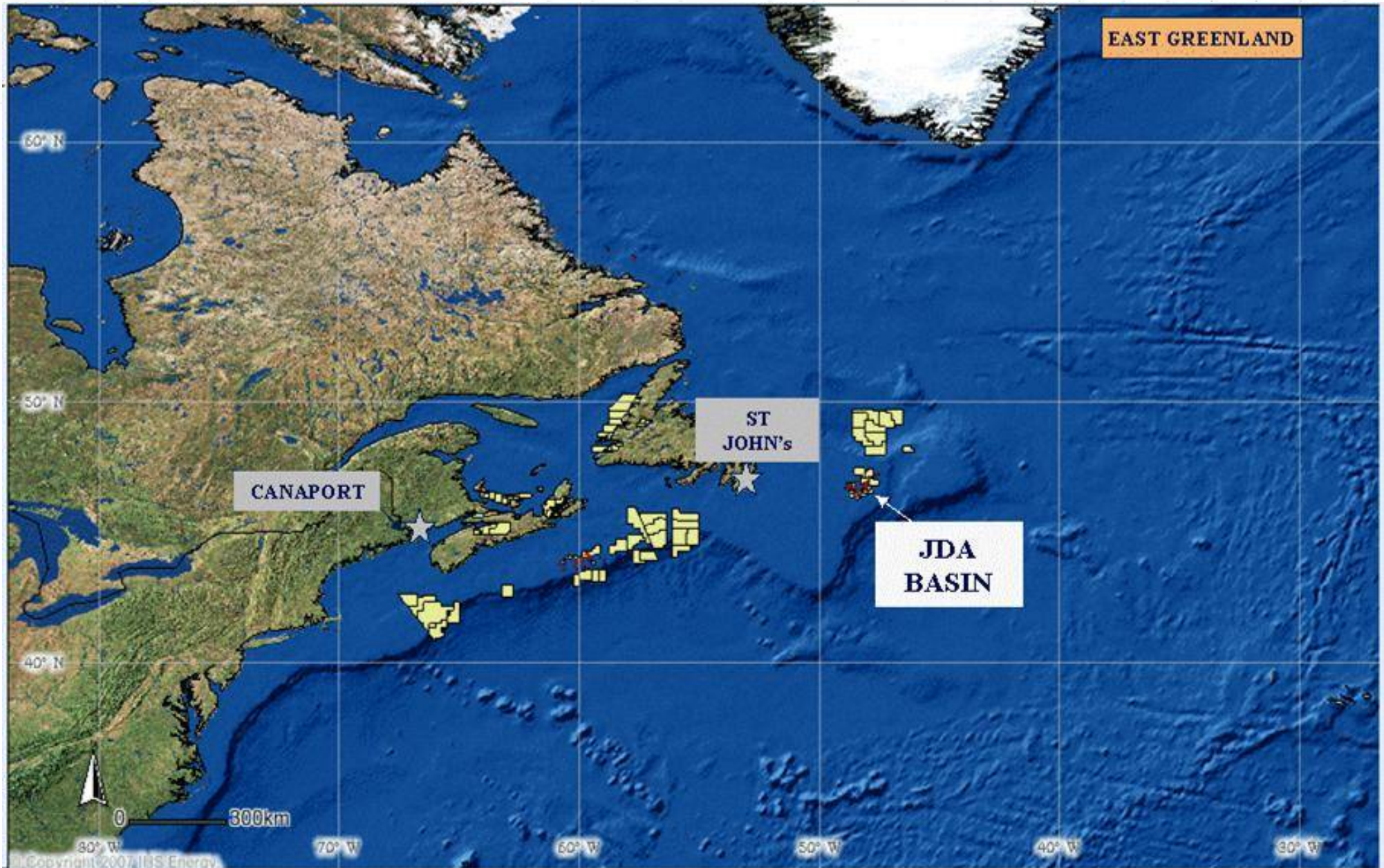


Source: National Energy Board / Canadian Association of Petroleum Producers

Canada estimated gas reserves



Jeanne D'Arc (JDA) basin location, East Canada



East Canada

Coordinate System: **Geographic**
Map Scale: **1 / 25 000 000**

Lon: **68°13'48" W**
Lat: **61°42'36" N**

East Canada (CAAP 2008)

Natural Gas Production

- (Offshore Nova Scotia)
- **Sable Offshore Energy Project** – 360 million cubic feet/day
- **Deep Panuke**
 - Second offshore natural gas project
 - Received regulatory approval and project sanction
 - Design capacity 300 million cubic feet/day
 - Production commencing 2010

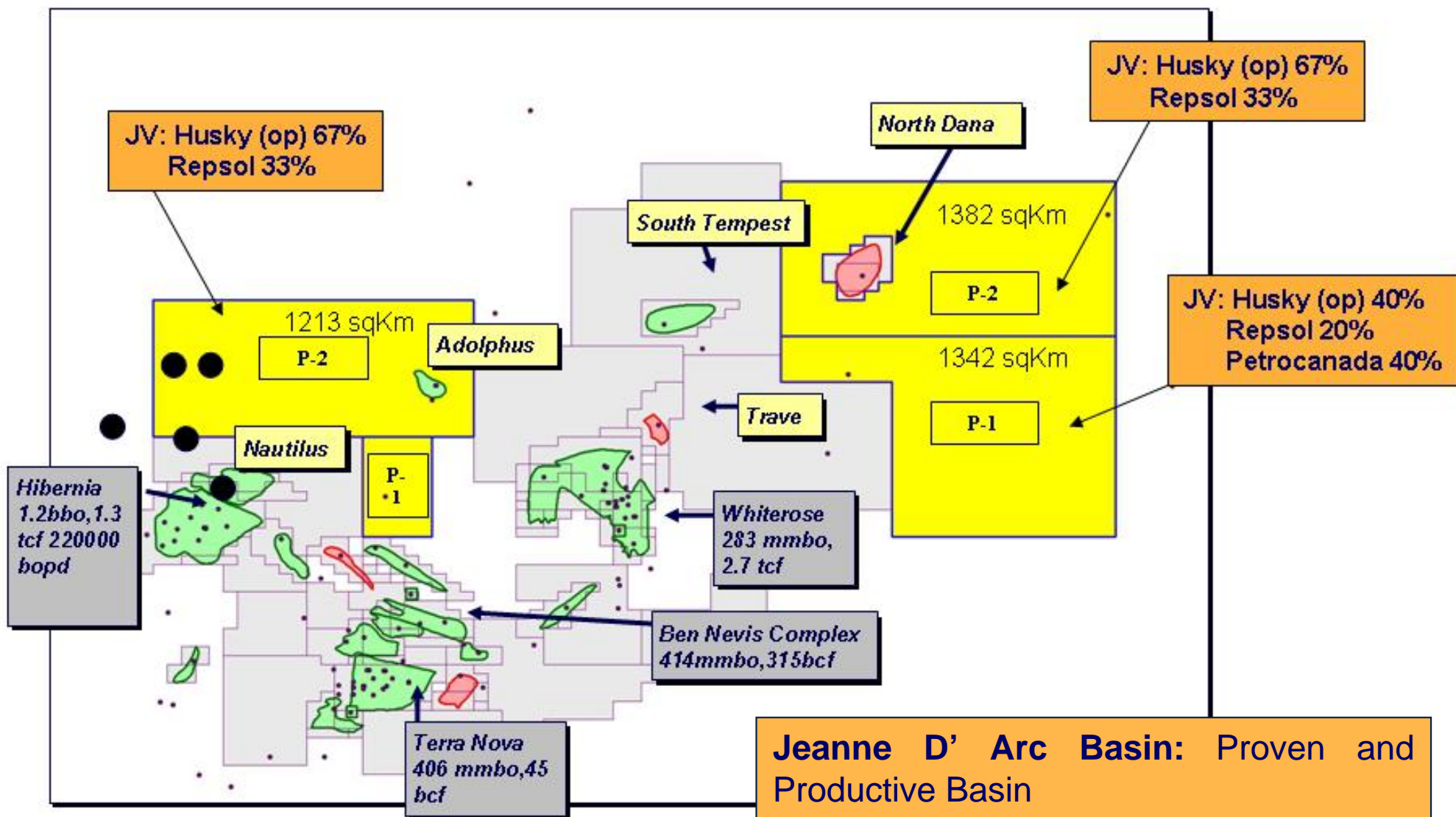
Oil Production :

- (Offshore Newfoundland and Labrador)
- **Hibernia** – 135,000 b/d
- **Terra Nova** – 116,000 b/d
- **White Rose** – 117,000 b/d
- **Future Developments and reserves:**
 - **Hibernia Southern Extension:** 230 million barrels (no start date yet announced)
 - **White Rose Extension:** 214 million barrels in three fields (announced start 2009)
 - **Hebron:** 400-700 million barrels (announced start 2015)



Map of Atlantic Canada showing projects offshore Newfoundland and Nova Scotia

Bid Round results



Jeanne D'Arc Basin: Proven and Productive Basin

- Daily Production: 370,000 BOPD.
- Oil: 2.75 B BOE (CNOBP)
- Gas: 5.9 TCF (not developed)

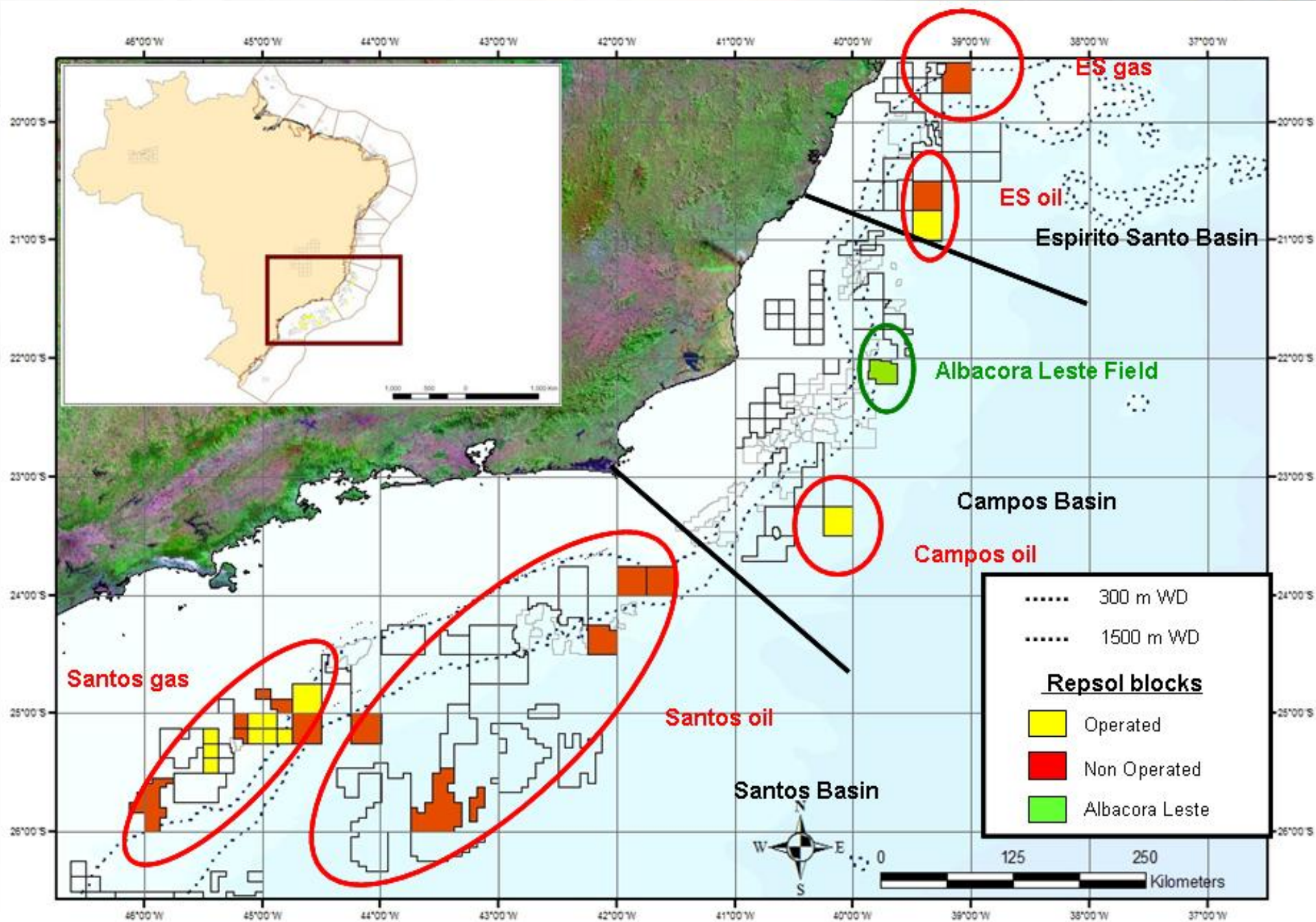
A large, faint world map is centered in the background of the slide. The map is composed of a grid of small, light-colored squares, giving it a digital or pixelated appearance. It covers most of the lower two-thirds of the slide.

Coffee break

Brazil Exploration

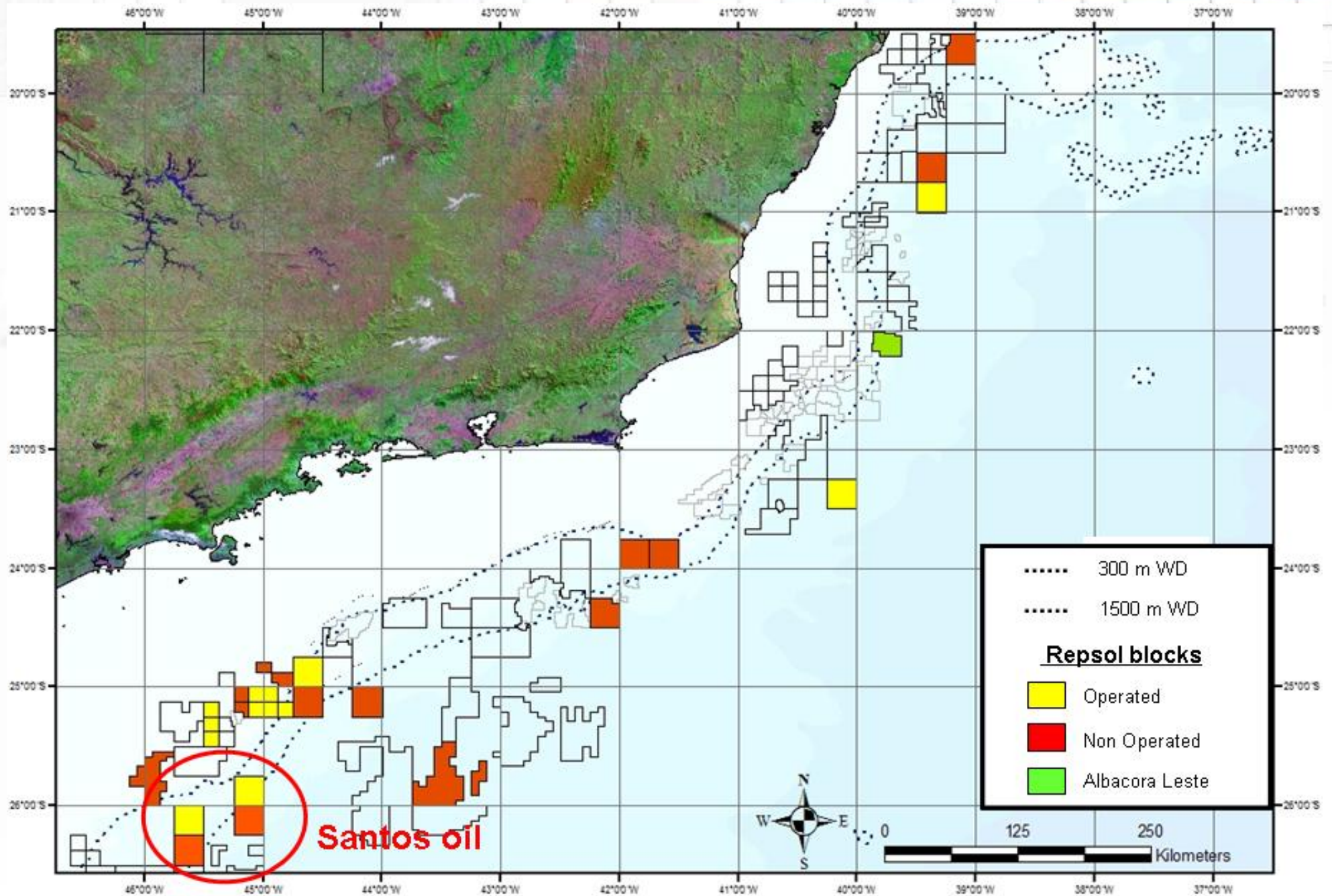


Repsol blocks location map



Eighth bid round Repsol blocks not yet awarded

Location map



Main objectives

In Brazil it is possible to identify three main objectives :

- **Gas Post-salt**

- In Brazil there isn't any real gas basin and the presence of free gas is, in general, result of an "anomaly" like for example the central part of the Santos Basin or the Northern part of the Espirito Santo Basin.
- Most of the produced gas in Brazil is associated gas

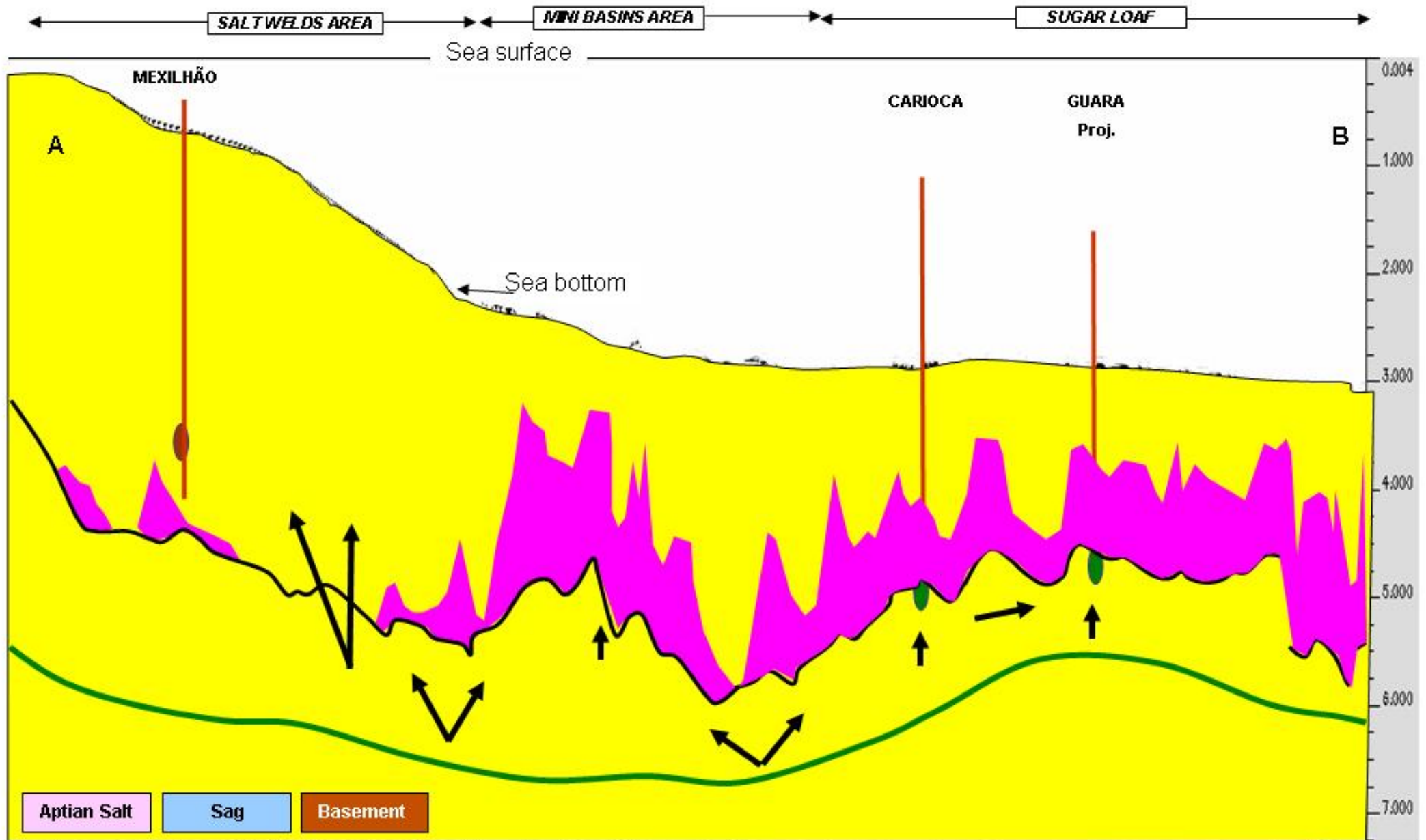
- **Oil Post-salt**

- "Classic" turbiditic objectives analogous to Albacora Leste

- **Pre-salt**

- Drilled for the first time in 2006

Pre versus post salt objectives



Repsol portfolio main characteristics

- Repsol has the second largest Brazilian offshore exploratory portfolio, after Petrobras
- The Repsol portfolio is concentrated into the three most prolific basins in the Brazilian offshore and it is the result of a good balance between:
 - Shallow water and deep water blocks (10 shallow / 14 deep)
 - Gas and oil blocks (12 gas / 12 oil)
 - Post and pre salt plays (18 post salt / 7 pre salt, plus eighth bid round blocks)
- It is composed by 24 blocks:
 - Three exploratory blocks in Espirito Santos Basin
 - One production block and one exploratory block in Campos Basin
 - Nineteen exploratory blocks in Santos Basin.

Main players in Brazil



Main players in Brazil:

- Petrobras
- Repsol
- Shell
- Chevron
- Exxon
- Eni
- VDRD
- Statoil-Hydro
- Anadarko
- BG
- Hess
- Maersk
- Devon
- GALP
- OGX

Main players, and Repsol partners/competitors in Brazil



Main Repsol partners:

- **Petrobras** is Repsol main partner in shallow or deep water, in gas or oil plays as well as in post or pre salt objectives in all three basins
- **BG** is an important partner in Santos Basin, in gas plays as well as, together with Petrobras, in pre salt objectives
- **Hess, Shell, Statoil-Hydro, Woodside and Vale do Rio Doce** are other important players associated with Repsol in gas and oil projects

Main players, and Repsol partners/competitors in Brazil



Main competitors:

Post salt :

- Petrobras
- Statoil-Hydro
- Maersk
- OGX
- Devon

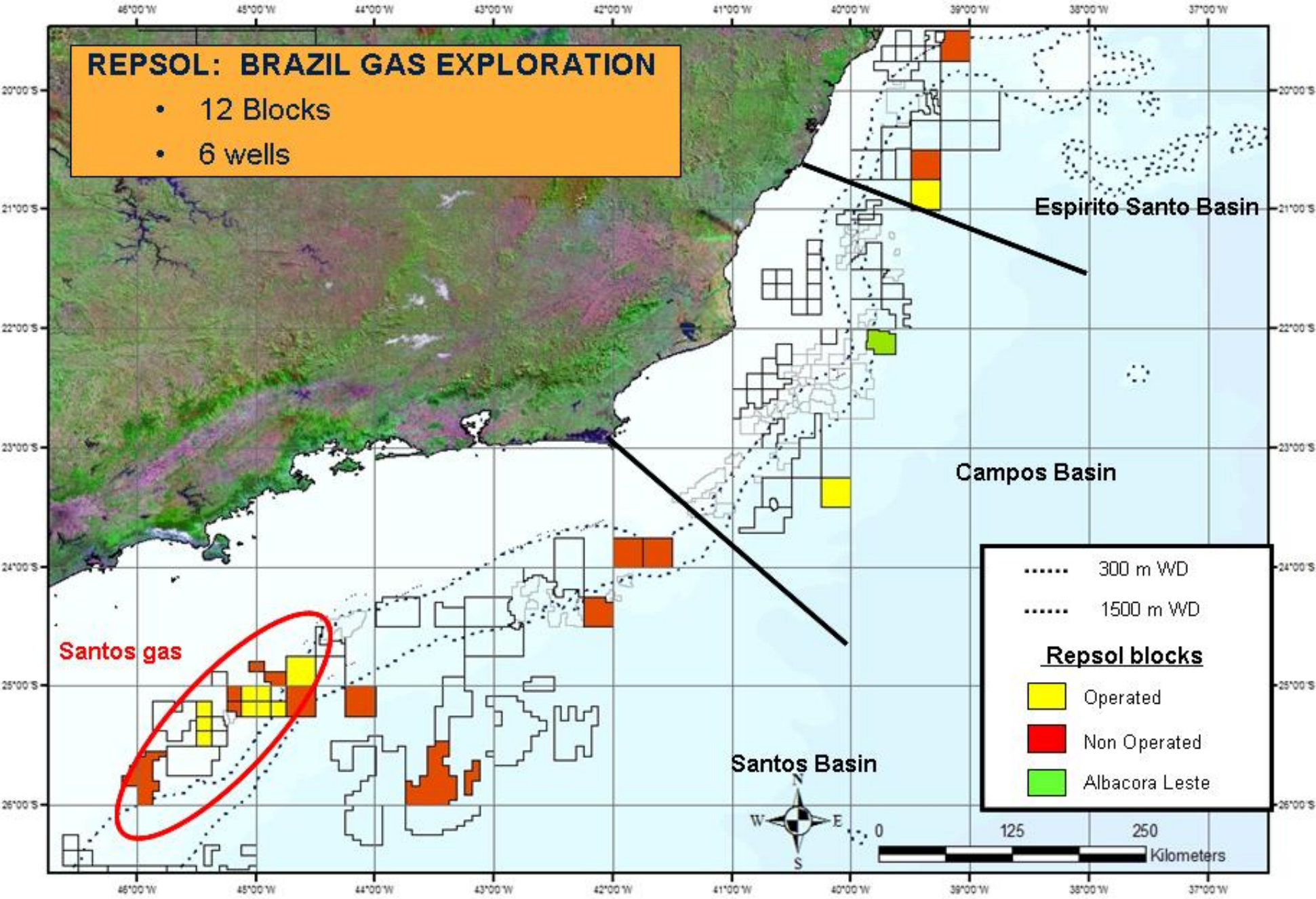
Pre-salt:

- Petrobras
- Exxon
- Shell
- Chevron
- Hess
- Anadarko
- Devon
- Eni

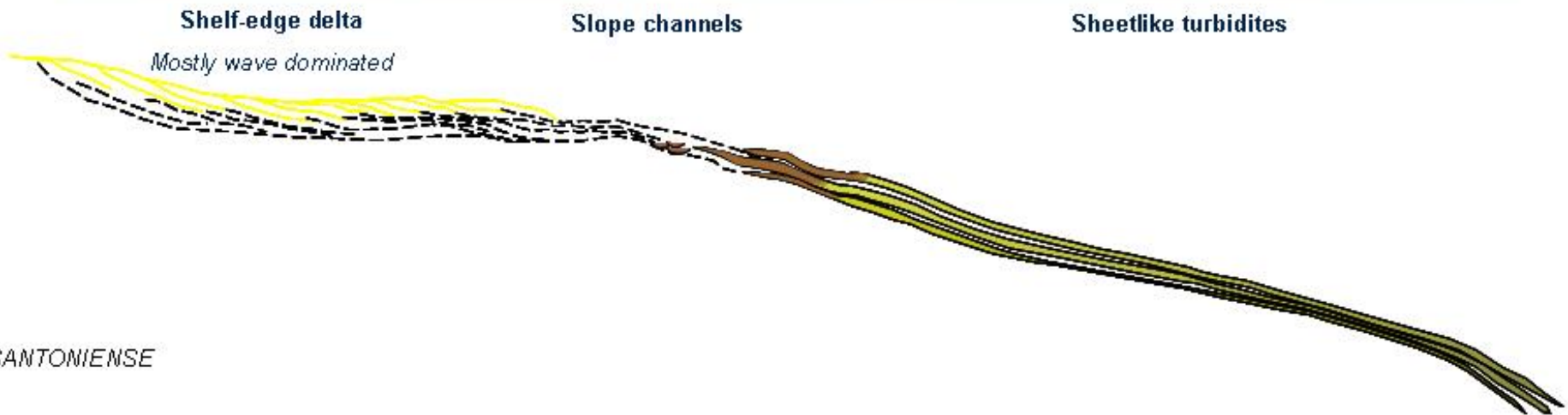
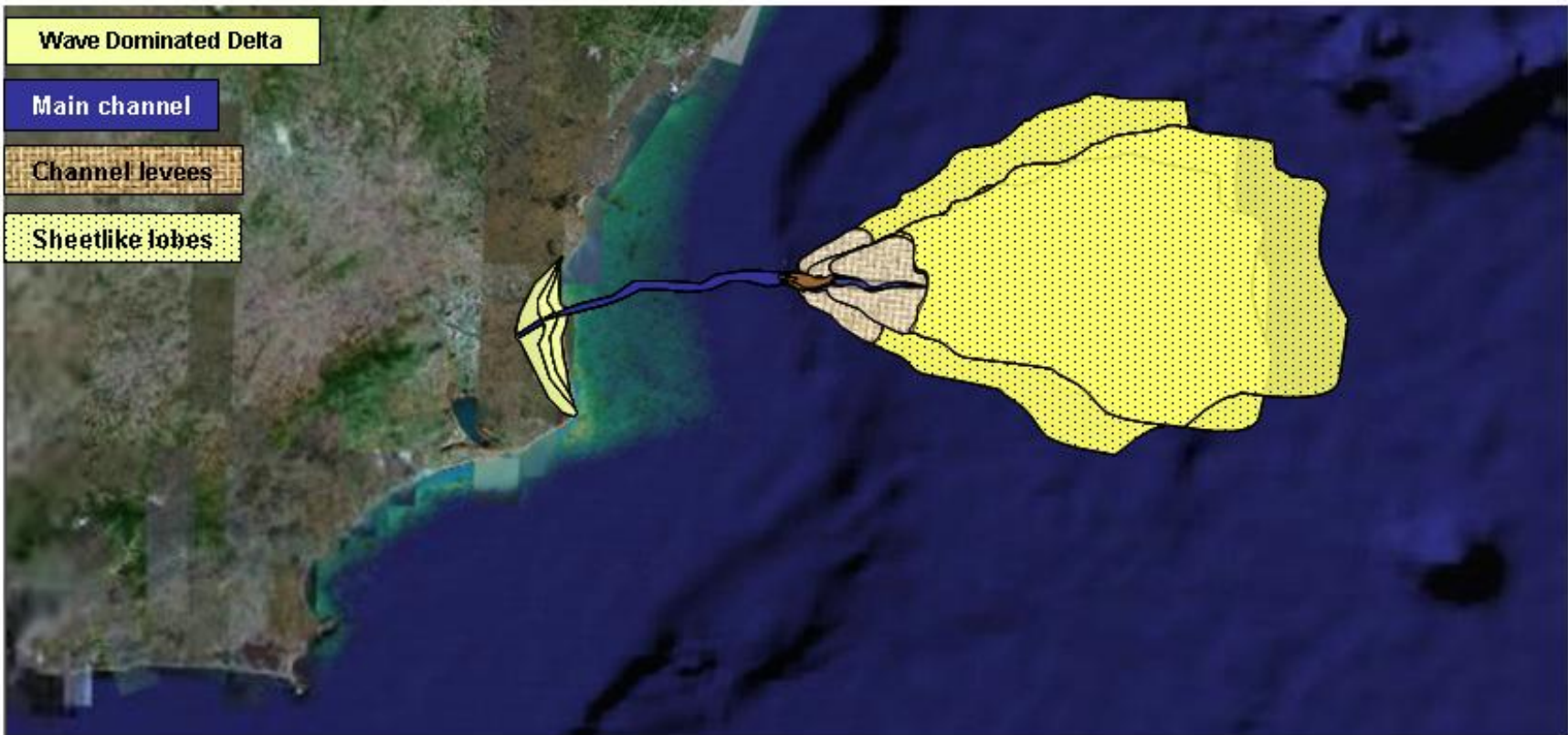
Repsol gas Projects

- In Brazil there aren't main gas basins
- Most of the gas is associated gas
- The few areas where the free gas is present are, in general, the result of an anomaly as for example the center of Santos basin, the Northern part of Espirito Santo basin or Camamu basin.
- Repsol has a privileged presence in the Brazilian gas project

Repsol gas projects location map



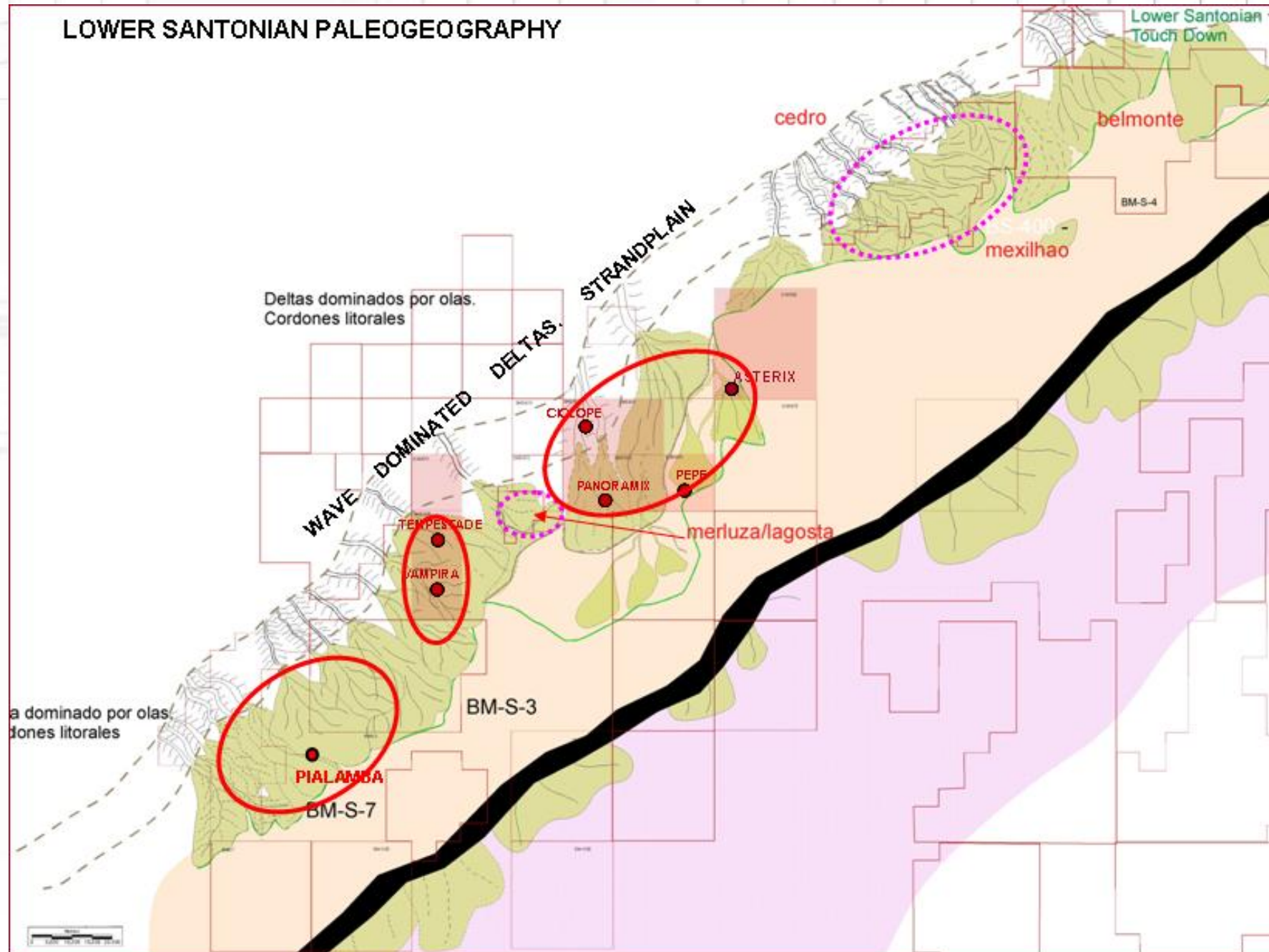
Sedimentary model Lower Santonian.



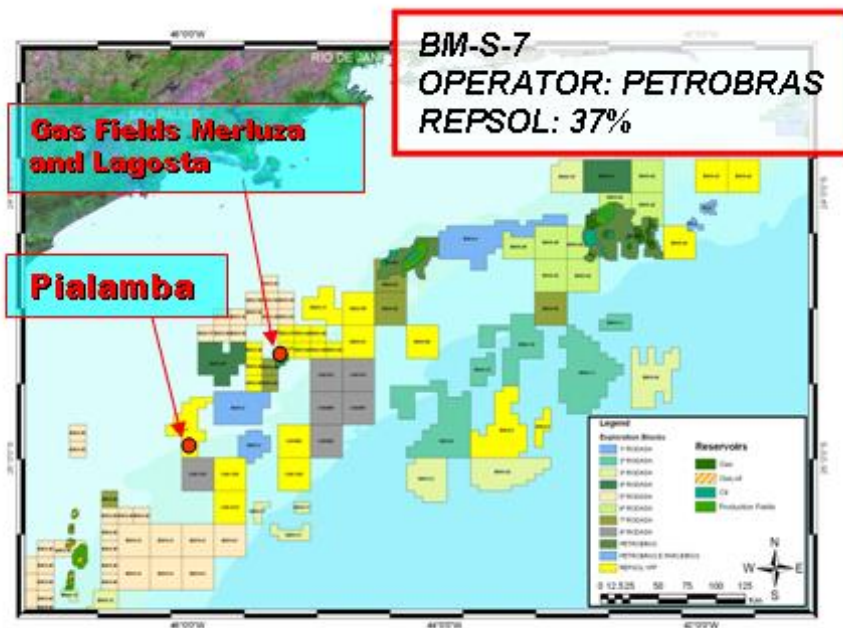
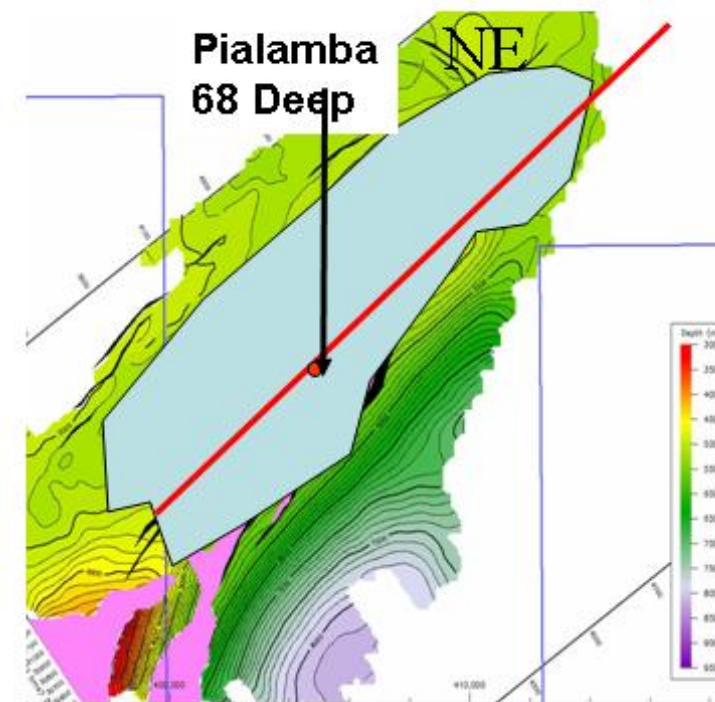
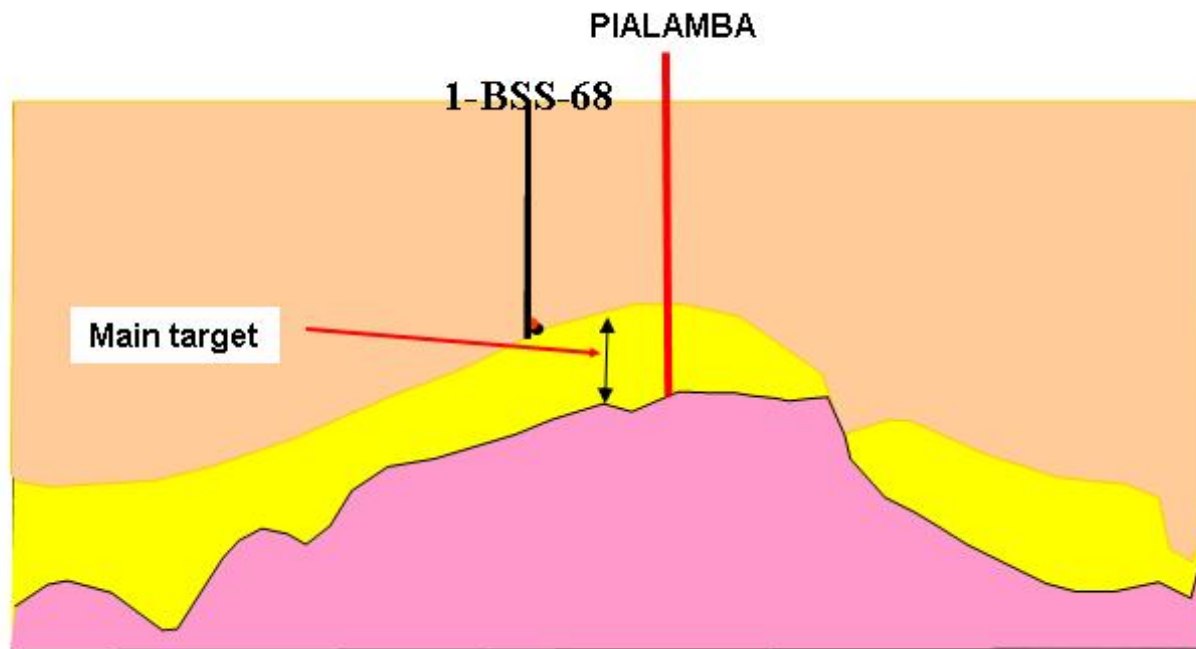
SANTONIENSE

Repsol Santos gas main projects

Basin Sedimentary Model Analysis. Lower Santonian

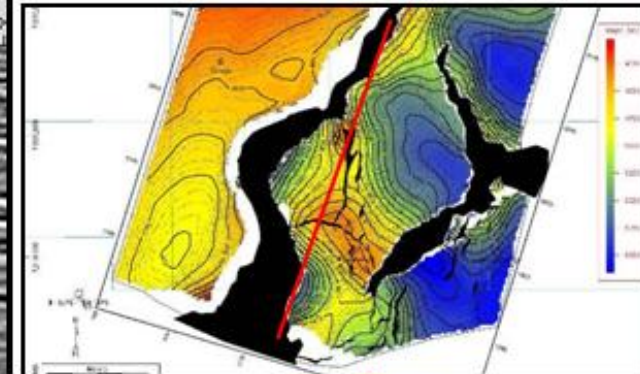
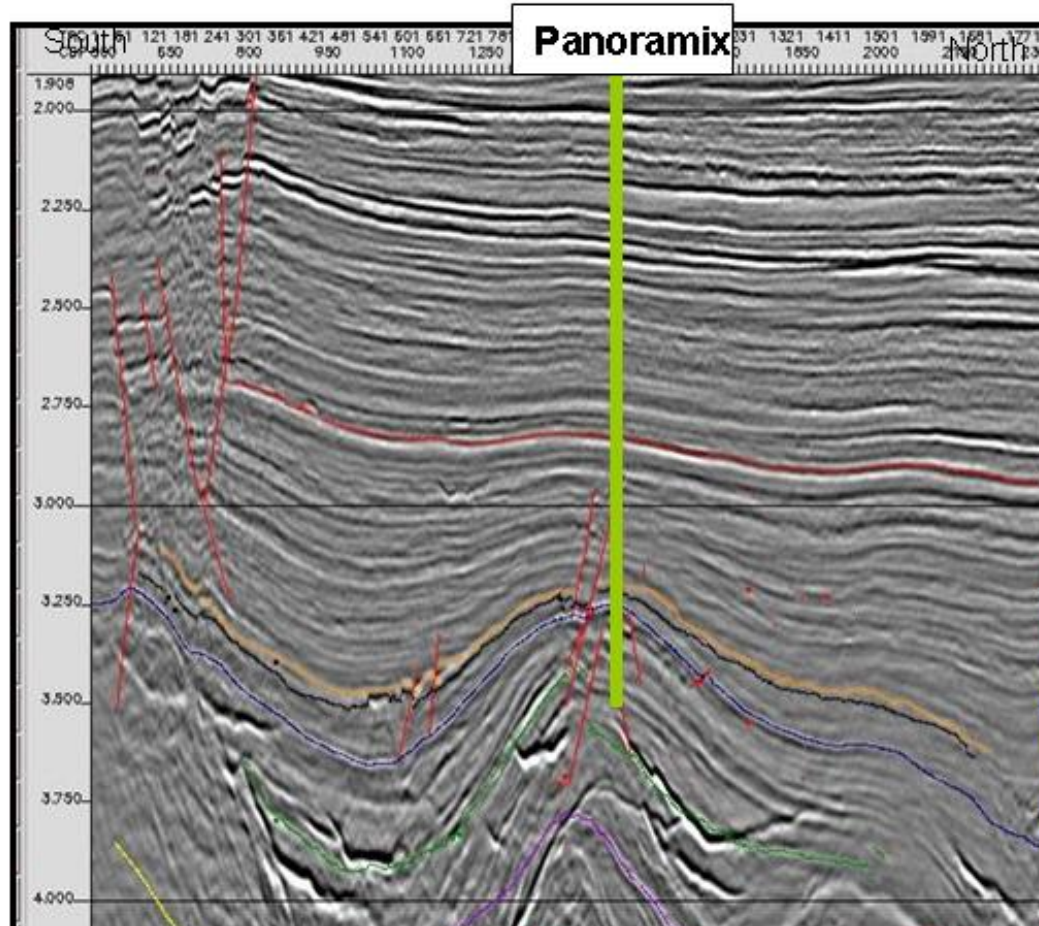


Santos gas: Exploratory well Pialamba

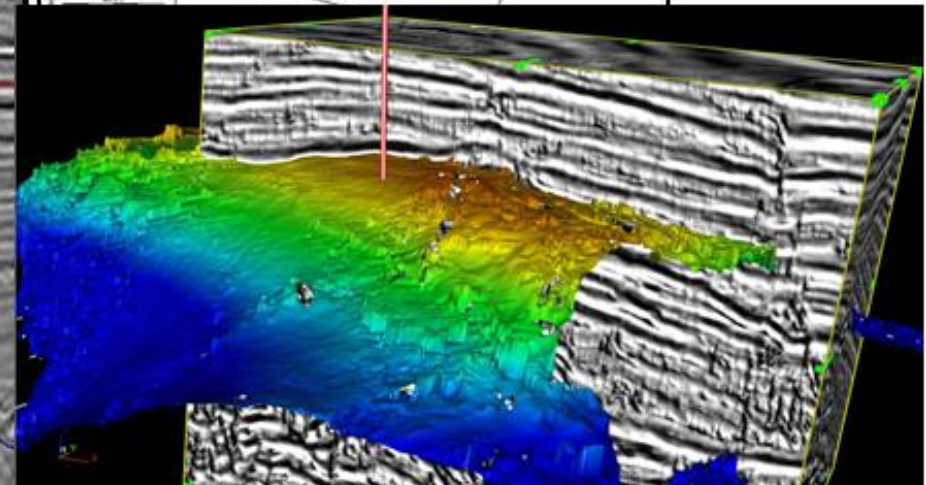


- **Block:** BM-S-7
- **JV:** Petrobras 63% -Repsol 37%
- **Observation:** in Trend with gas field of Mexilhao, Lagosta and Merluza. \
- **Expected spud date:** drilling

Santos gas: well Panoramix

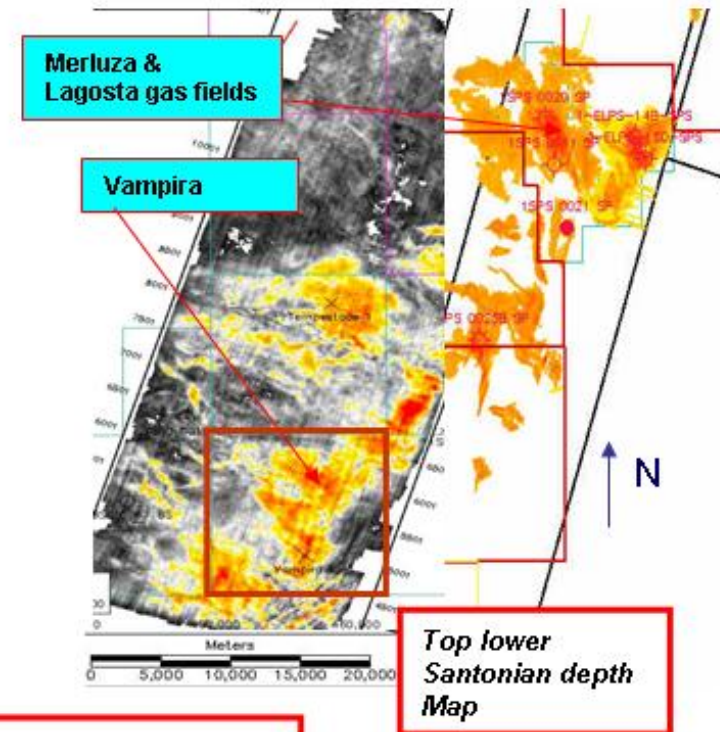
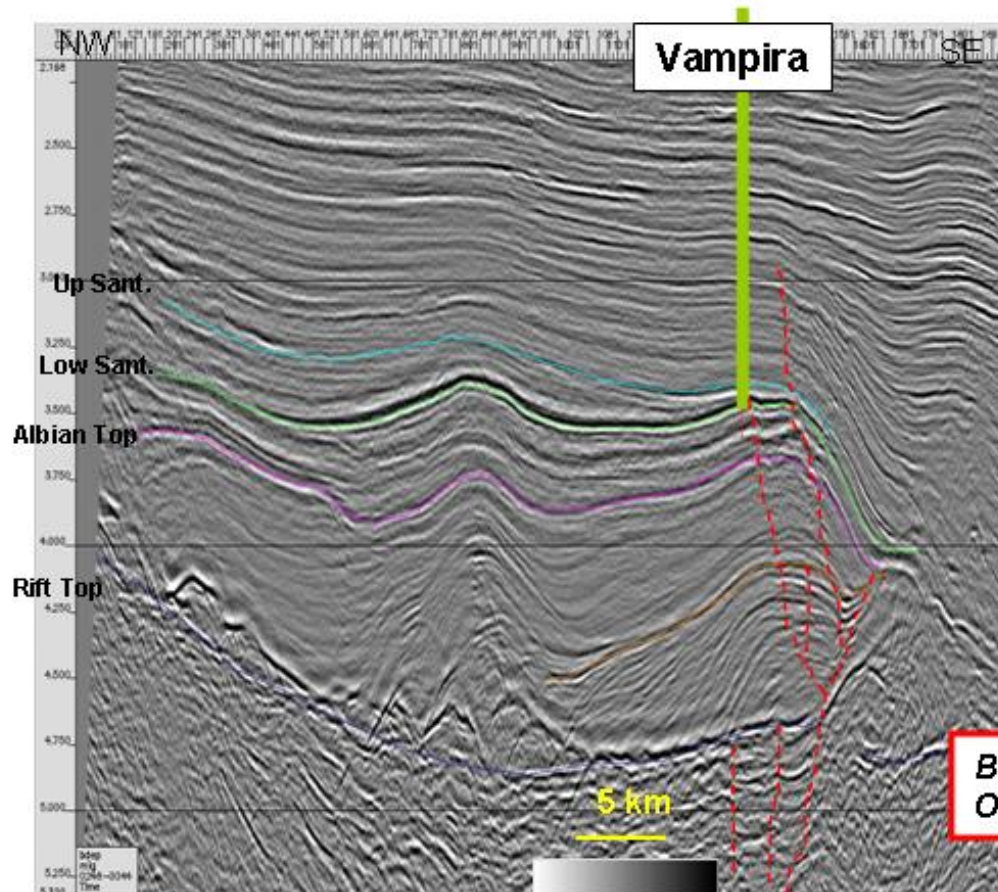


Top lower Santonian depth Map



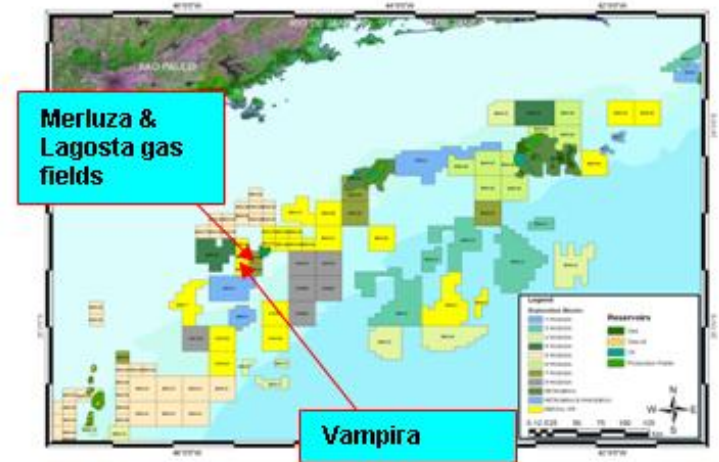
- **Block:** BM-S-48
- **JV:** Repsol 40%(op),Petrobras 35% Woodside 25%
- **Observation:** in Trend with gas field of Mexilhao, Lagosta and Merluza.
- **Expected spud date:** drilling

Santos gas: Vampira Prospect



BM-S-48
OPERATOR: REPSOL 40%

- **Block:** BM-S-48
- **JV:** Repsol 40%(op),Petrobras 35% Woodside 25%
- **Observation:** in Trend with gas field of Mexilhao, Lagosta and Merluza.
- **To be drilled after Panoramix**



Santos Gas: Asterix Prospect

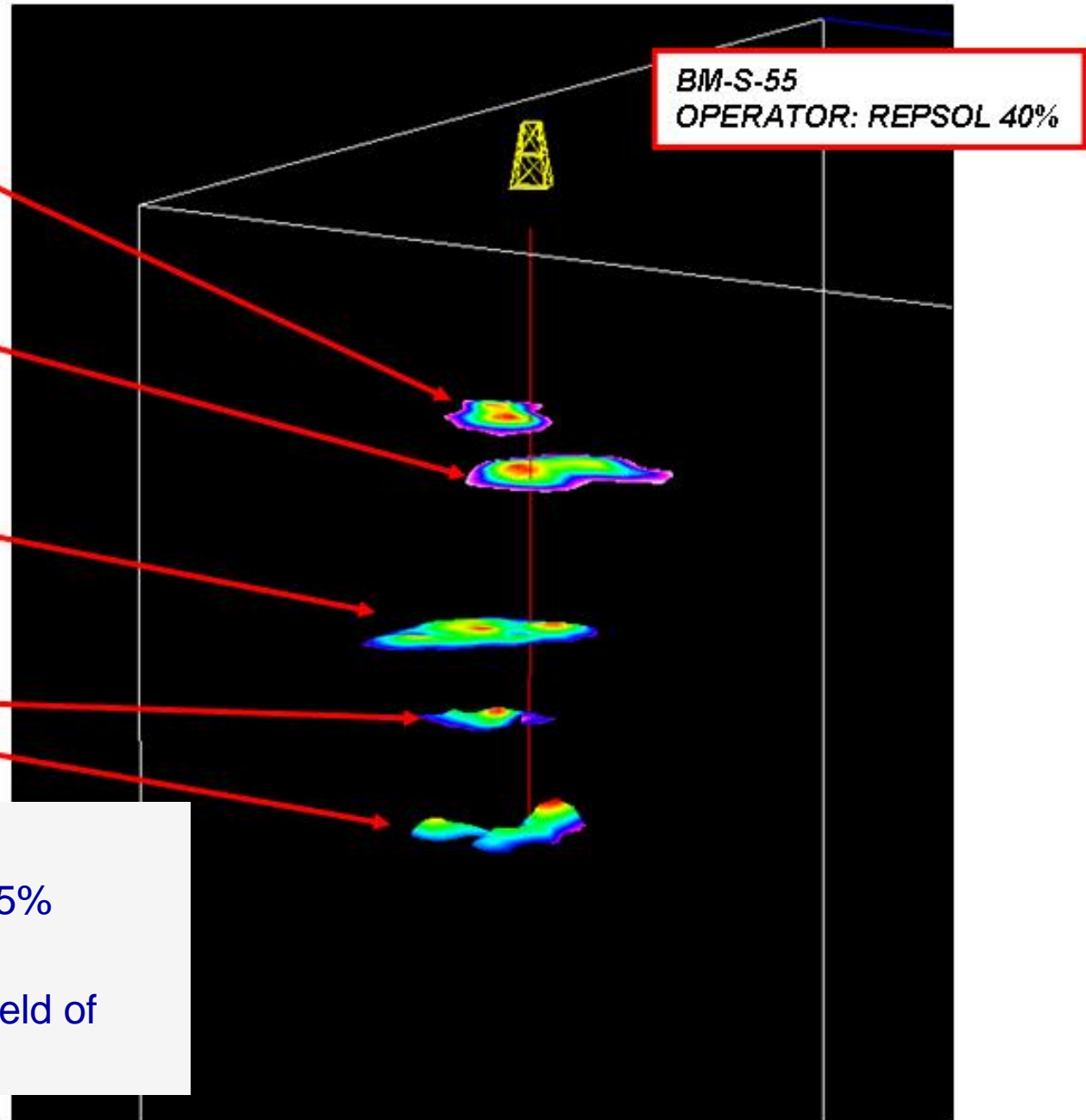


Eocene: Up side

Maastrichtian: Up side

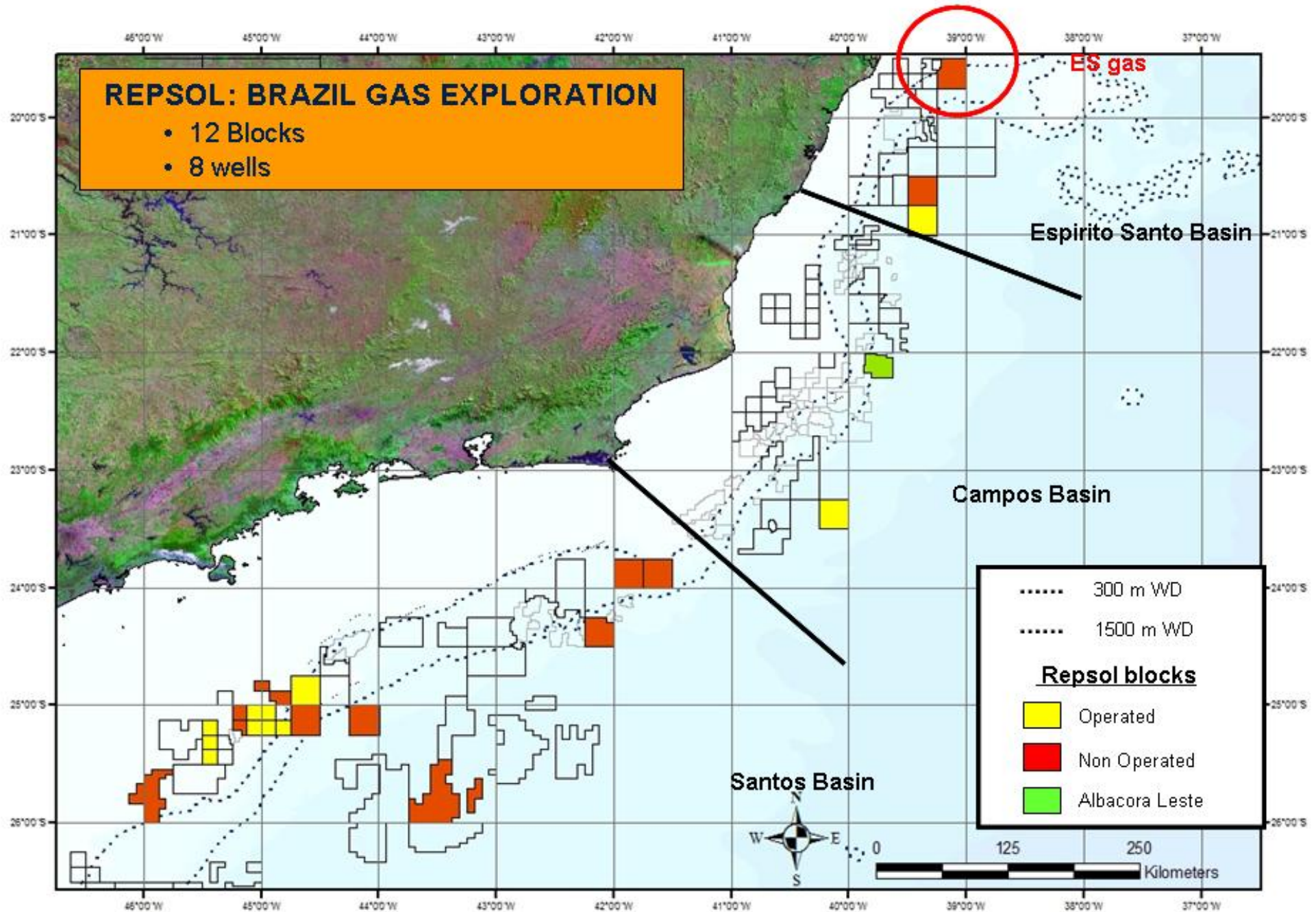
**Up. Campanian:
Up side**

**Top Santonian plus
Lw. Santonias:
Main objectves**

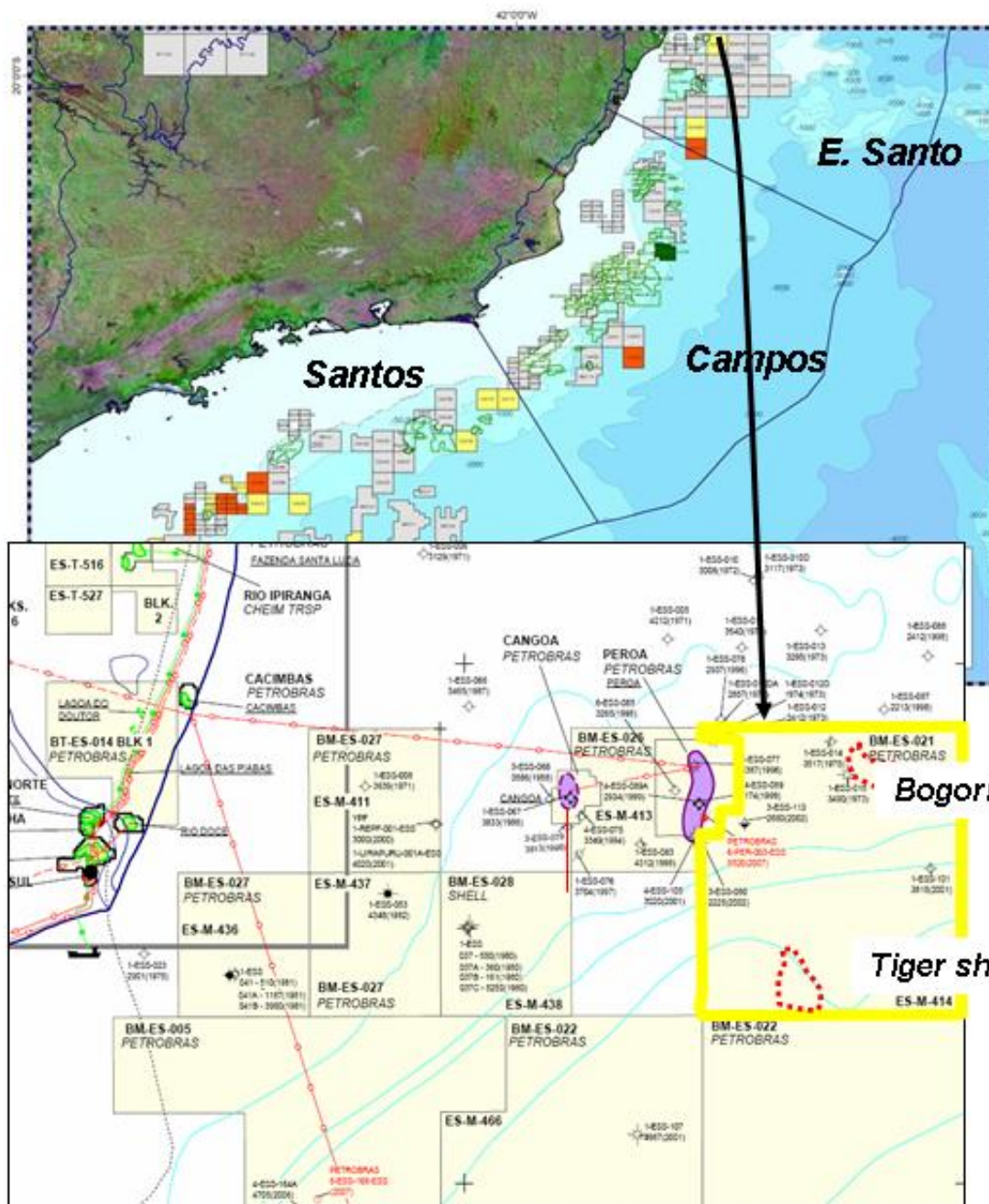


- **Block:** BM-S-55
- **JV:** Repsol 40% (op), Petrobras 35% Woodside 25%
- **Observation:** in Trend with gas field of Mexilhao, Lagosta and Merluza.

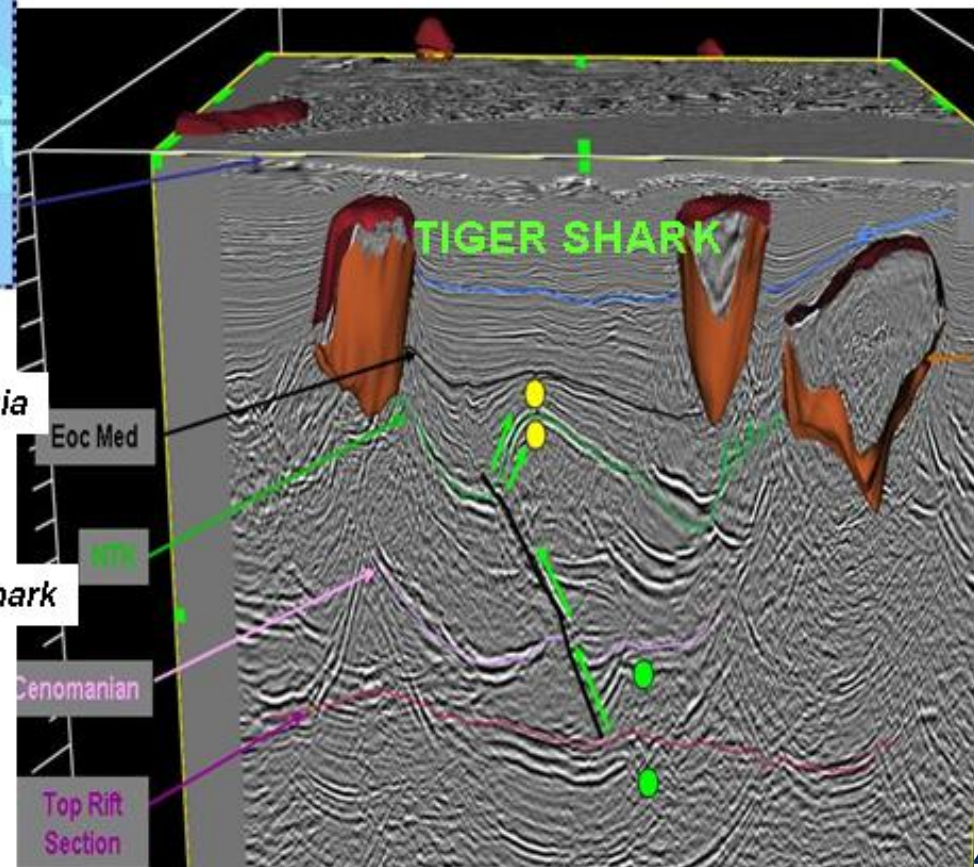
Repsol gas projects location map



Espirito Santo gas: BM-ES-21

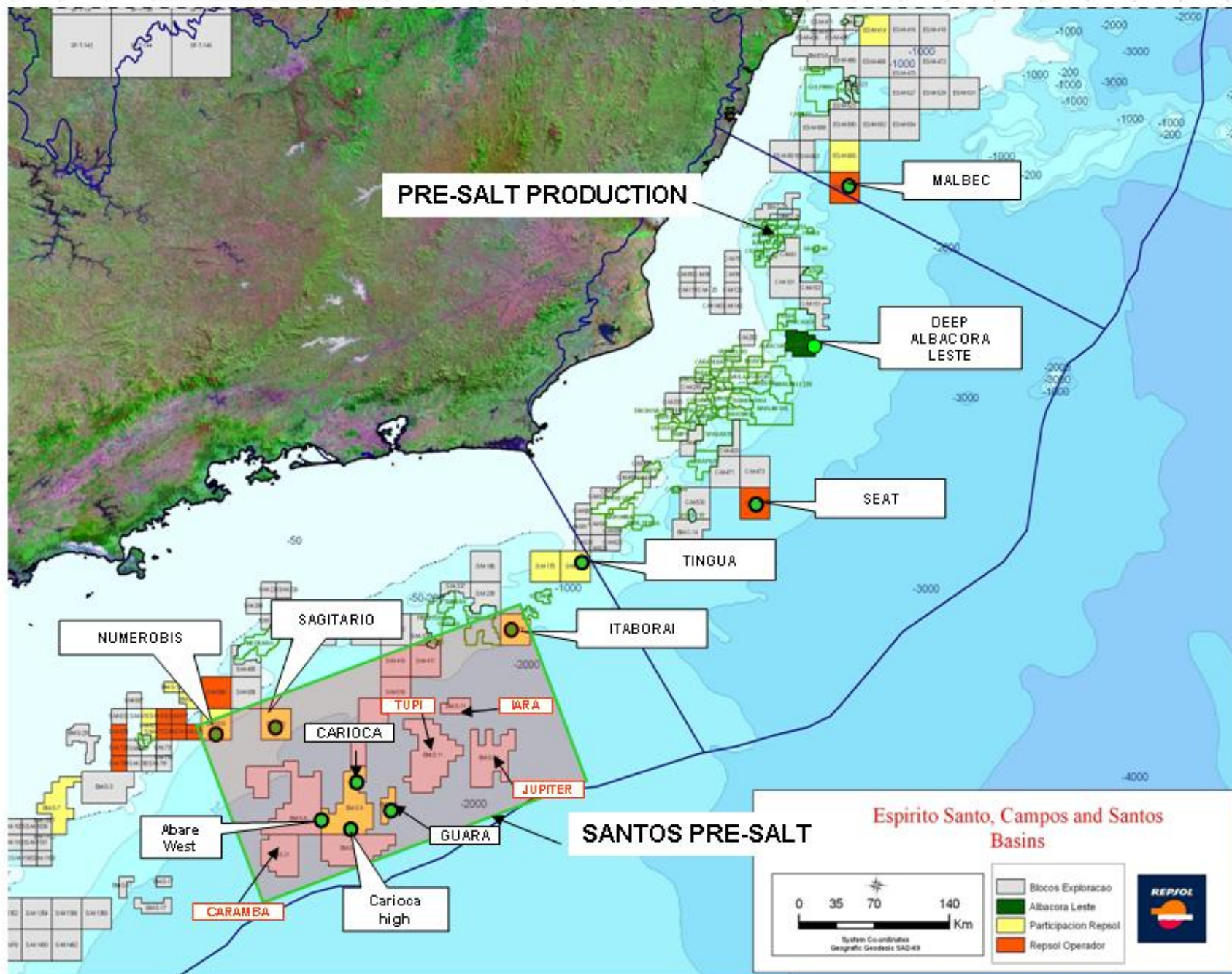


- **Block:** BM-ES-21
- **JV:** Petrobras 80% -Repsol 20%
- **Observation:** It is located in the middle of the facilities
- **Spud date:** First quarter 2009



Oil Project/Pre-salt Play

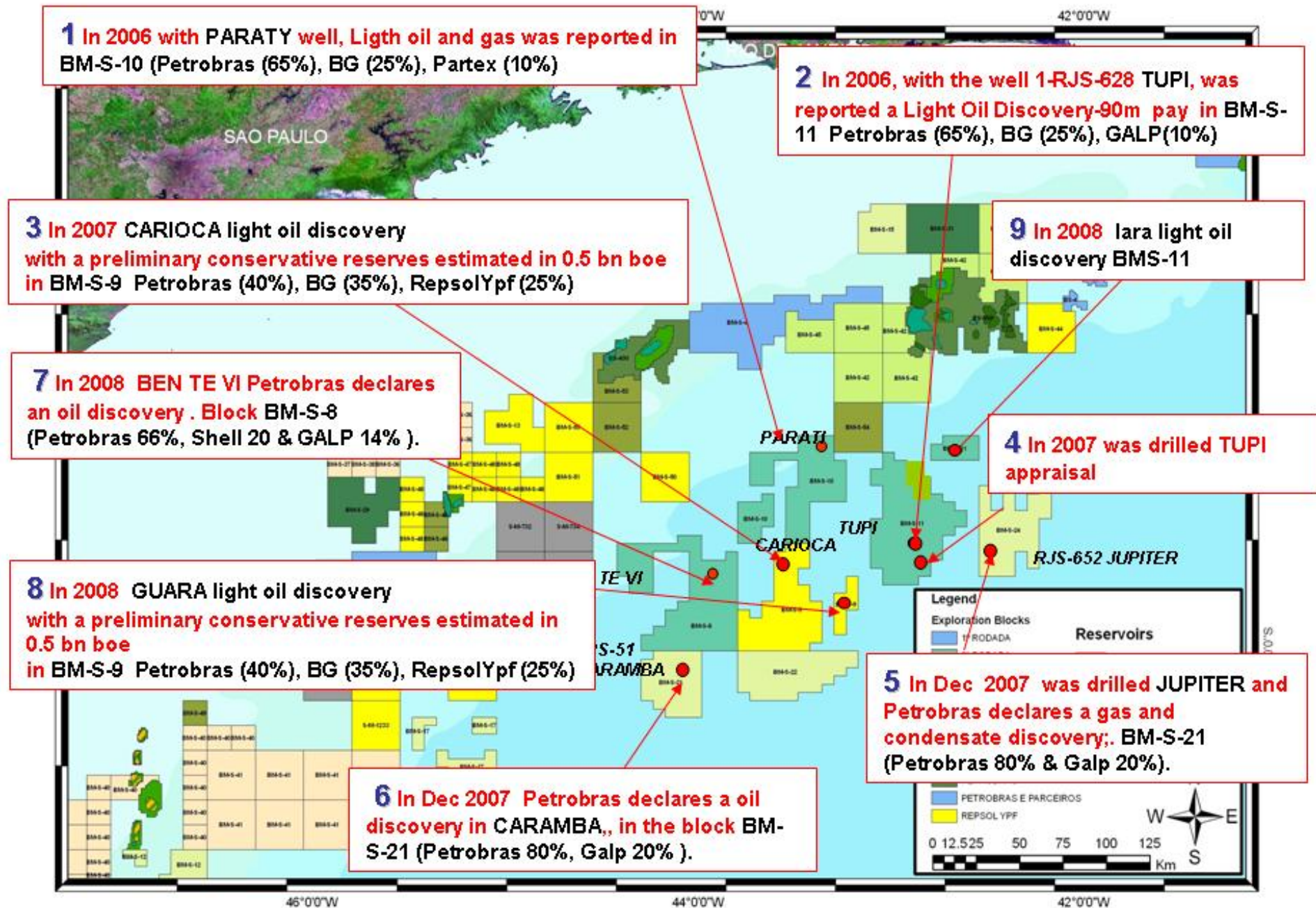
Pre-salt Repsol projects



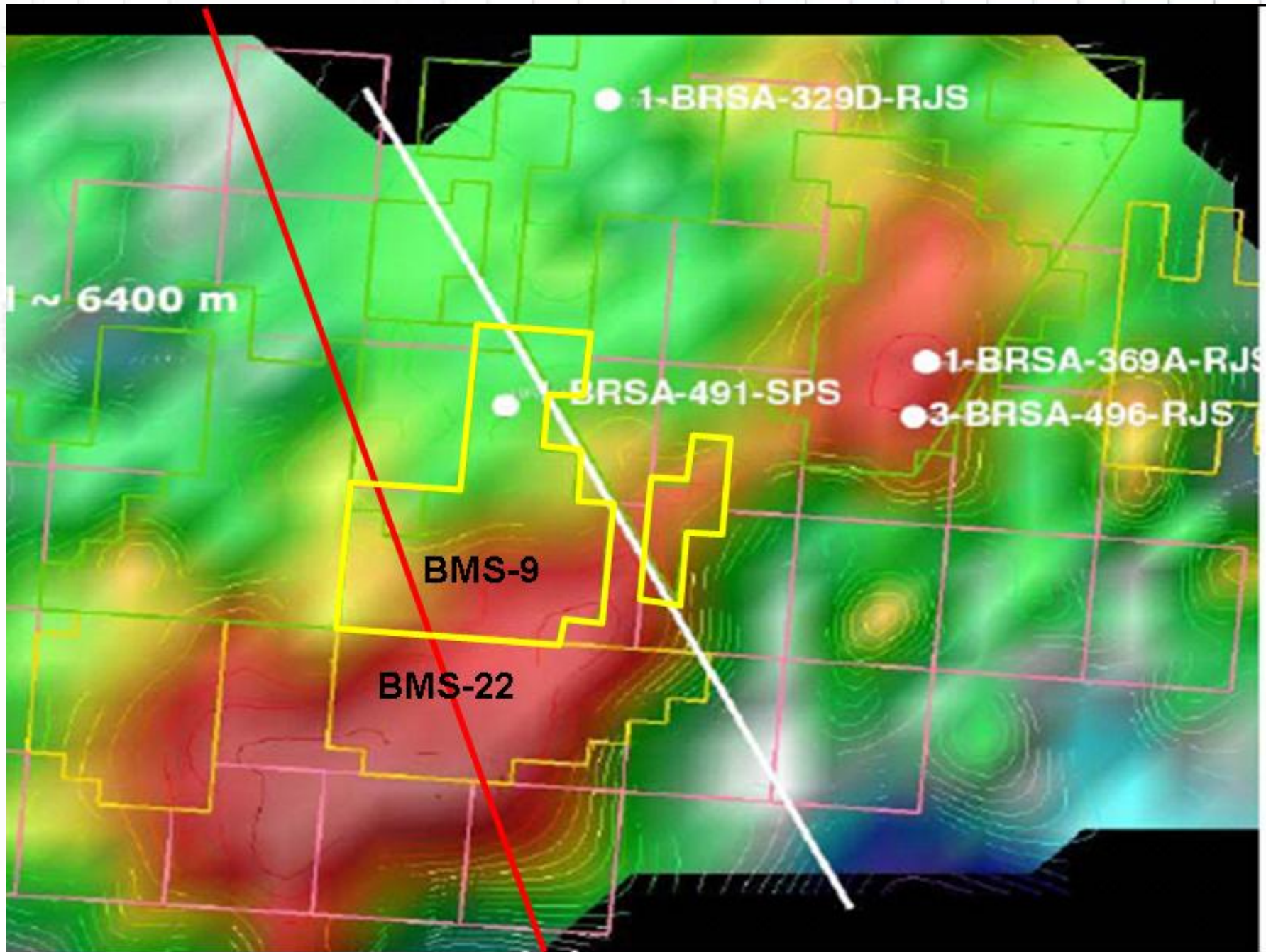
Introduction Santos Basin Pre-salt

- The pre-salt play in the “Sugar Loaf” area was drilled for the first time in 2006 (Parati well BMS-10).
- Up to now, 9 wells have been drilled in this area, all successful.
- Eight of them result as light oil discovery and one (Jupiter) as gas and condensate discovery, in a carbonate reservoir located below a thick salt section that ensure the sealing effect and the integrity of the structure.
- Guara is the last drilled well participated by Repsol and resulted as oil discovery. The well is located between Carioca and Tupi discoveries in the BMS-9 block and Repsol participation is 25%.

Santos Pre-salt Exploration



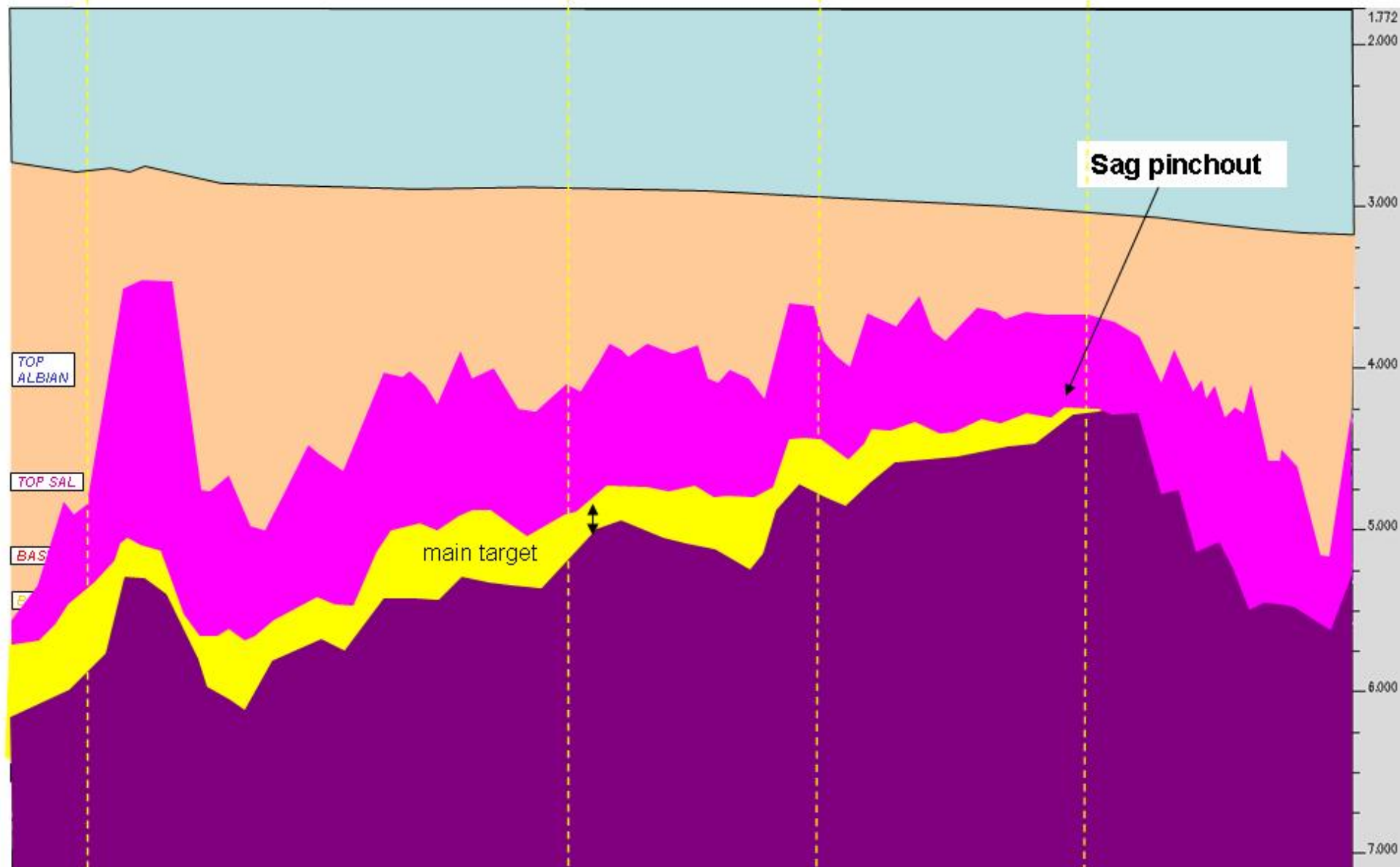
“Sugar Loaf” salt base structural map (source ANP)



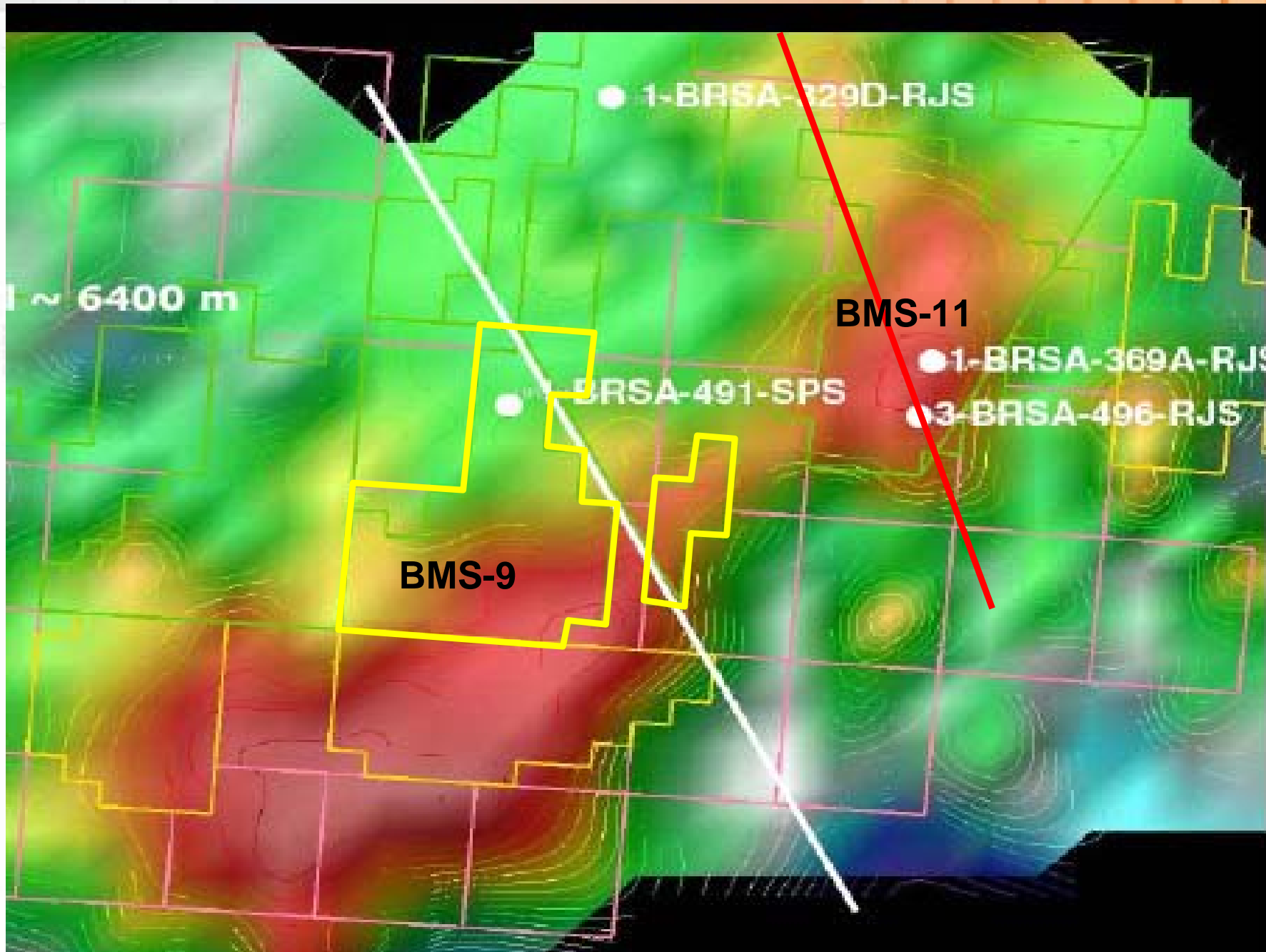
**BM-S-08
BLOCK**

**BM-S-09
BLOCK**

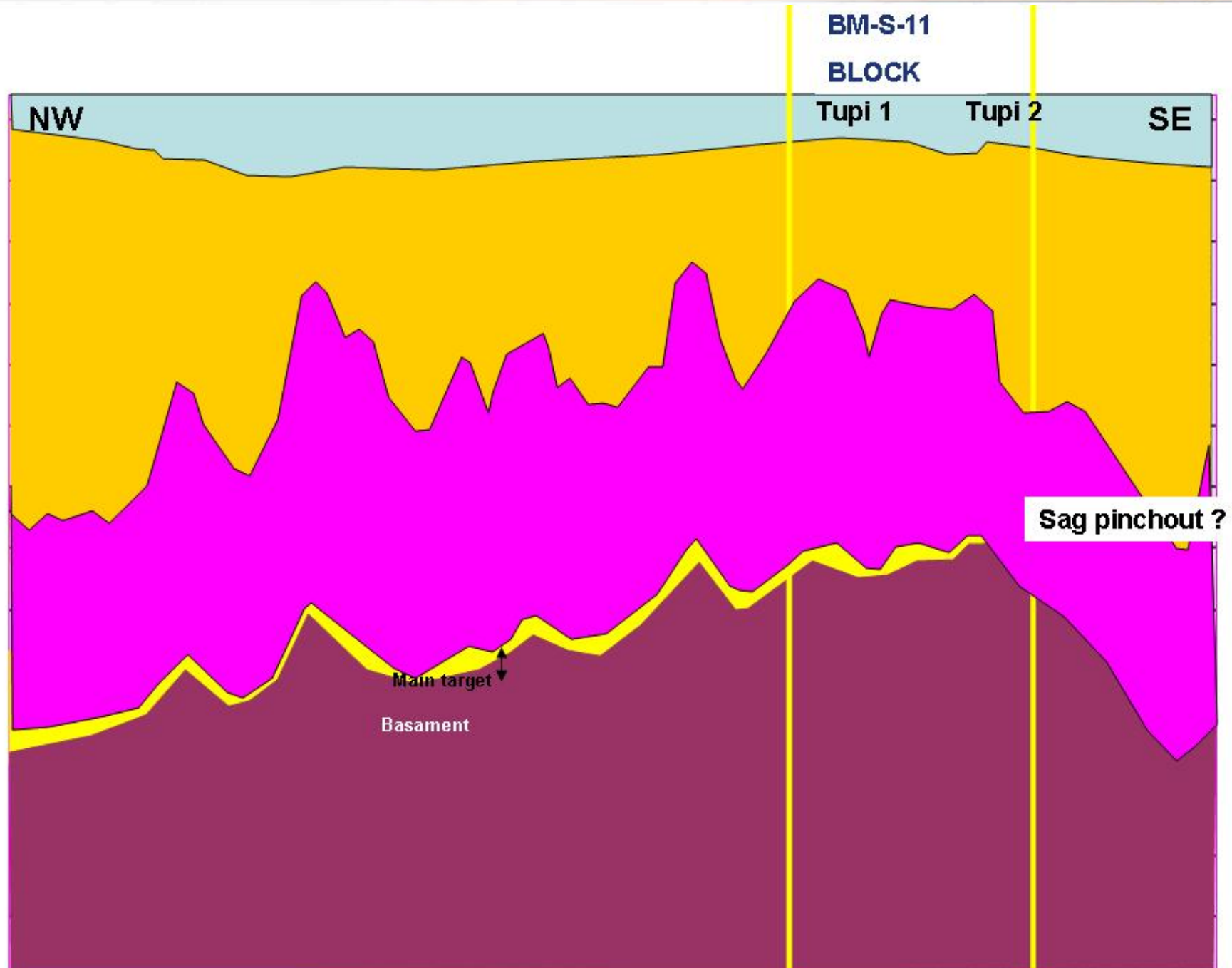
**BM-S-22
BLOCK**



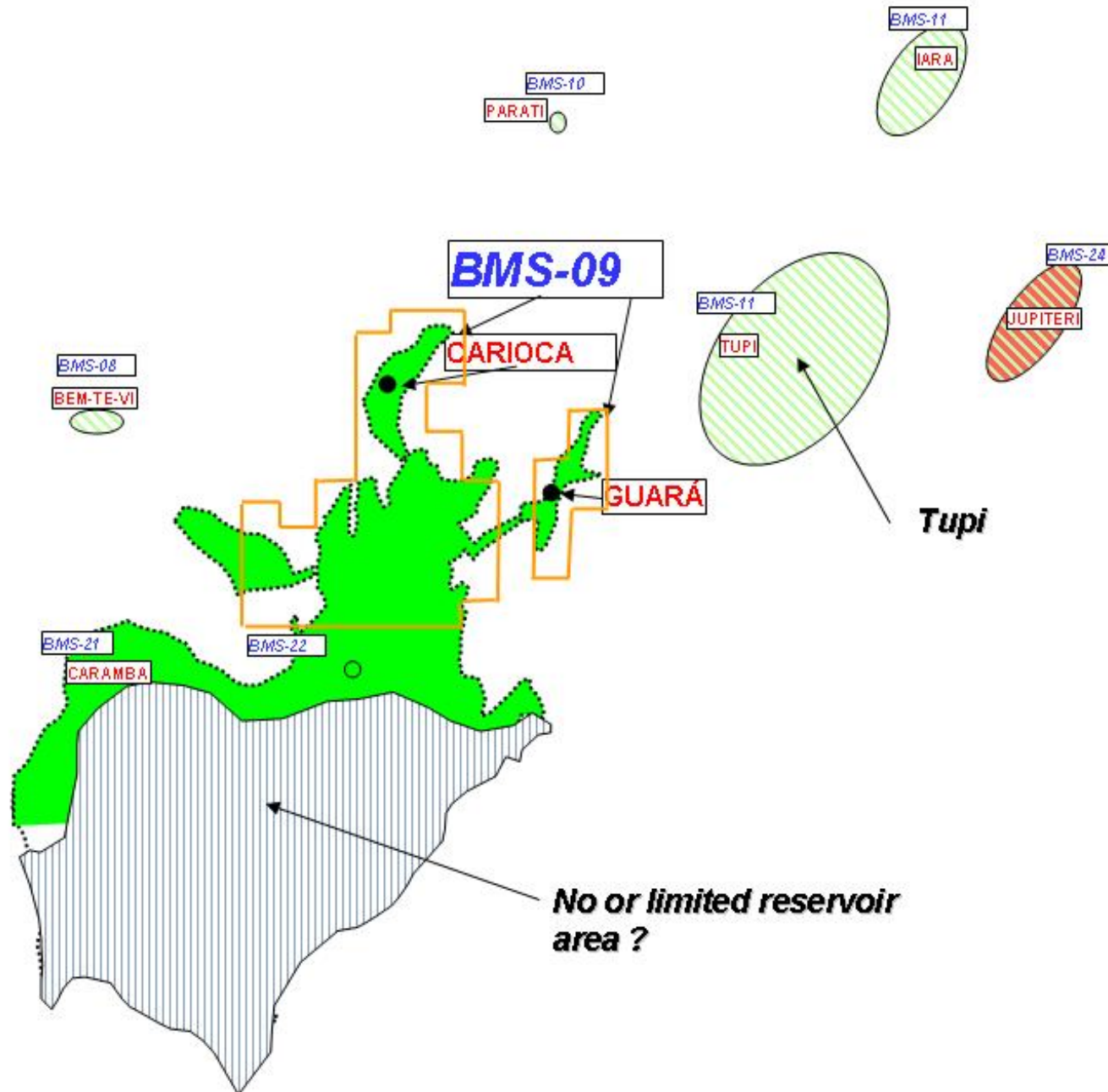
“Sugar Loaf” salt base structural map (source ANP)



Regional Seismic Section-Tupi Discovery

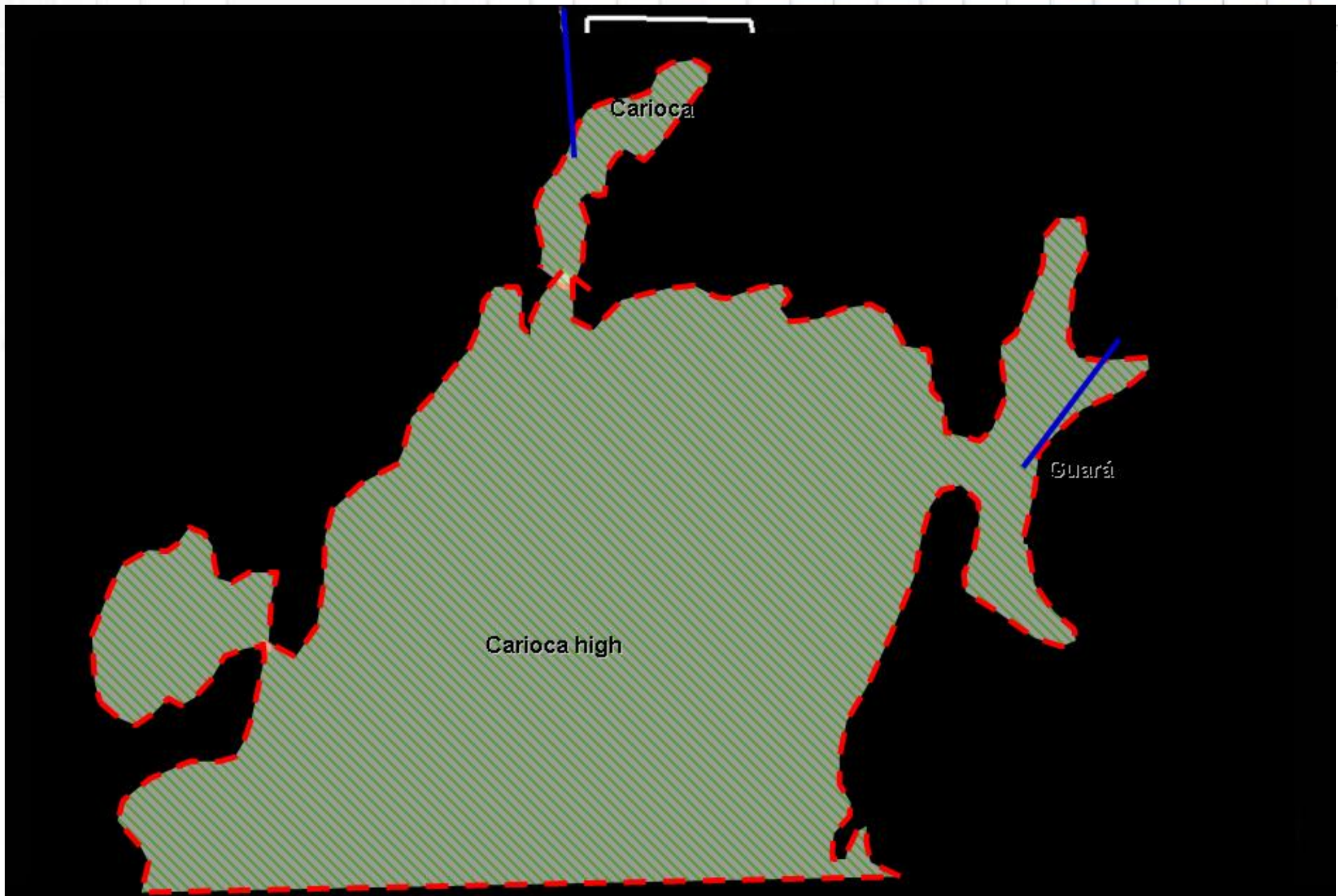


Sugar Loaf structure

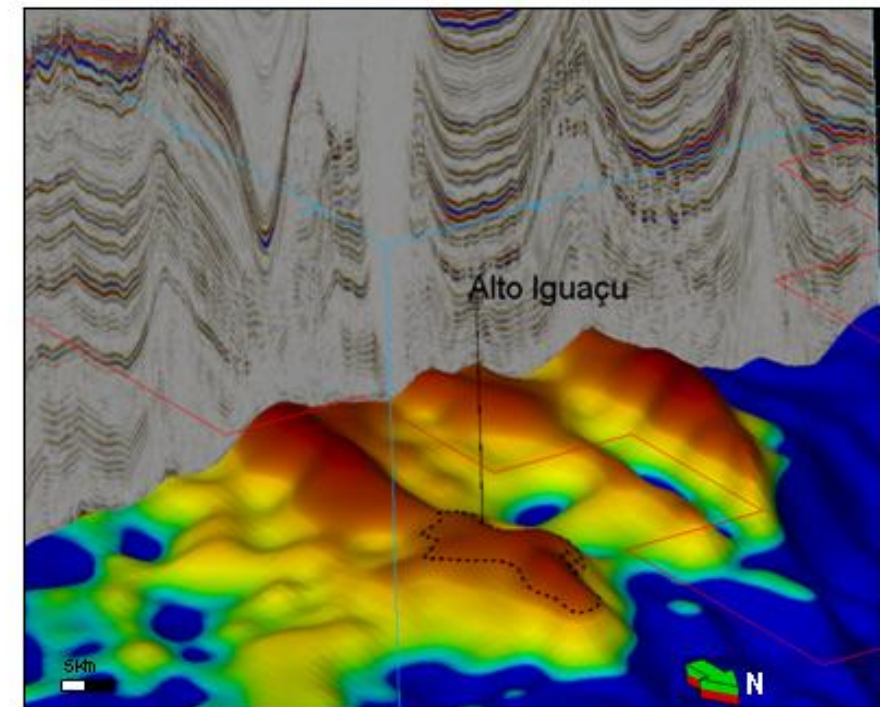
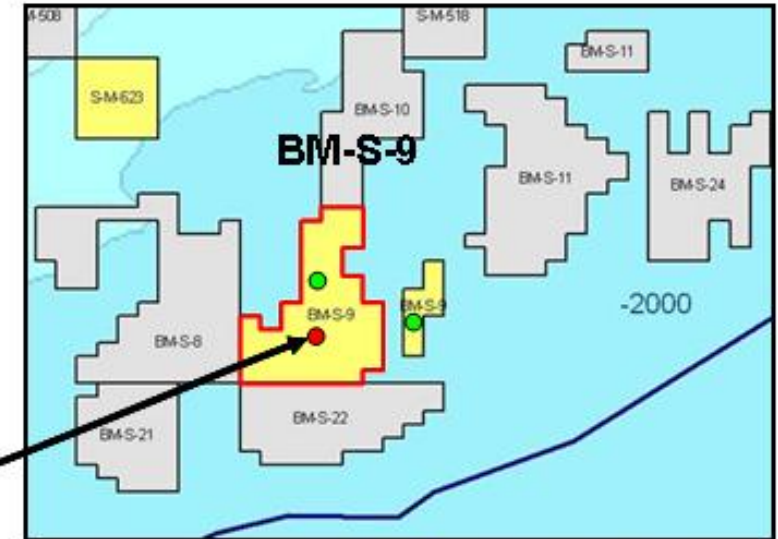
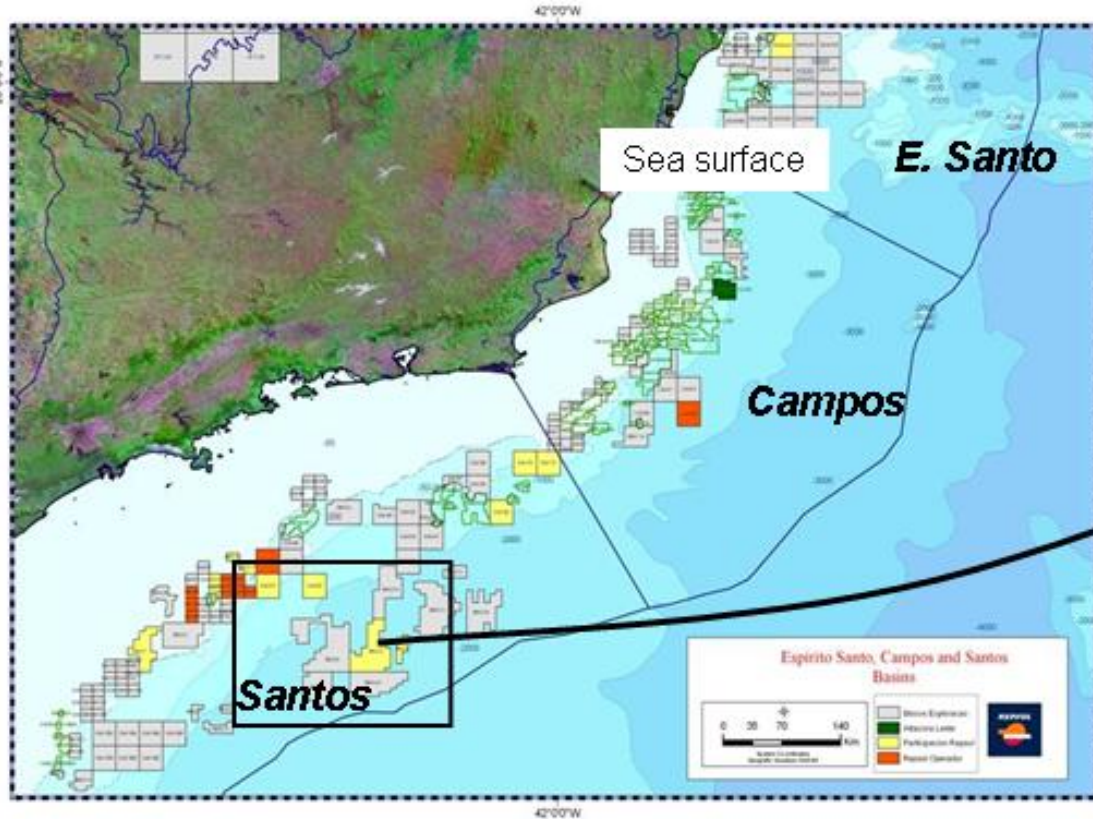


BMS9 – upside

Calculated reserves between 2000 and 8000? MMBOE



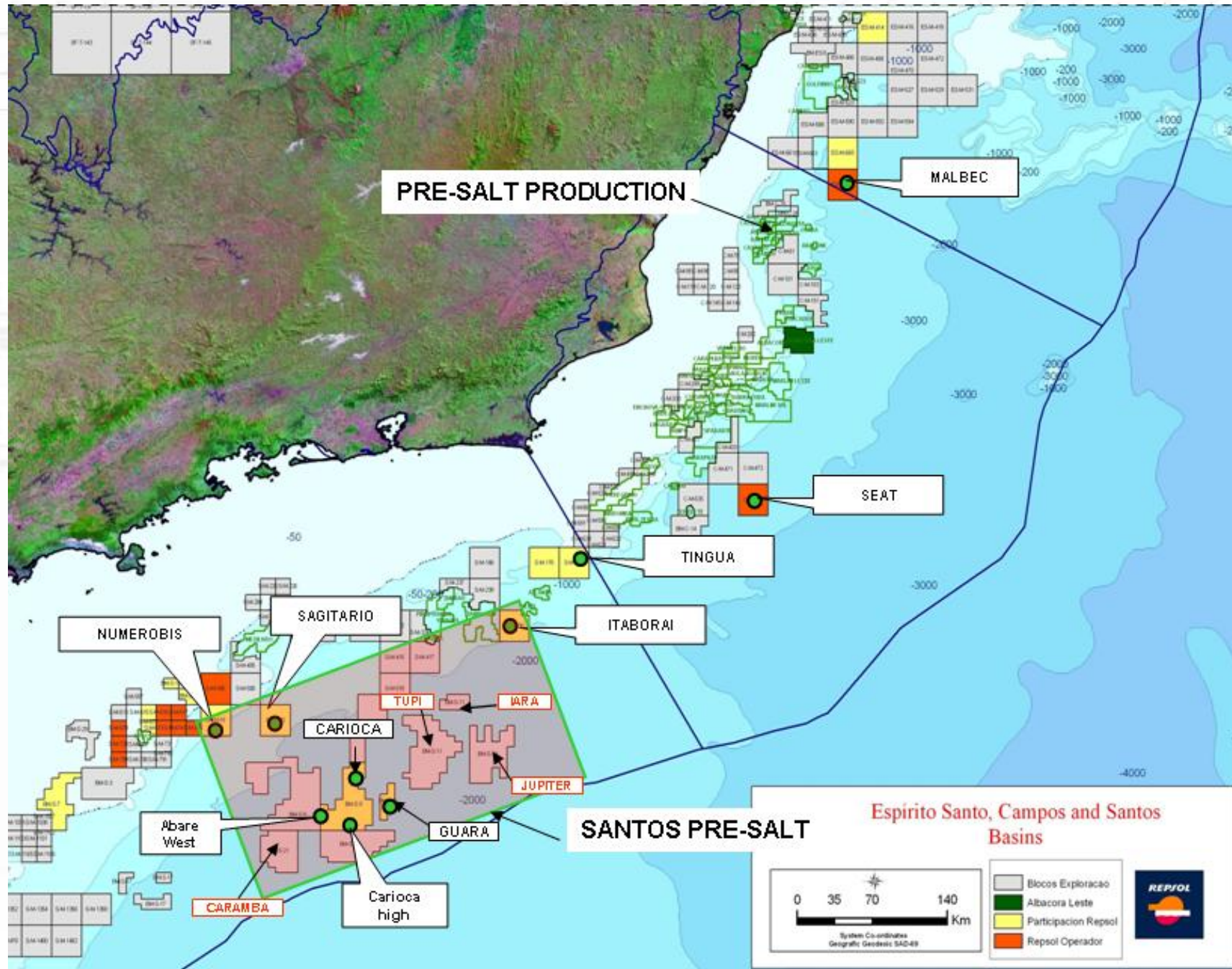
Carioca high (Alto Iguaçu well)



- **Block:** BM-S-9
- **JV:** Petrobras 45% - BG 30% - Repsol 25%
- **Spud date:** First semester 2009
- **WD:** 2,131m
- **TD:** 5,560 m

- The “Sugar Loaf” play has huge reserves potential, billions barrels yet to find
- Not always higher structure will correspond to the bigger volumes
- Actual resource situation (like availability of rigs or technical personnel), project size and high technology needing will require to joint force and work in partnership
- Big investments, high tech: not everybody turf

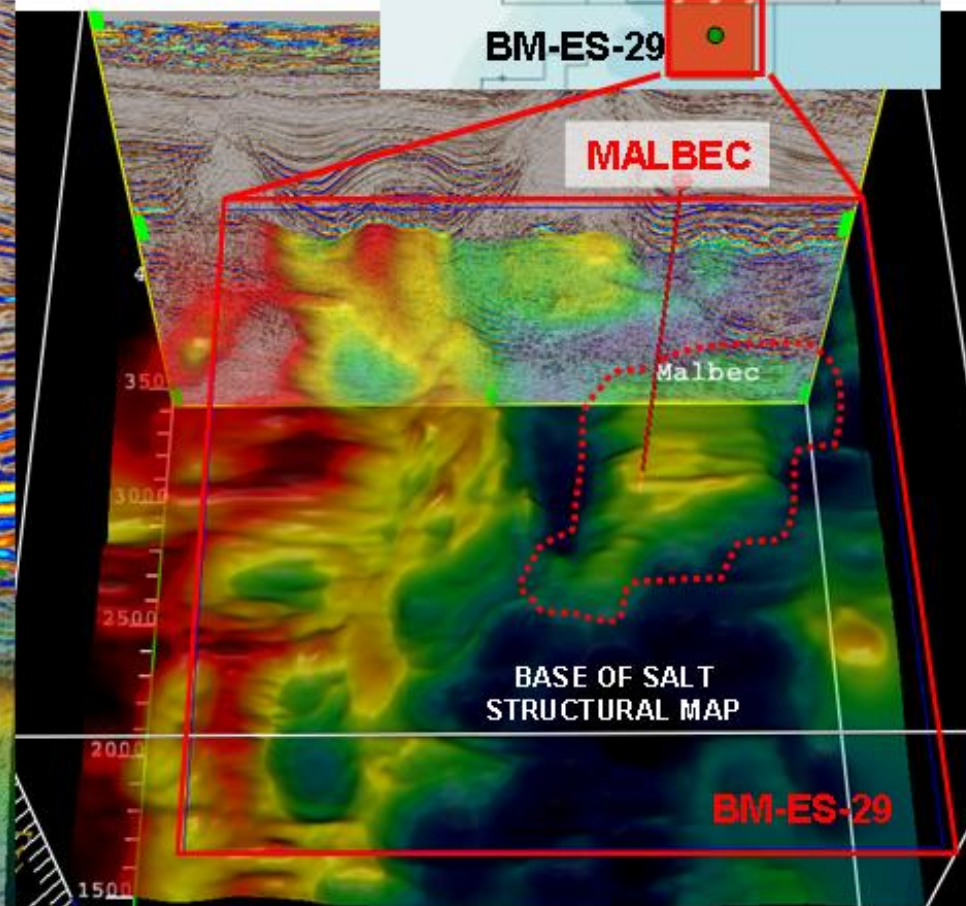
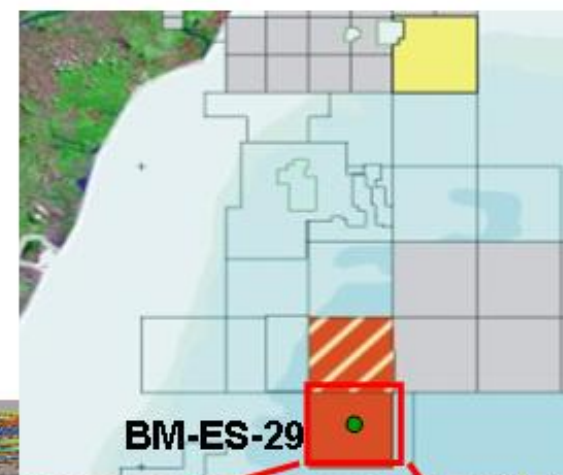
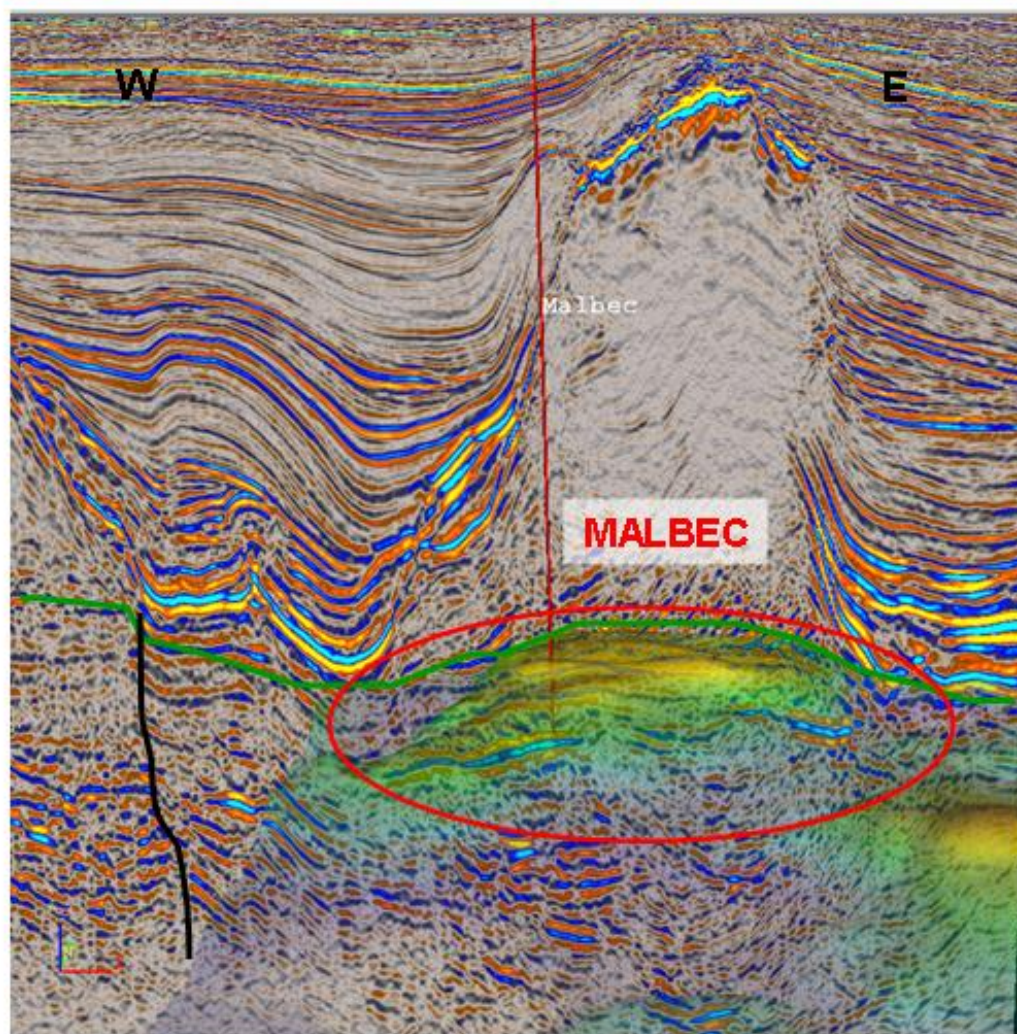
Pre-salt Repsol projects



BM-ES-29 Malbec Prospect



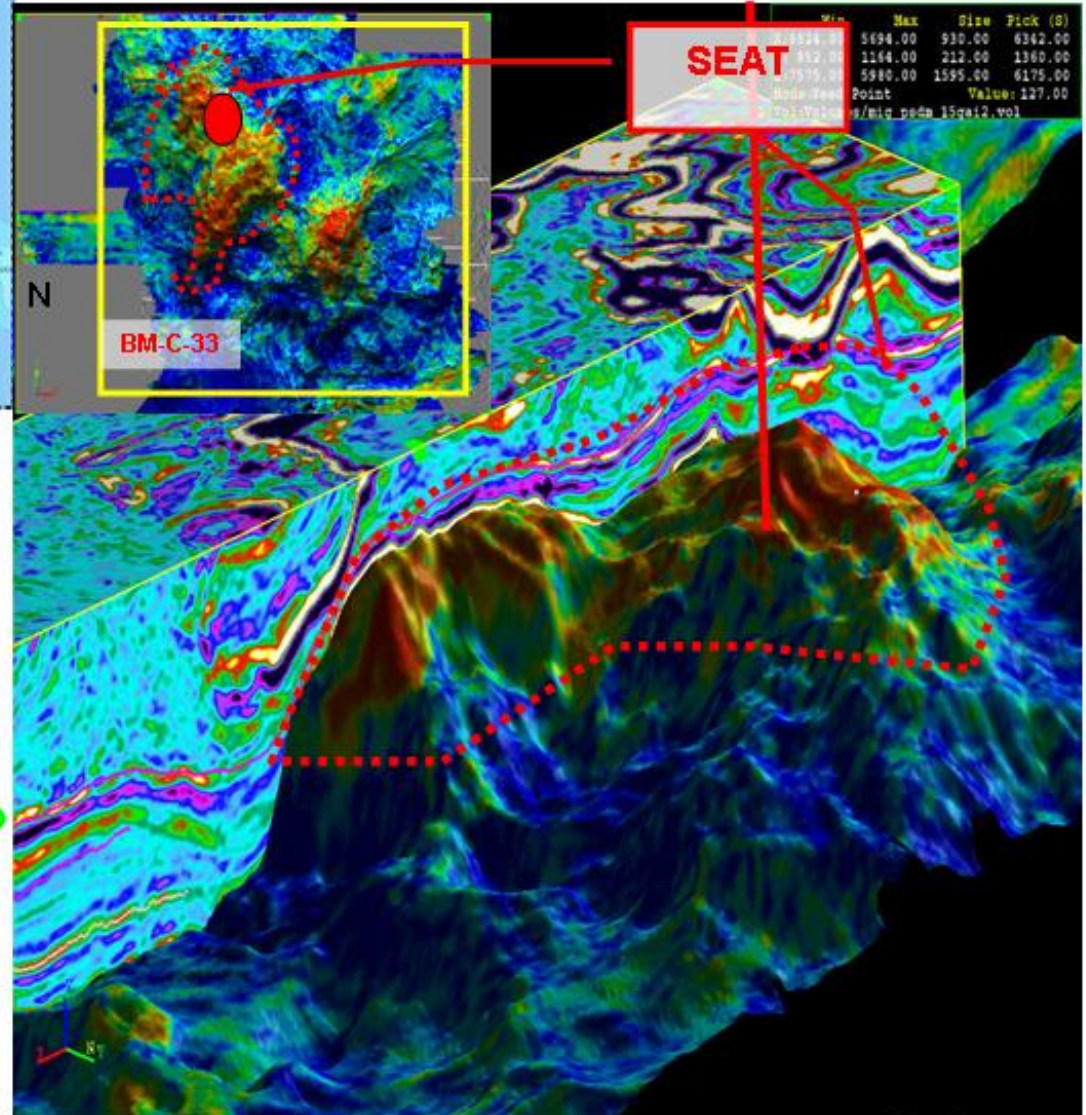
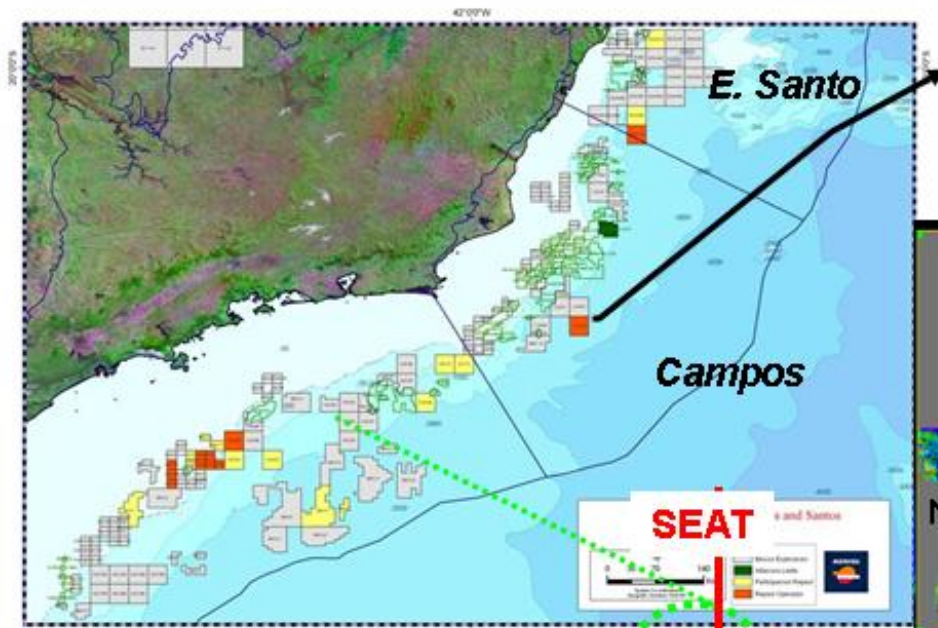
REPSOL 100%



BM-C-33 Seat Prospect



- **Block:** BM-C-33
- **JV:** Repsol 50% (op) - StatoilHydro 50%
- **Spud date:** second half 2009



SANTONIANO

BASE DE SAL



Exploration

North America & Brazil

Creating the future

Roberta Camuffo

North America & Brazil Exploration Director

Repsol YPF

Houston Investors Field Trip

December 2008

REPSOL



Addressing the Challenge of Evolving Technology

Francisco Ortigosa
Geophysics Director

Repsol YPF
Houston Investors Field Trip

December 2008

Disclaimer



Safe harbour statement under the US Private Securities Litigation Reform Act of 1995

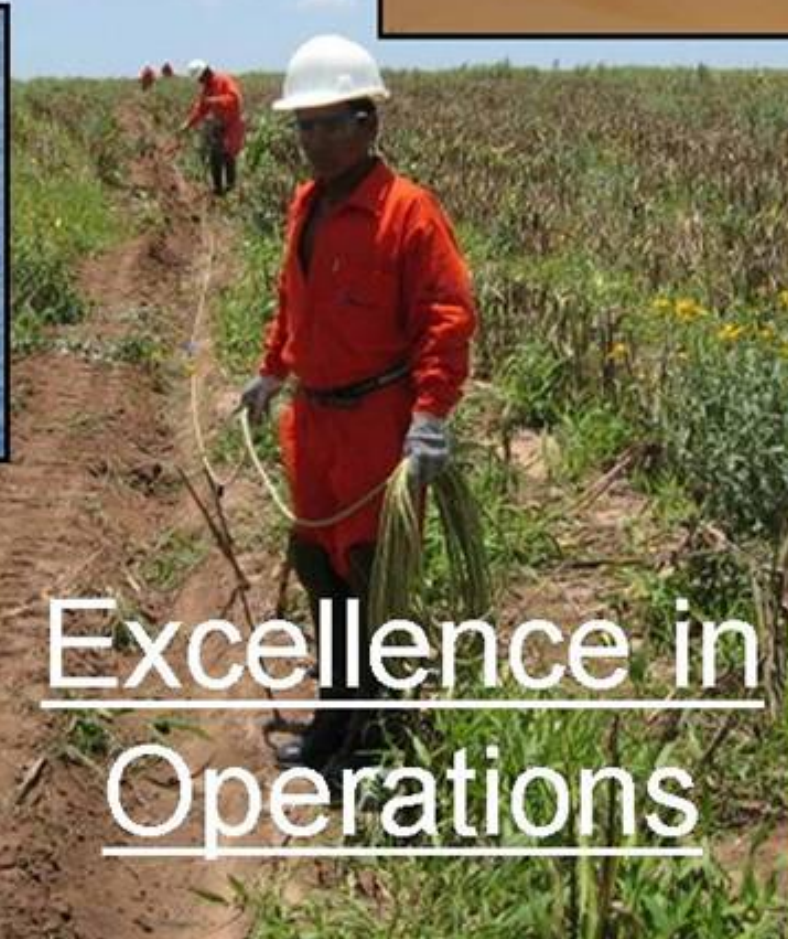
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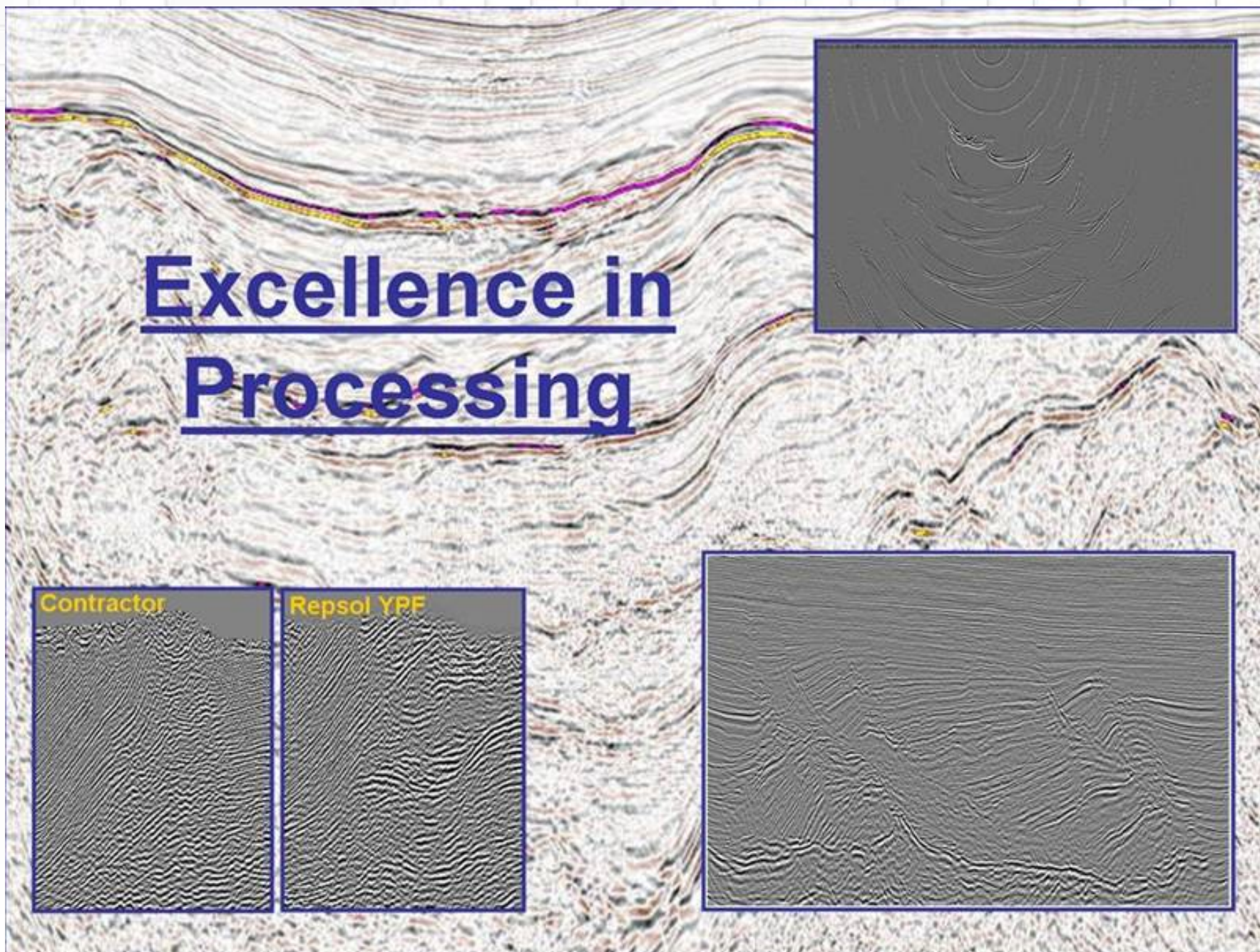
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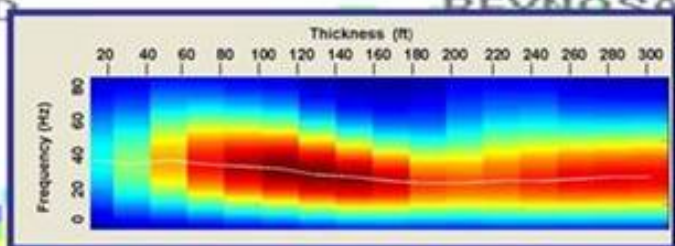
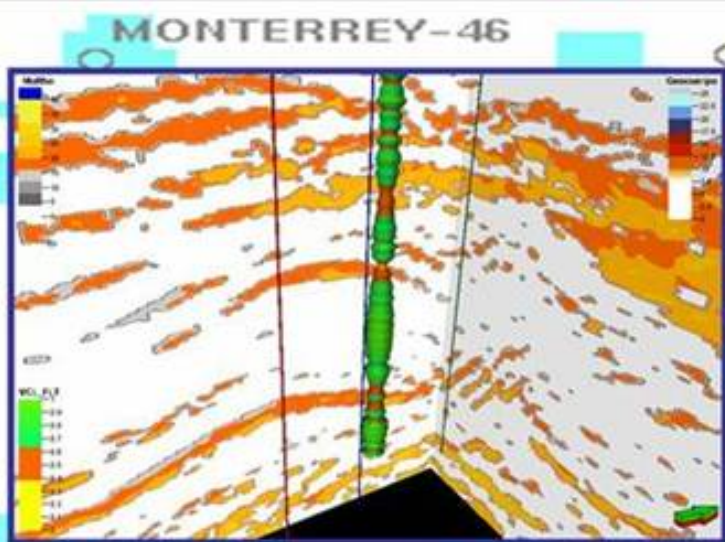
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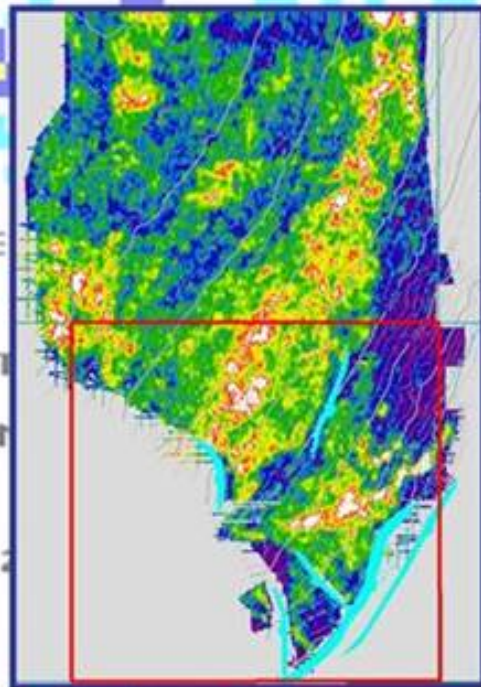
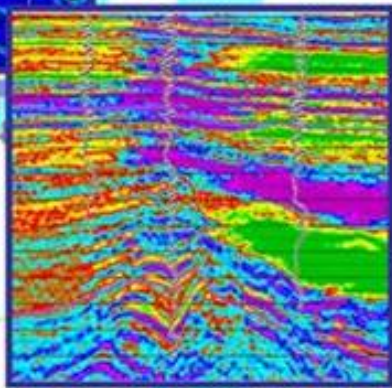
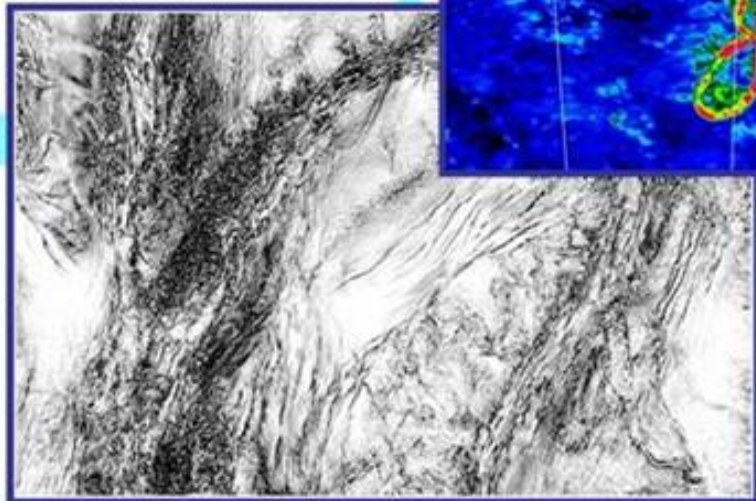
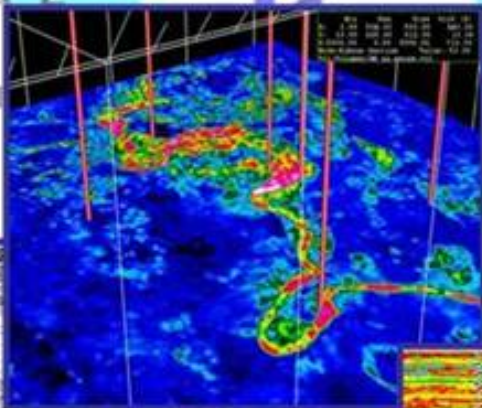
Excellence in Operations

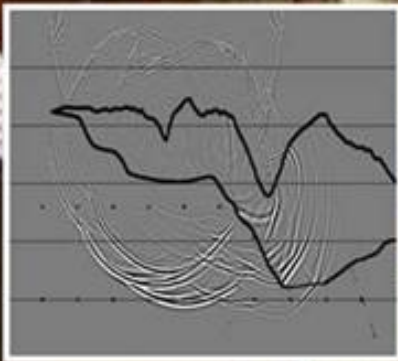
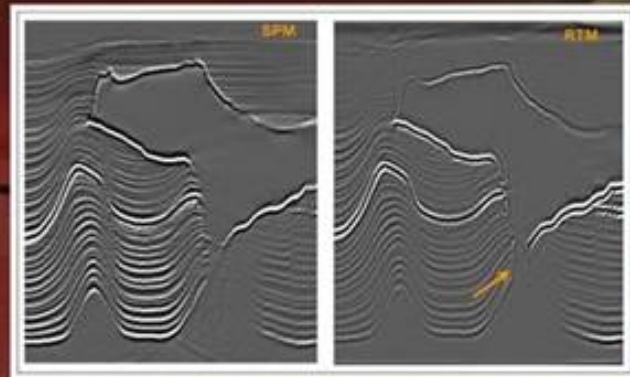
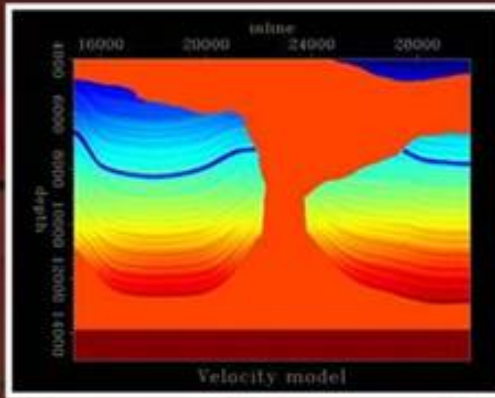
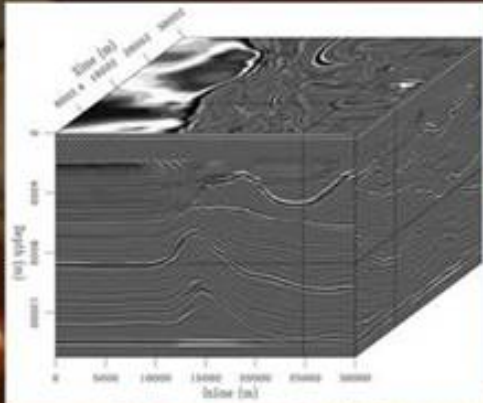
Excellence in Processing



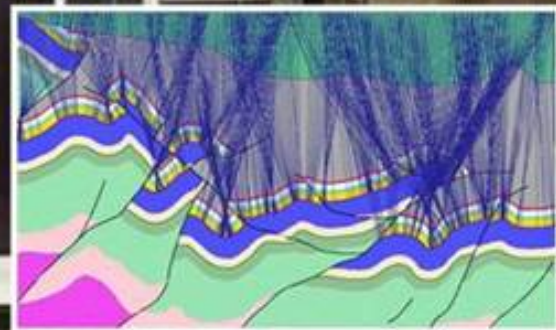
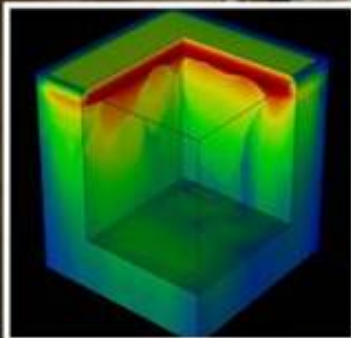
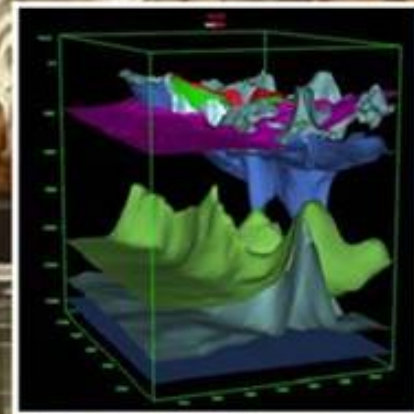


Excellence in Attributes





Excellence in Innovation



Our Challenges: the two sides of the same coin



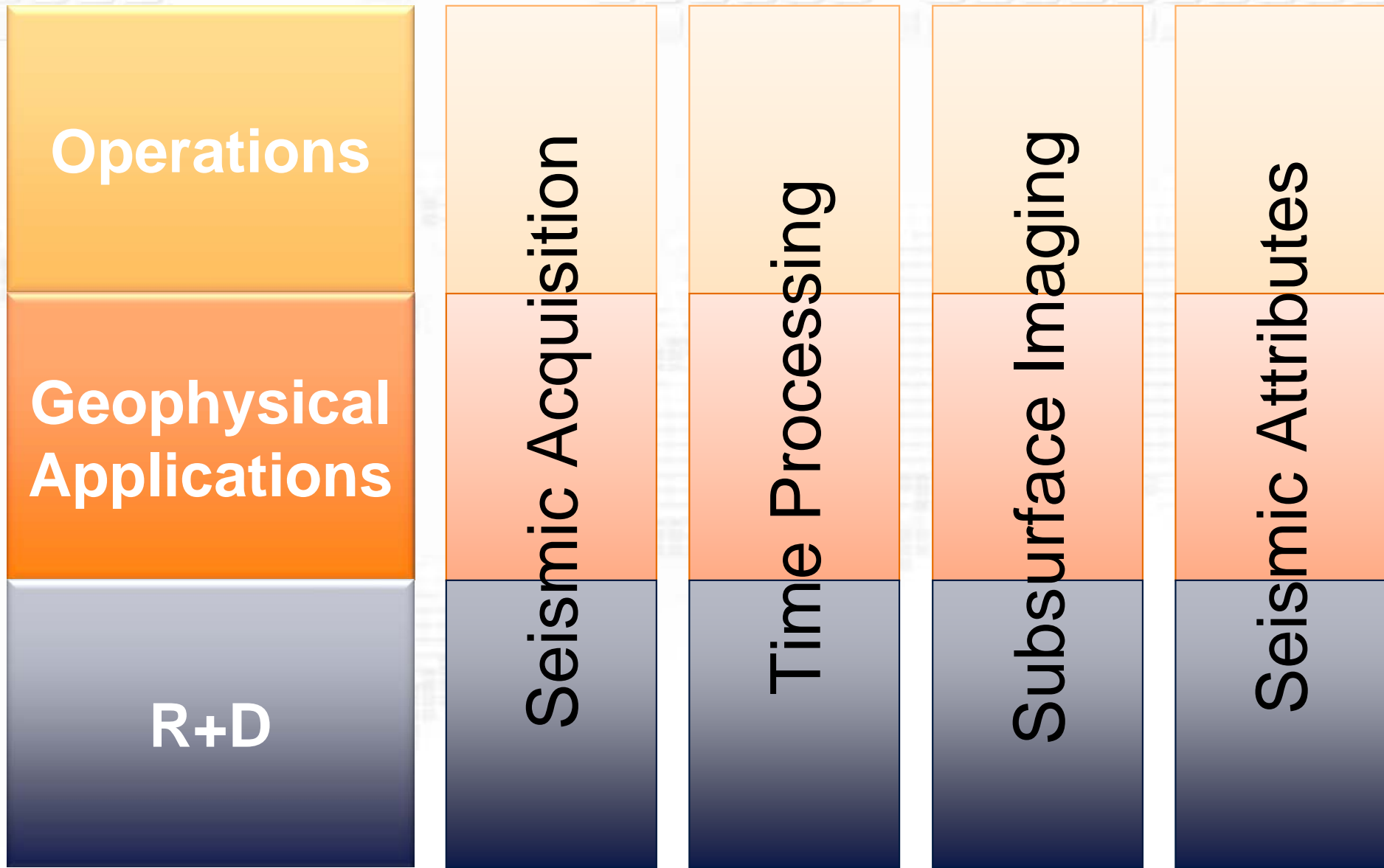
Technological Challenge

We pursue the best subsurface images in areas with irregular topography and/or, complex near surface and/or subsurface with complex structure.

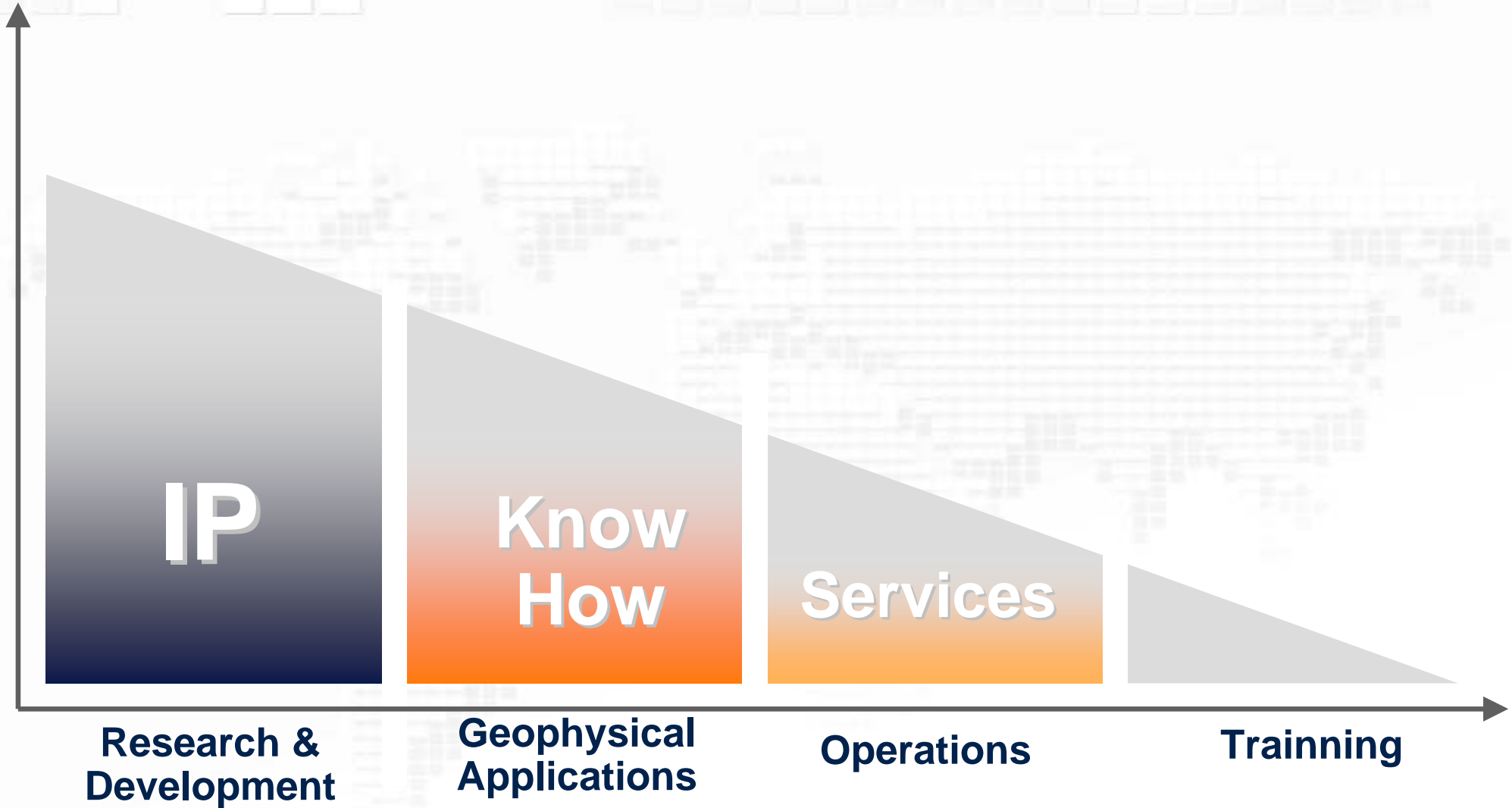
Operational Challenge

We operate geophysical data acquisition from deserts to forests, mountains to offshore, with the maximum possible HSE and technological standards.

The right Organization to face the challenges



Sources of Value

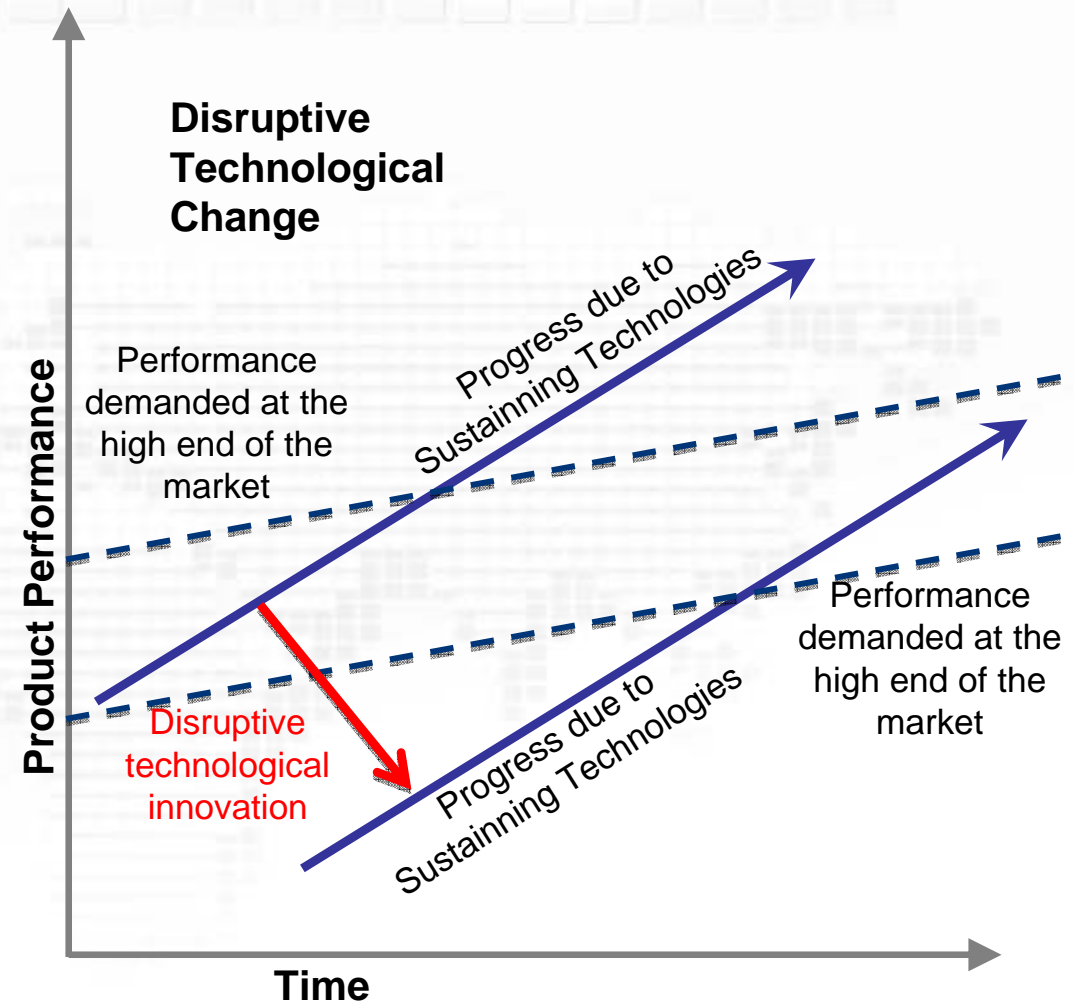
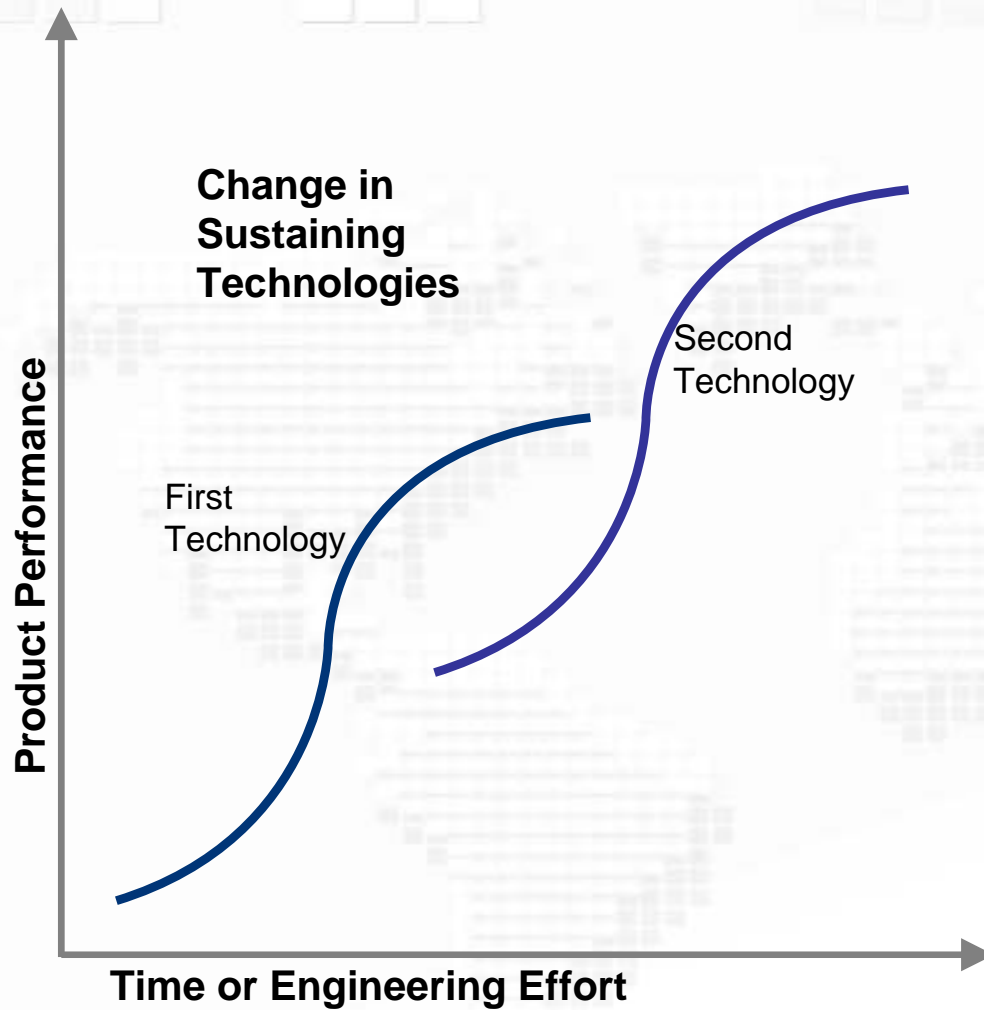


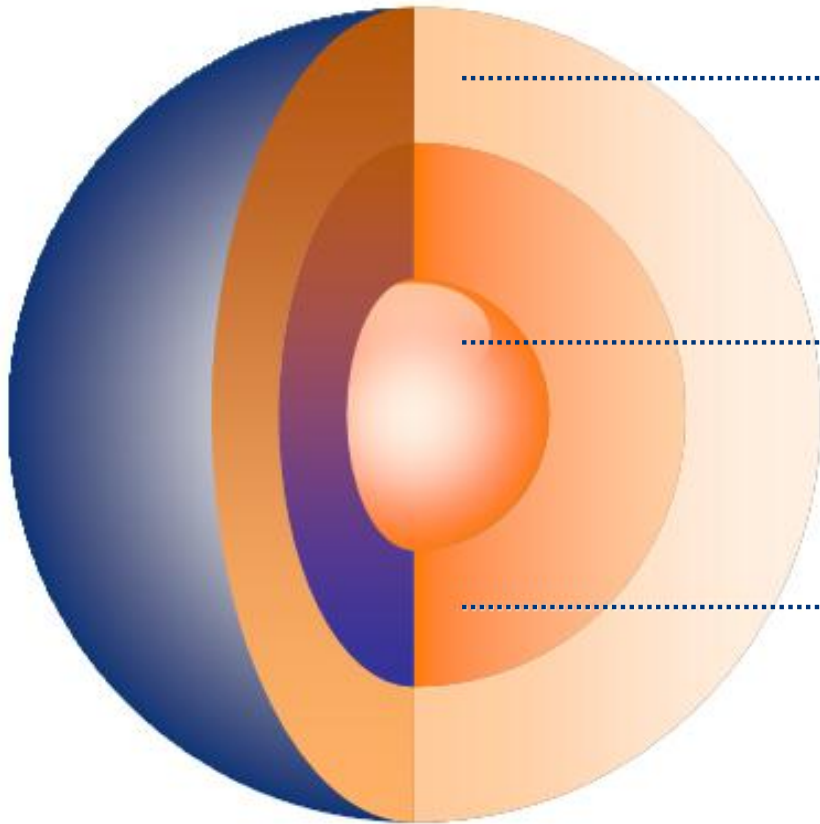
Innovation in Geophysics



The road to Growth

Sustaining vs. Disruptive Innovation



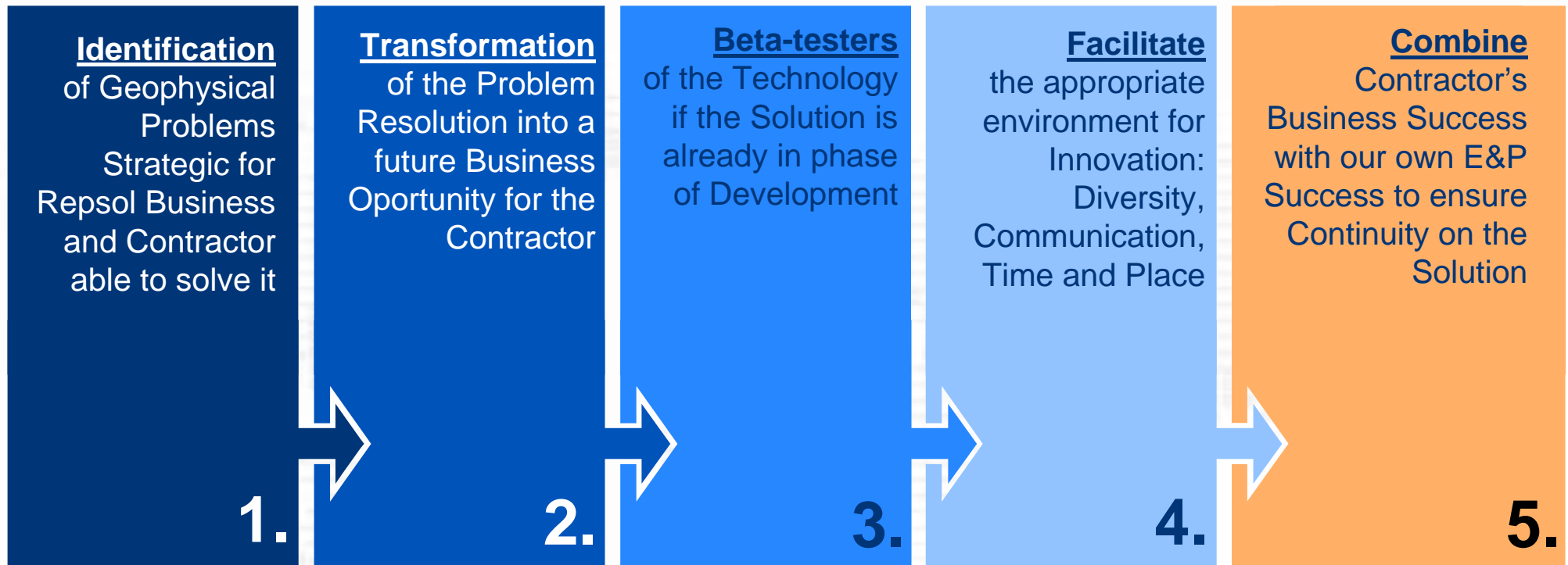


Specialist Sphere: Sustaining Innovation. Client Driven. Operations.

Trend Creators

R+D Sphere: Disruptive Innovation. Process Driven. Innovation and Special Projects.

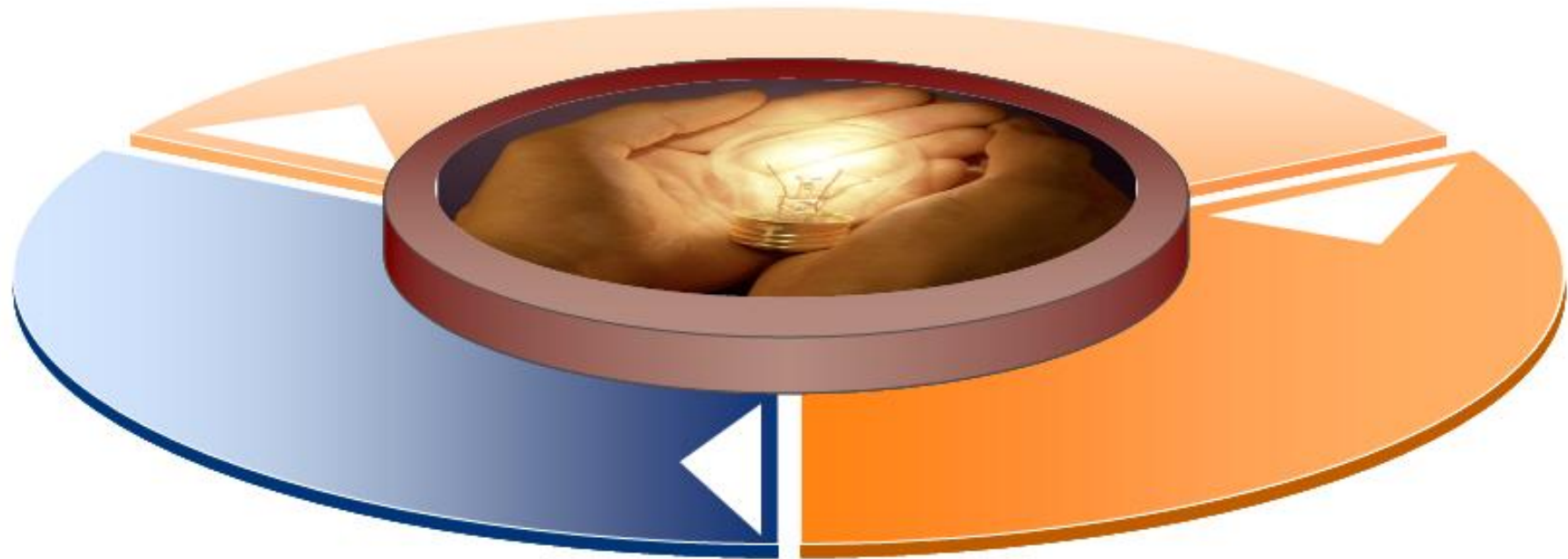
Strategy “One Step Ahead of the Market”



Preconditioning Innovation



1 Diversity of Thinking

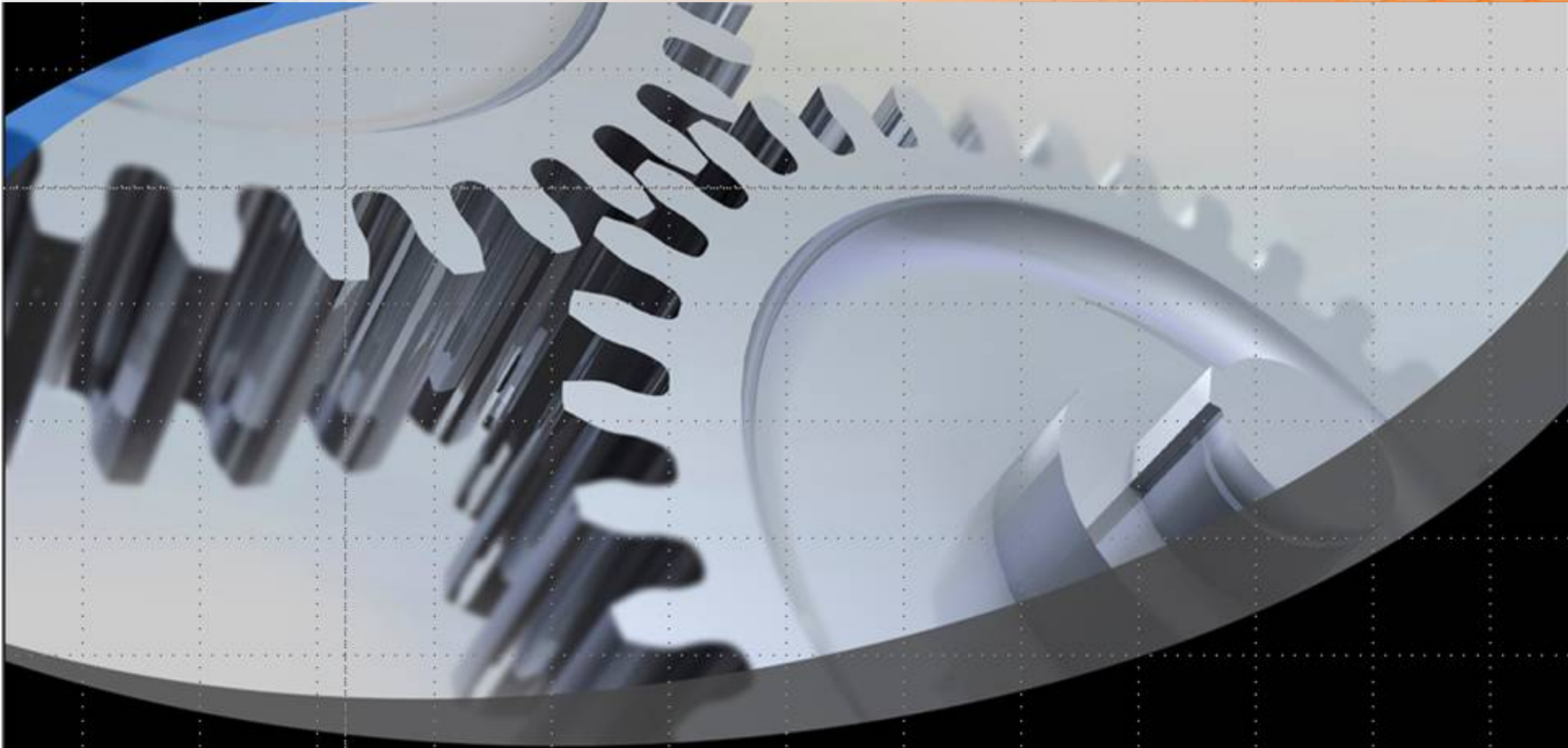


3 Bandwidth: Space and Time

2 Communication

Geophysical Pillars for our E&P Business

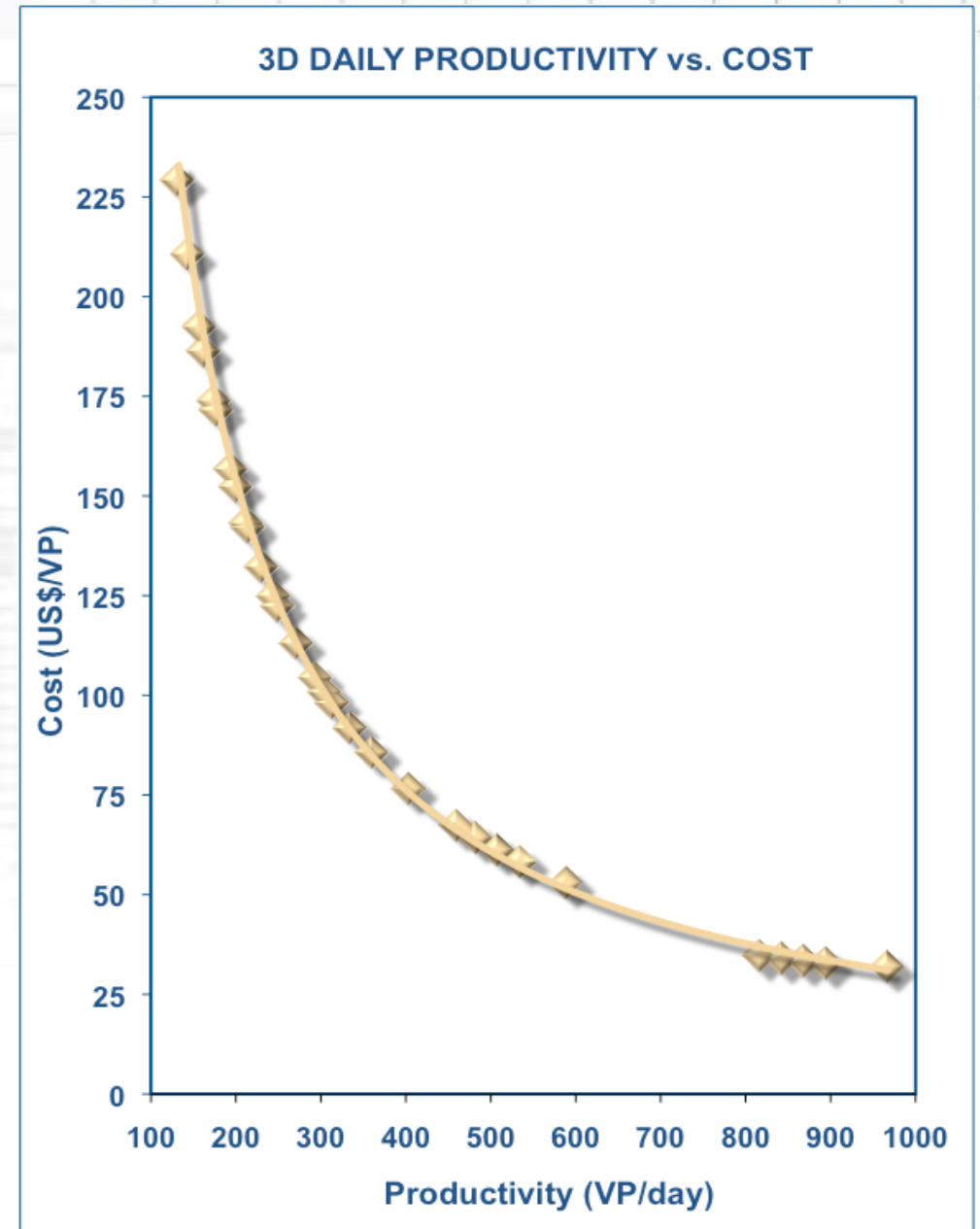
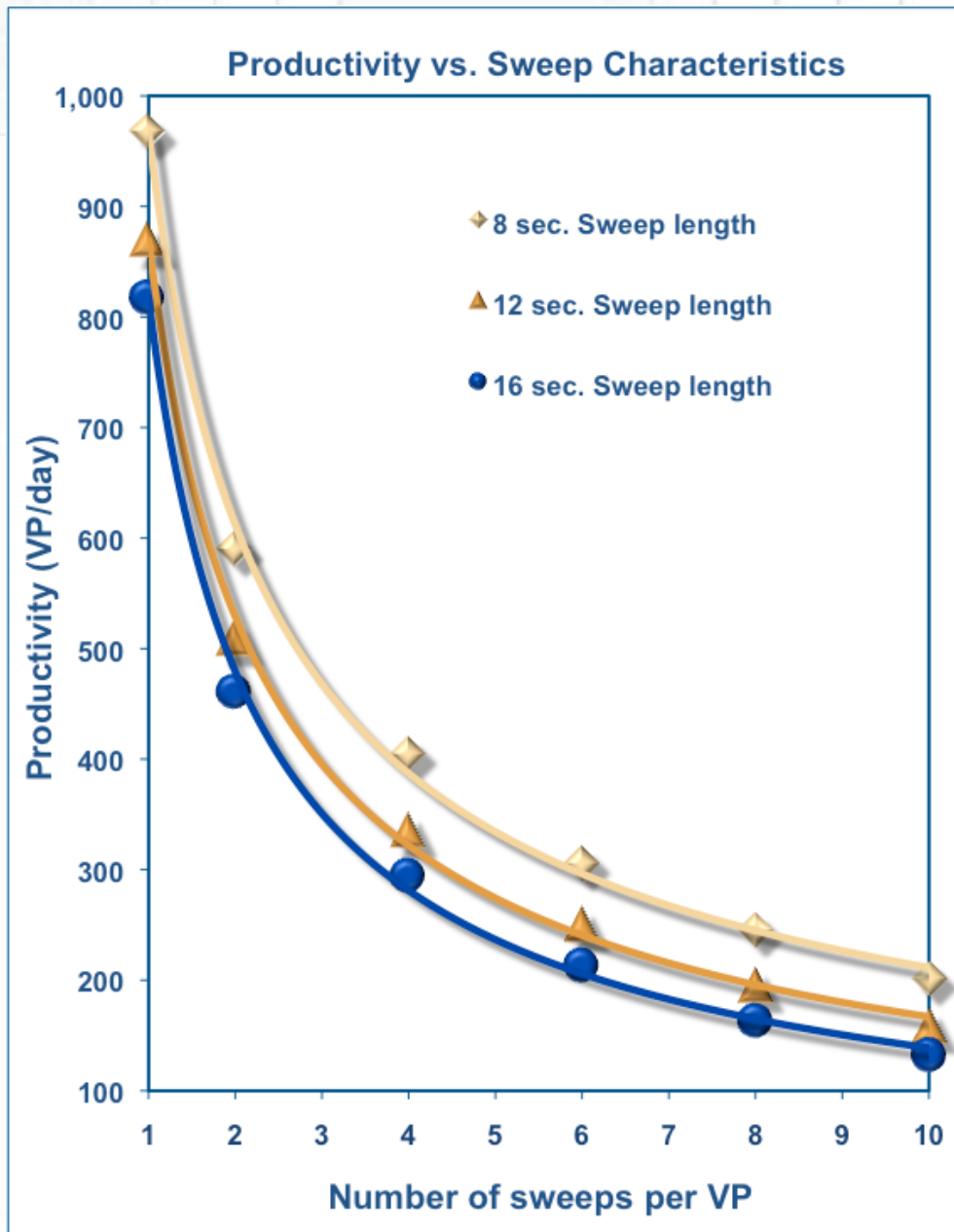
- **Seismic Imaging:** Elastic RTM, Waveform Inversion, Wavepath Tomography, Land Implementation
- **Seismic Acquisition:** Increase productivity. Slip Sweep, Cascaded Sweep. Marine Offshore Wide Azimuth Mode Converted Acquisition
- **Time Processing:** Fracture Detection 3D-3C, Attributes, Near Surface Statics, Processing in the Shot Domain
- **Time Lapse Non-Seismic Methods:** MTEM, Microgravity



Operations

Meeting our Clients Requirements

Cost and Productivity



Source effort reduction

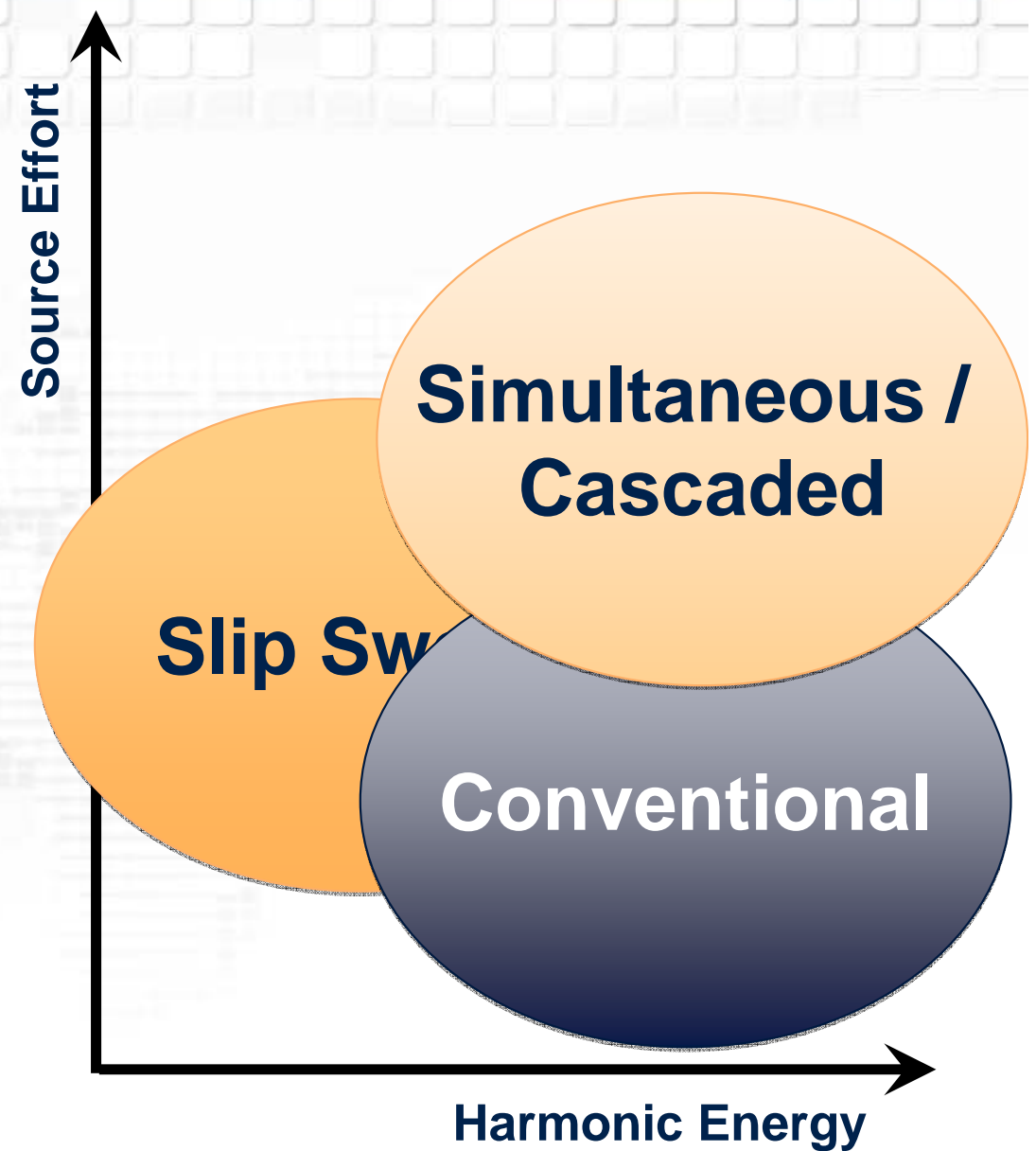
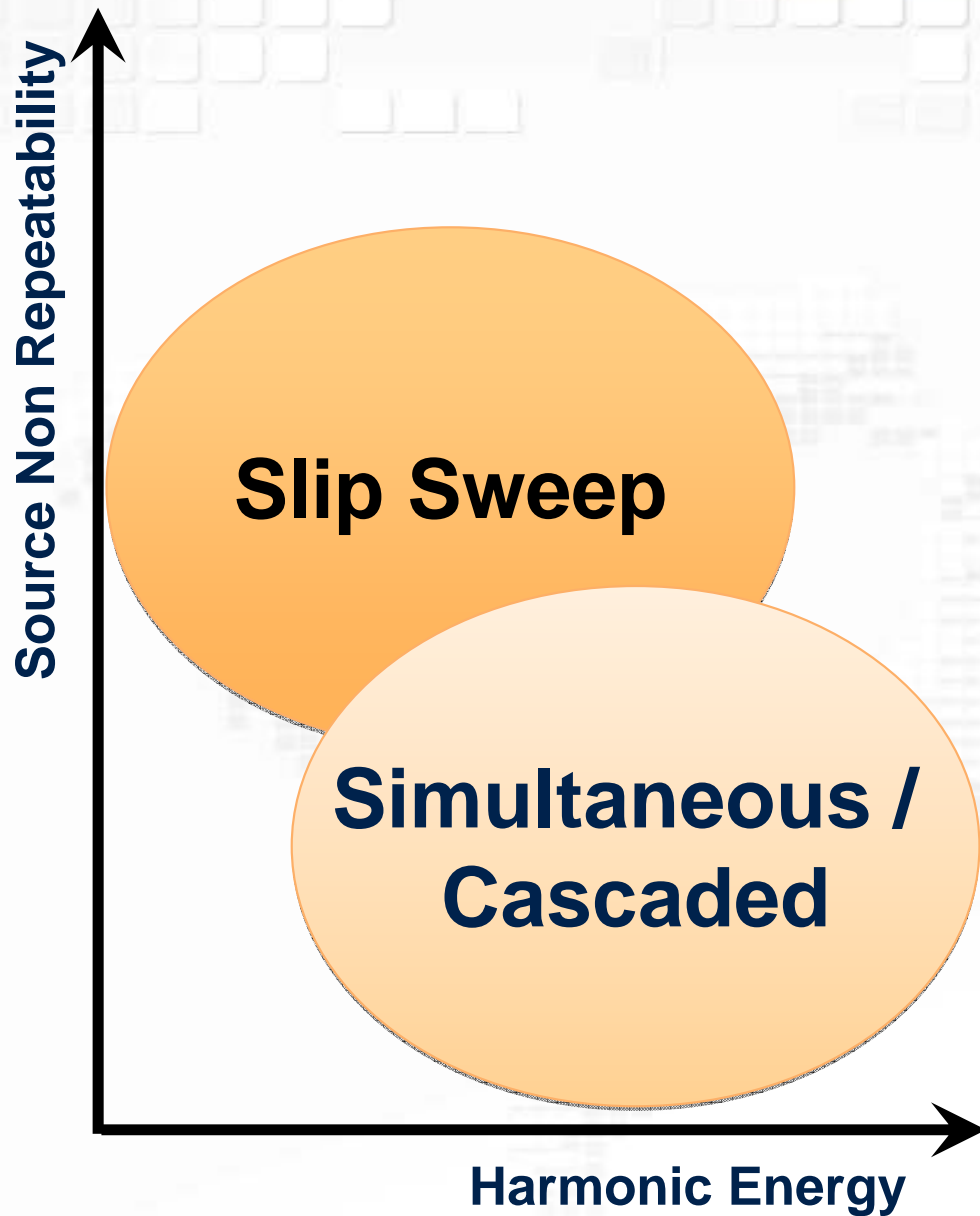


	1991	1992-94	1995-96	1997-98	1999-00
Number of Vibros	4	5	5	4	4
Peak Force (lbs.)	50000	50000	50000	60000	60000
Sweep Length	10	10	10	14	14
Number of Sweeps	16	10	8	6	3
Number of Phones	72	72	72	72	72
Fold of Stack	64	72	72	72	80
SNR (dB) ~	158	157	155	153	148

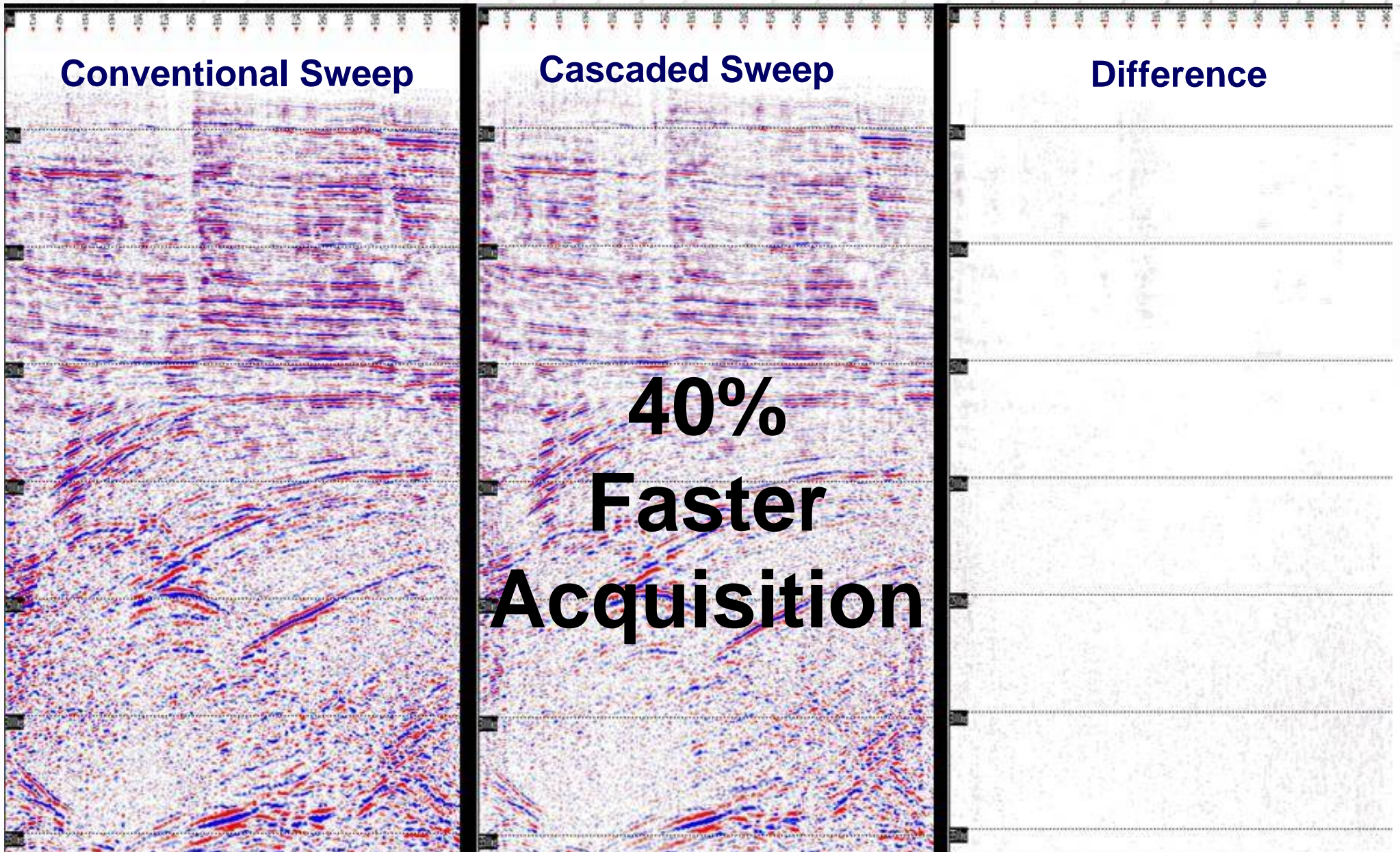
- 82 % decrease in source effort over the decade
- Cost reduction of 15% in real terms from survey to survey

$$\text{SNR} \propto 20 \times \log \{ (\# \text{vibs}) \times (\text{force}) \times \sqrt{(\text{sweep length}) \times (\# \text{sweeps}) \times (\# \text{phones}) \times (\text{fold})} \}$$

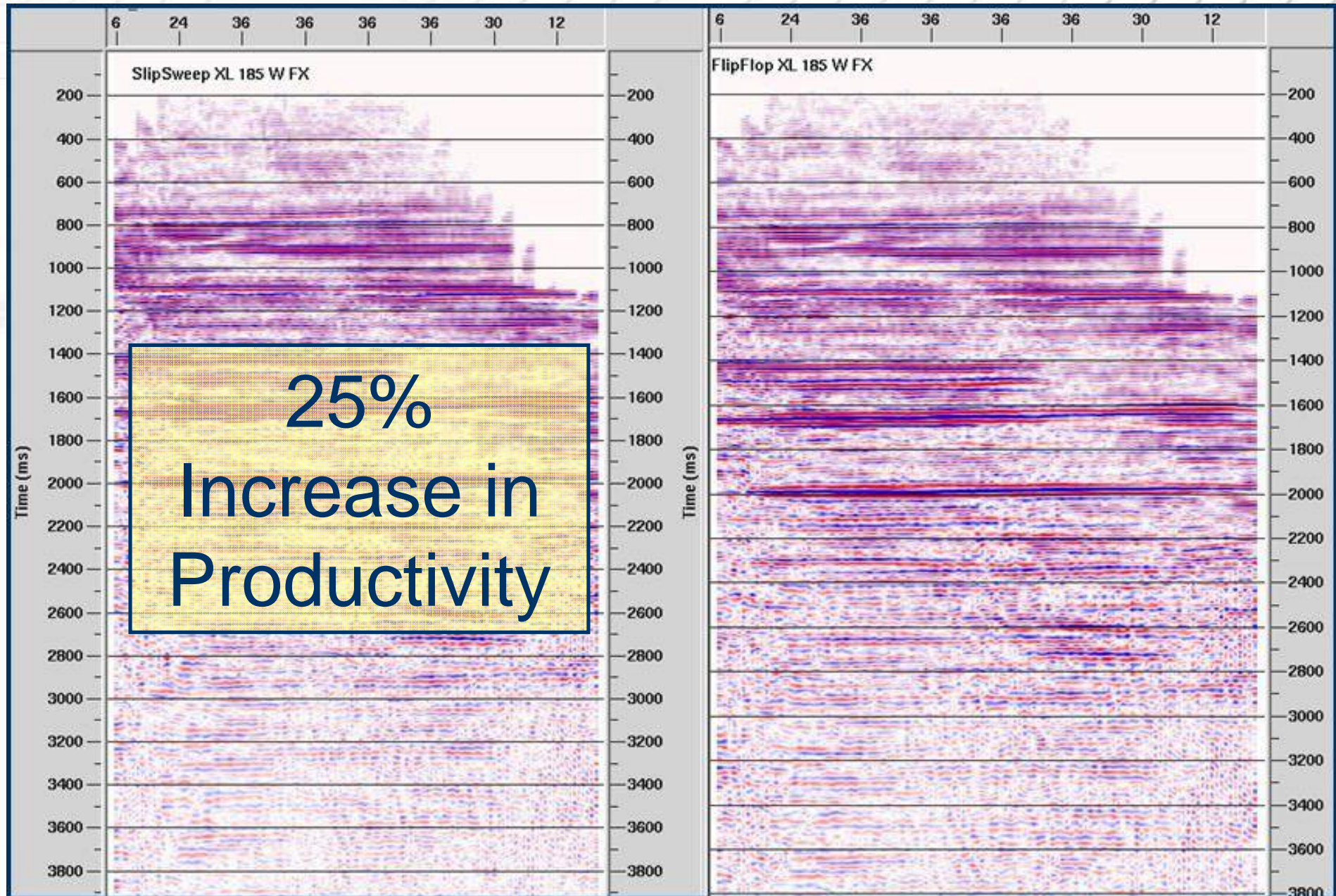
Source effort reduction



Cascaded Sweep Comparison



Operations: Slip Sweep Design and Test

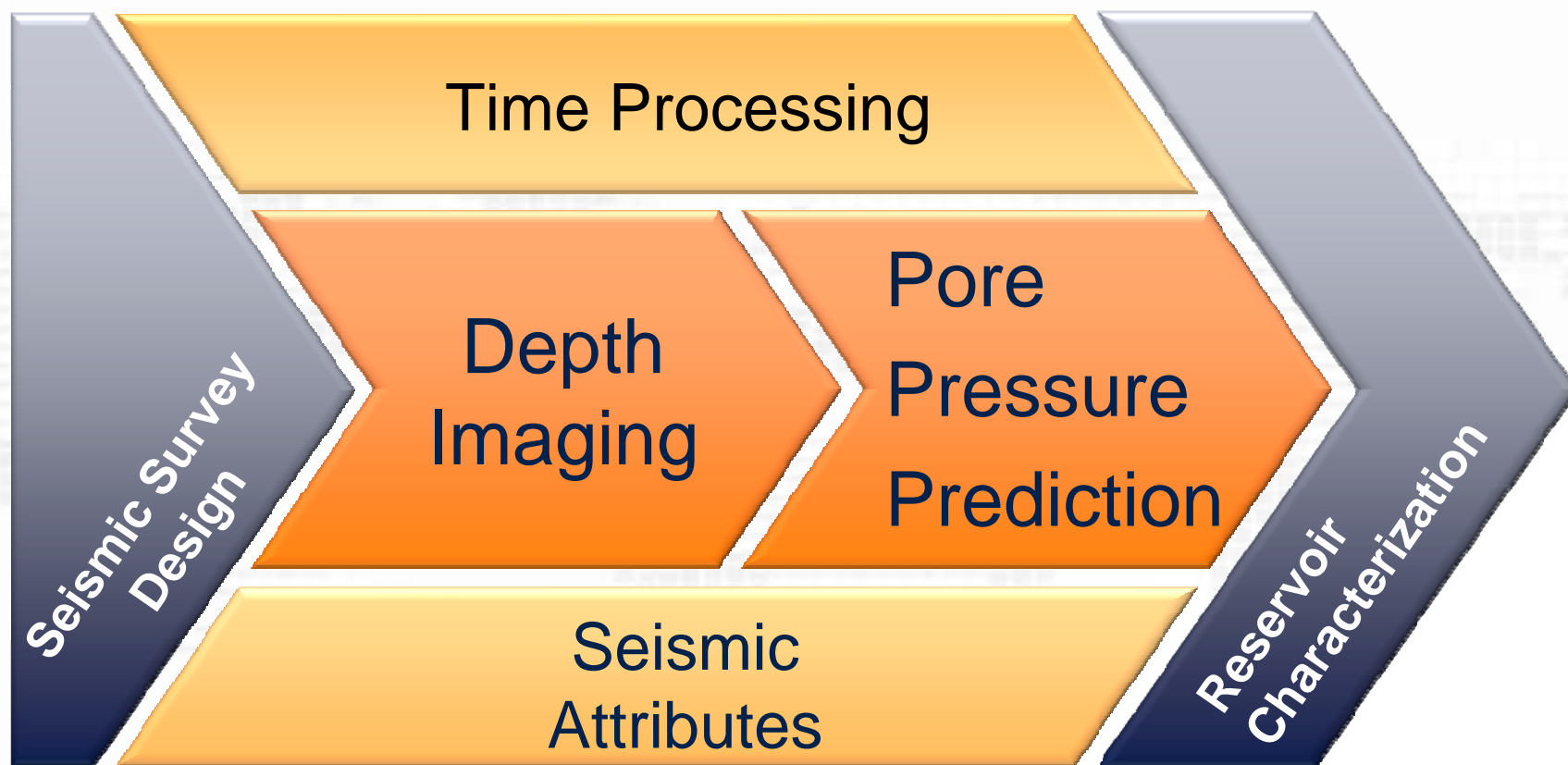


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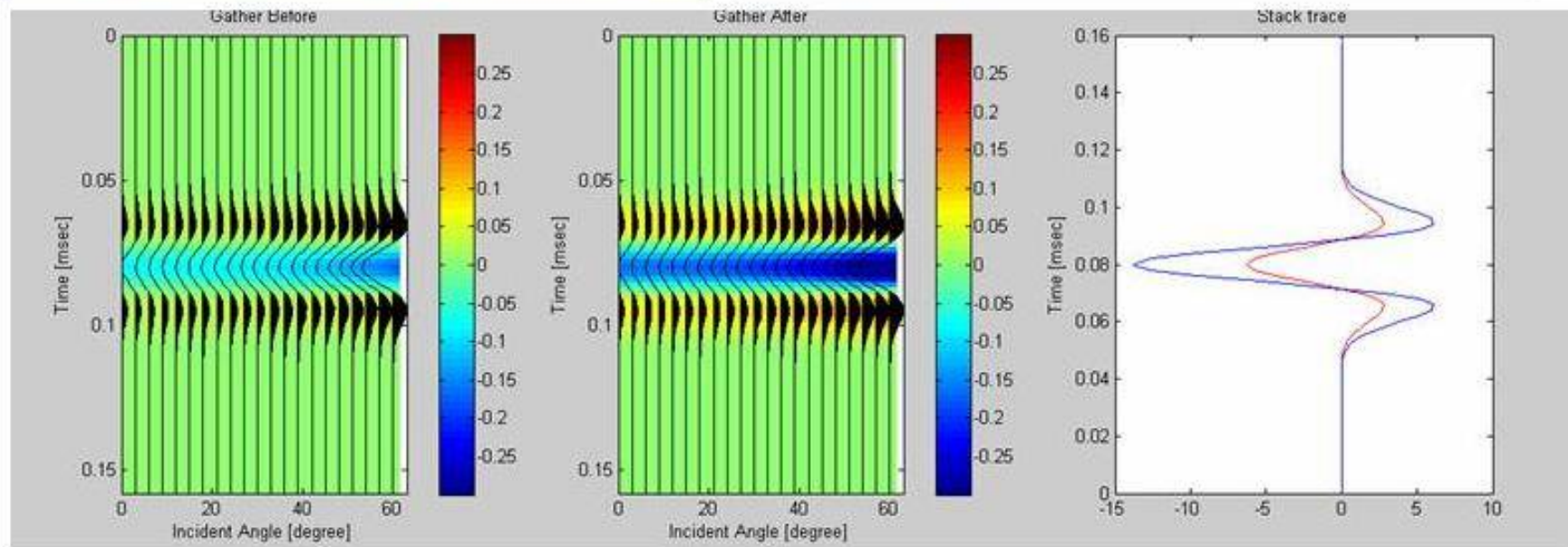
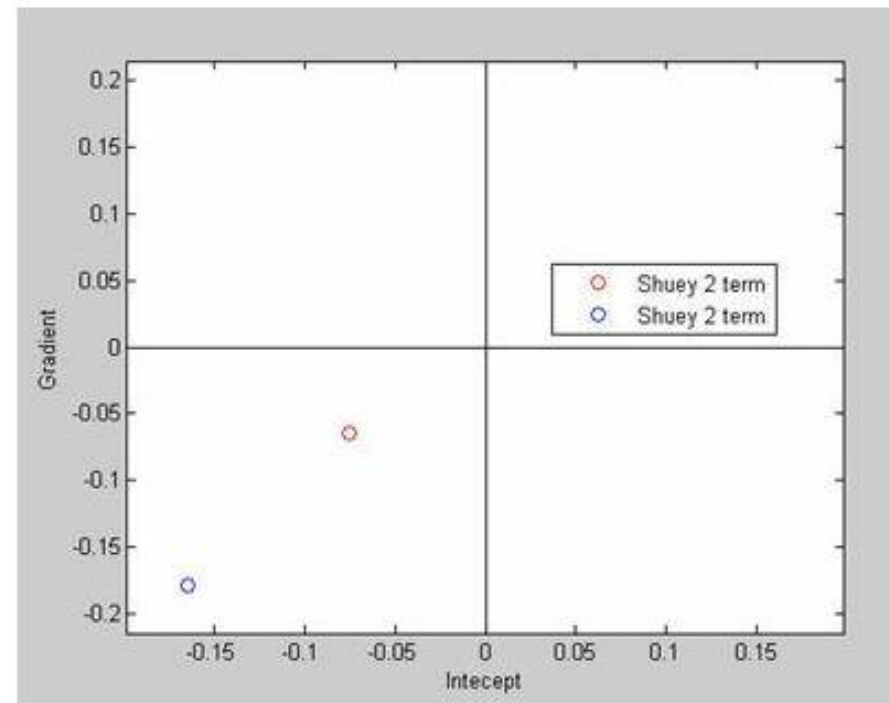
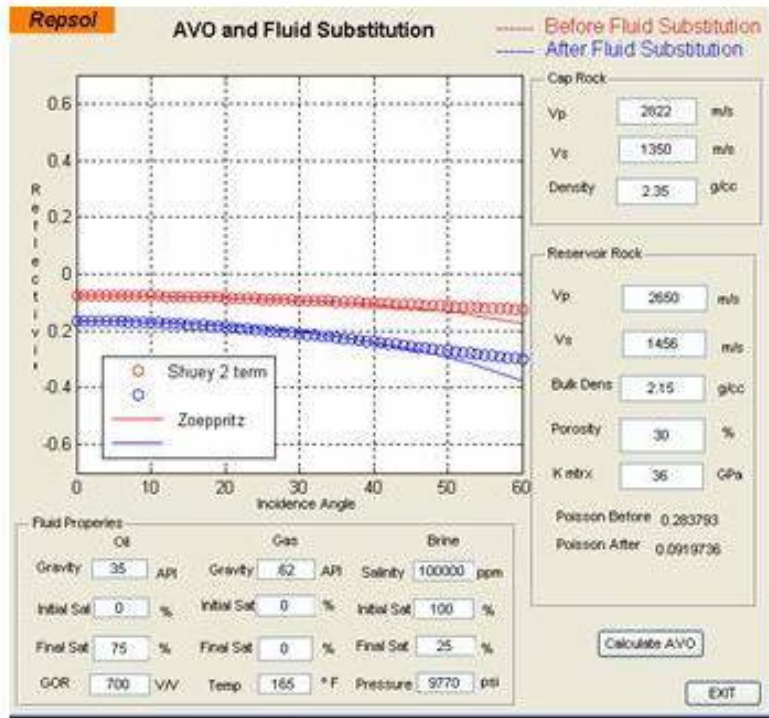
Geophysical Applications

Leveraging the Know How

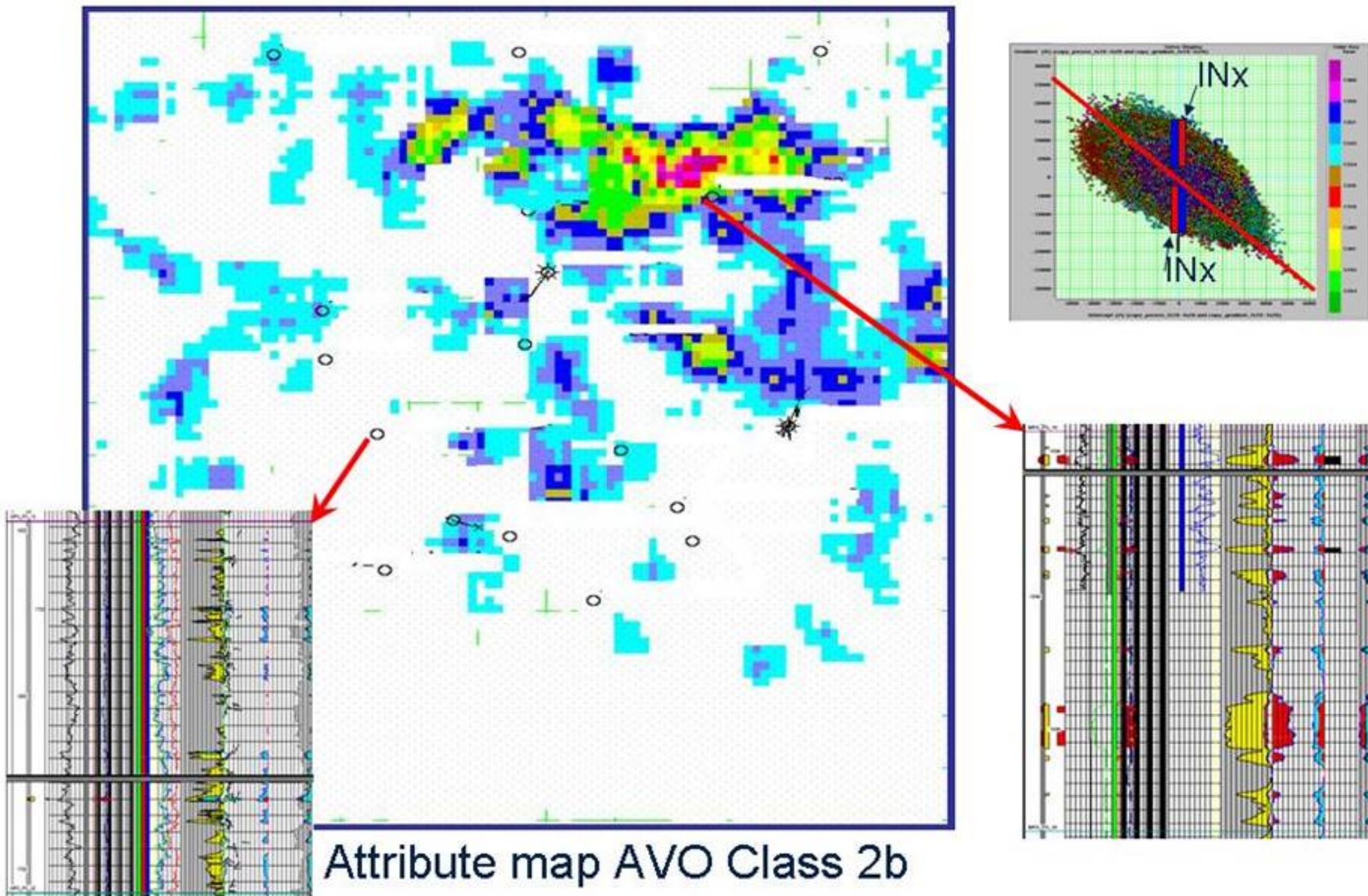
Know-How Integration



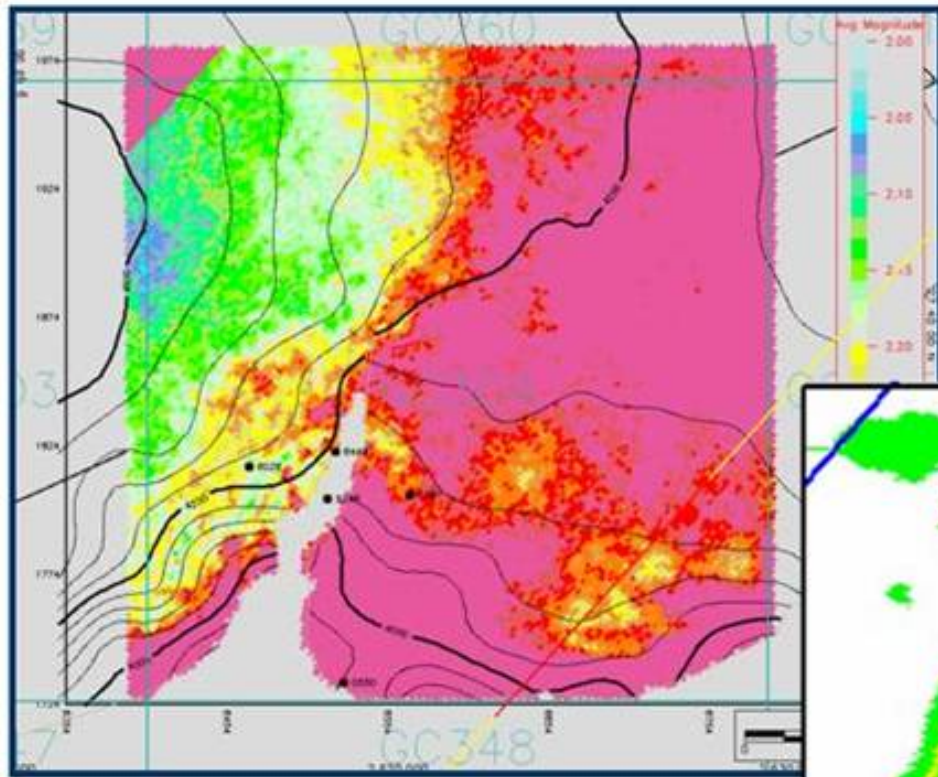
AVO Analysis In-house Software



Value added by Improved AVO

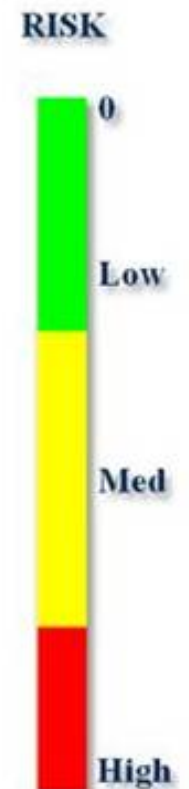
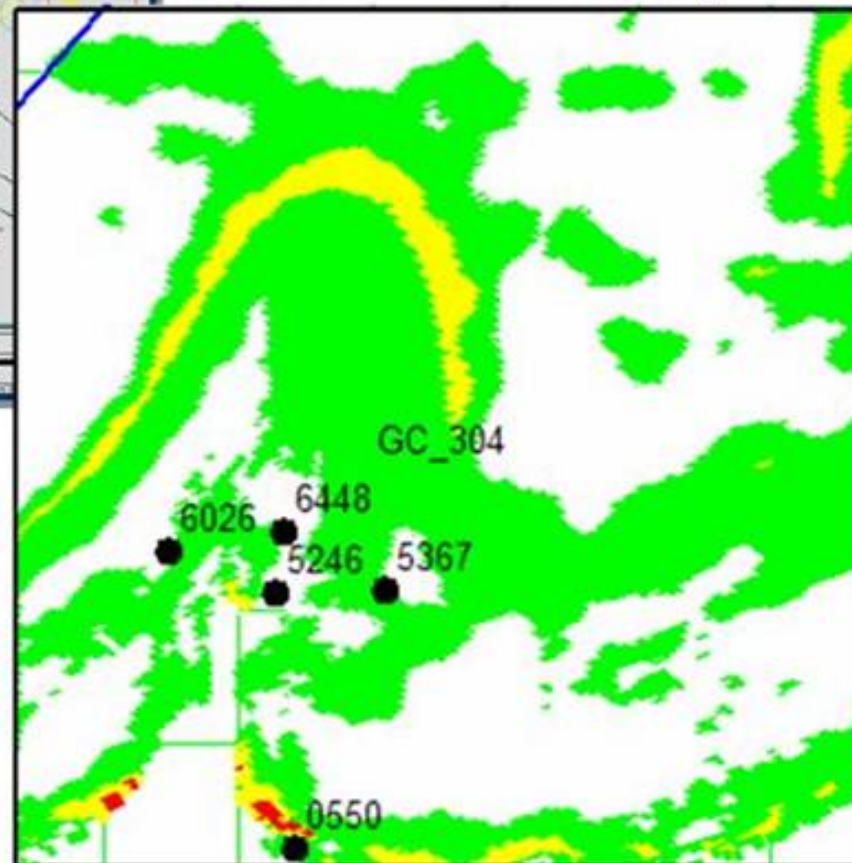


Seismic Attributes: Shallow Hazards

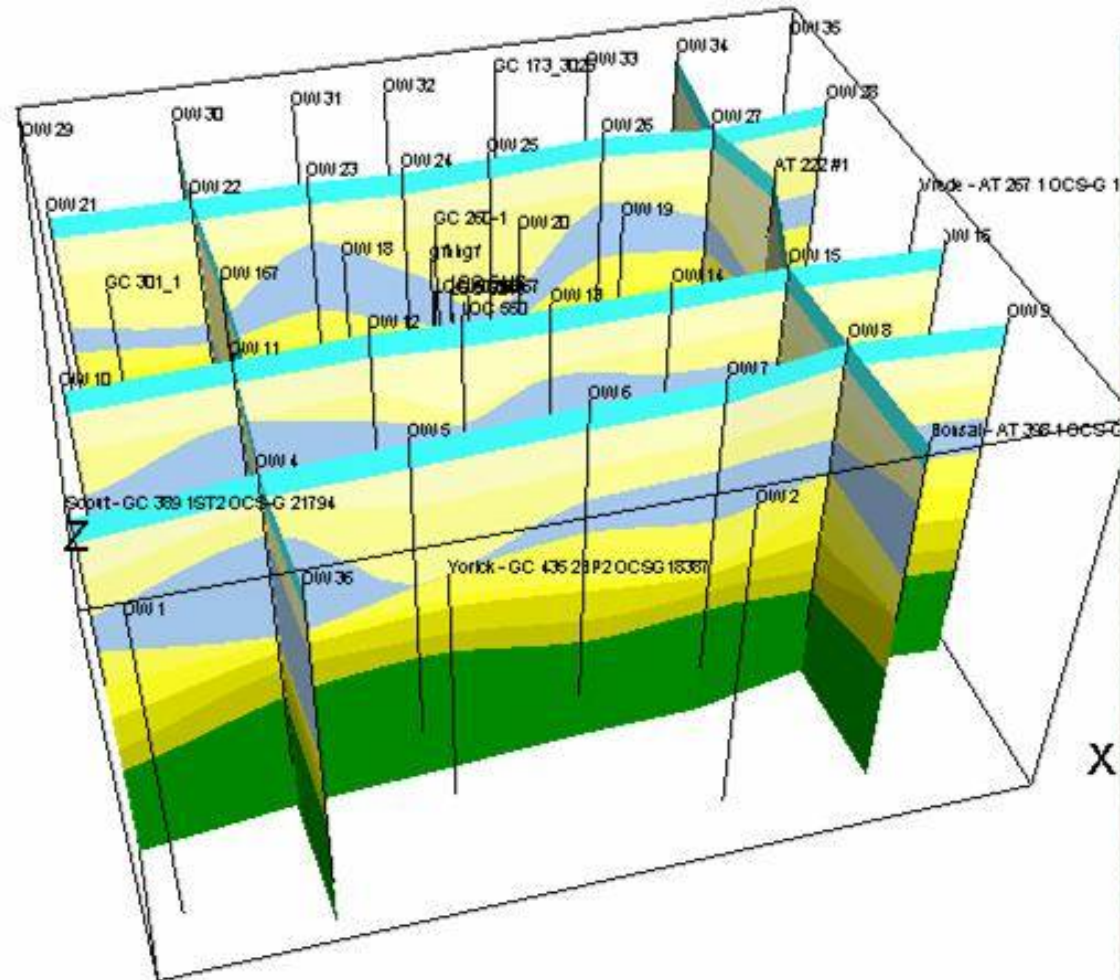


Vp/Vs ratio (average)

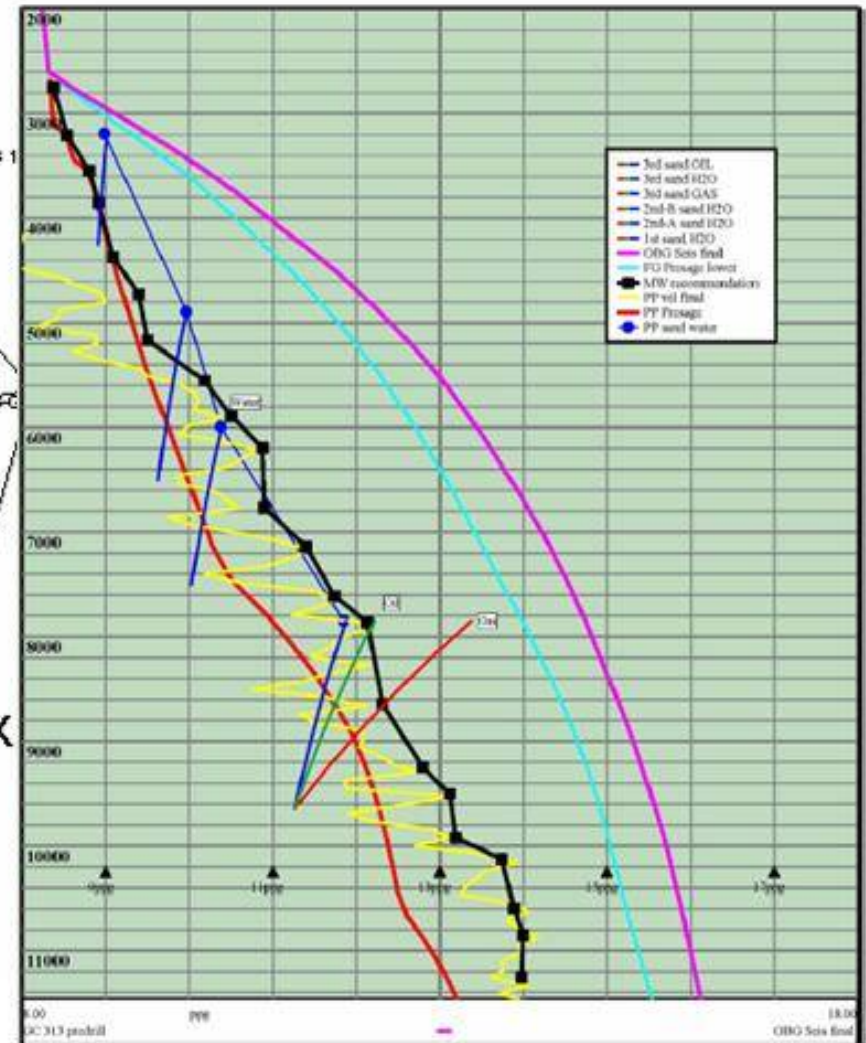
Risk Evaluation Map



Seismic Attributes: Pore Pressure Prediction

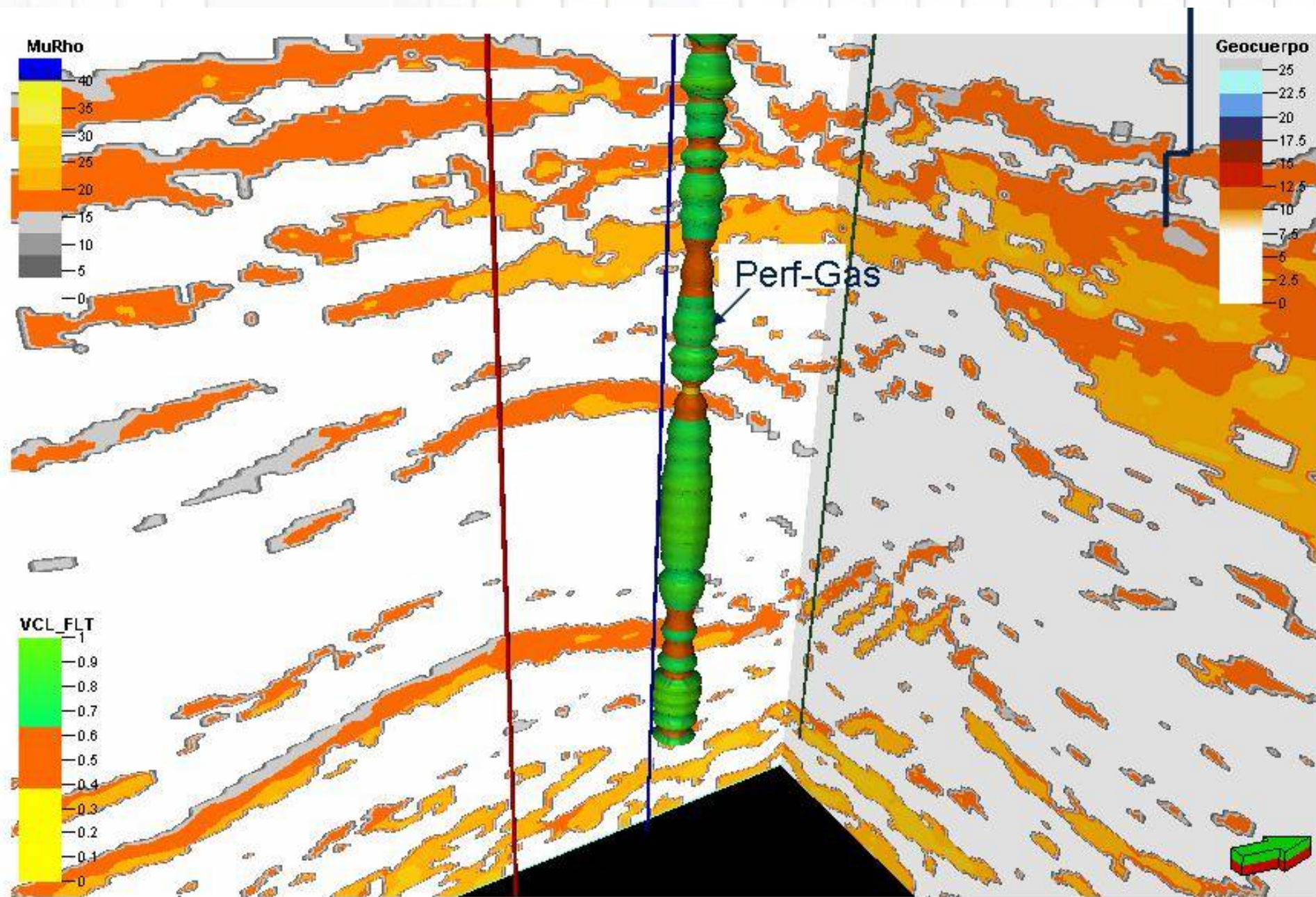


3D Pore Pressure Modeling

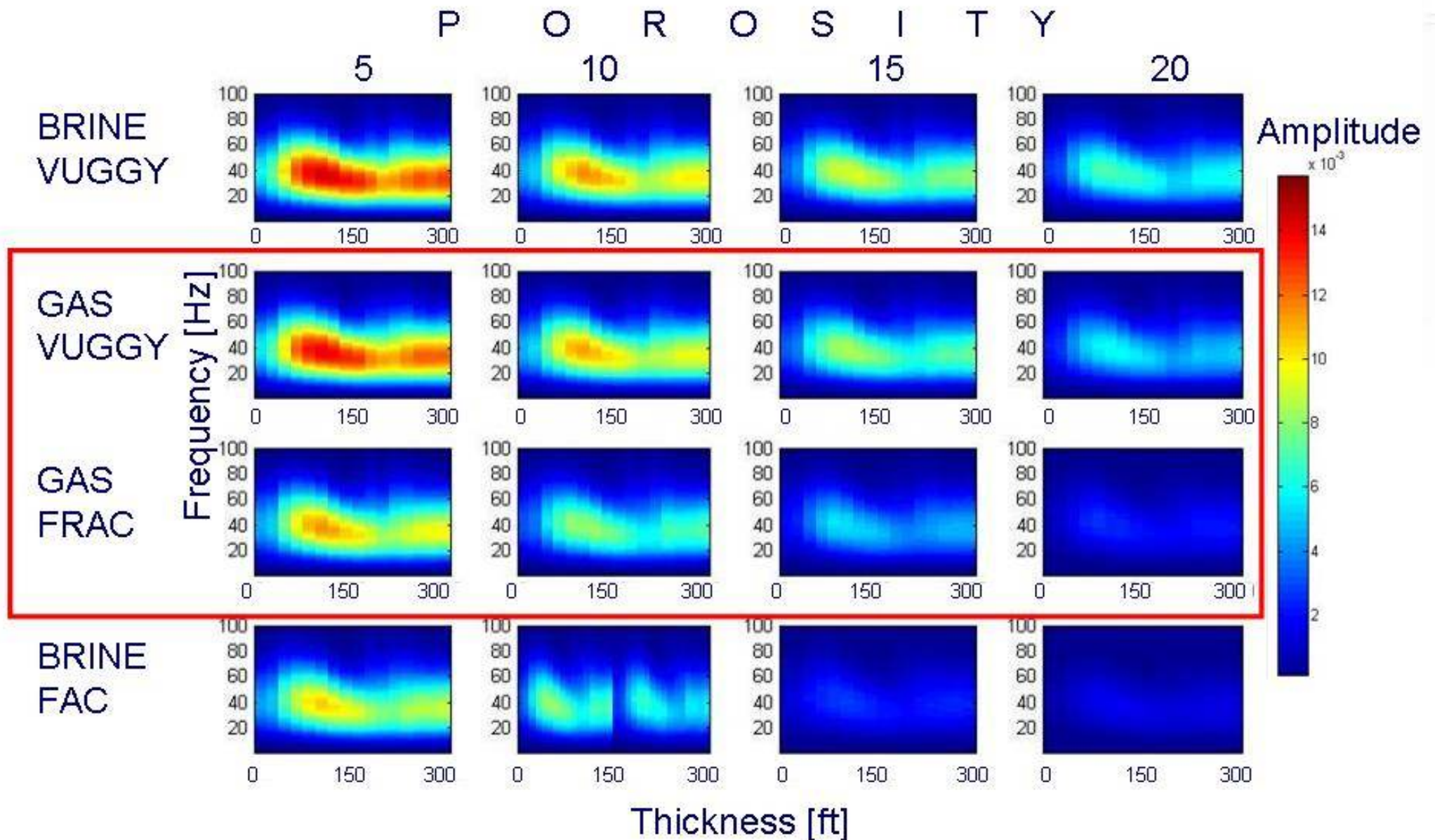


Pore Pressure Prediction

Facies Prognosis, Simultaneous Inversion



Spectral Decomposition



Geophysics in Figures, last 5 years



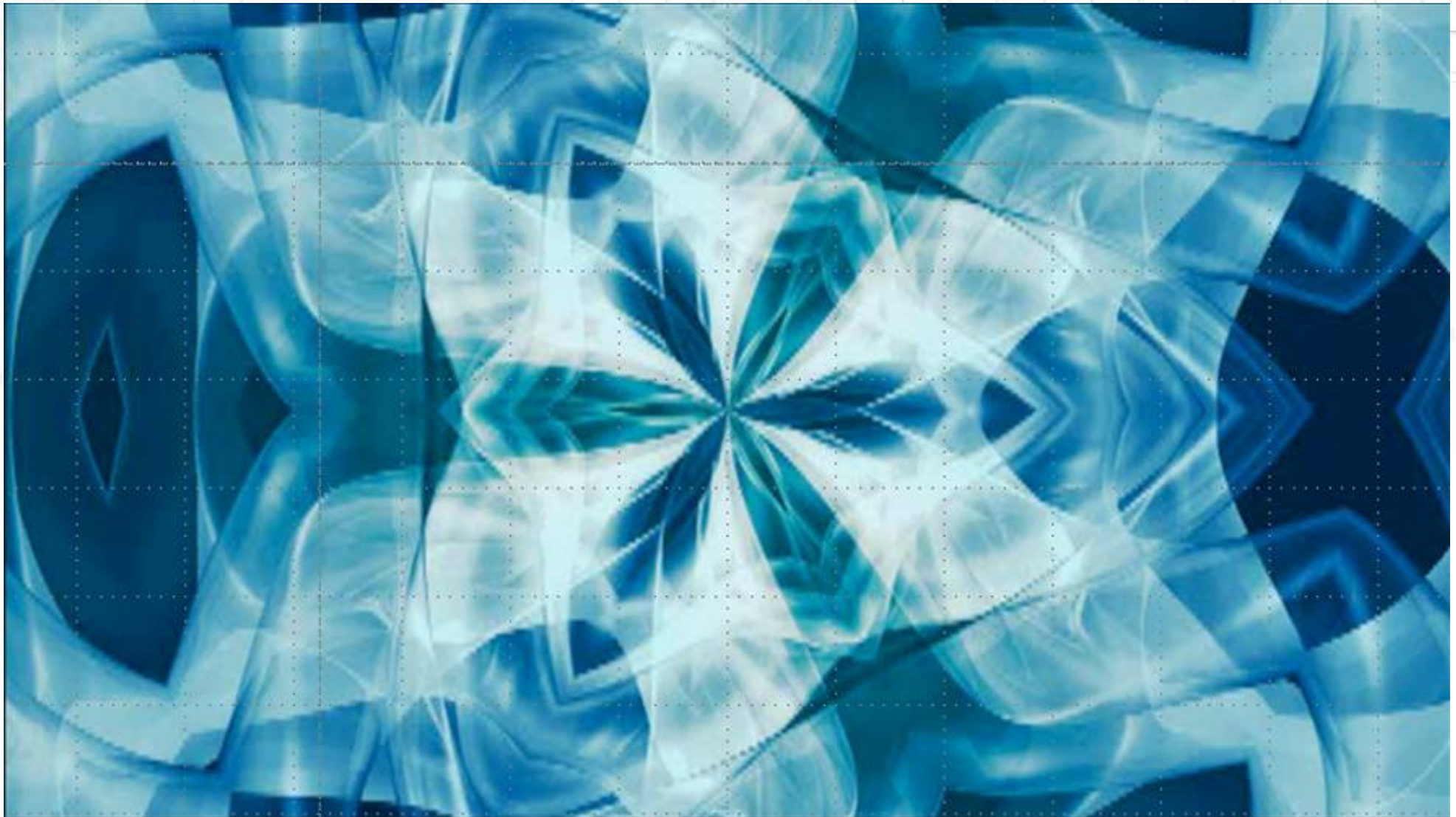
300+ Projects

**75 International
Technical
Publications and
one Patent**

**70 MMUS\$
Cost Reduction**

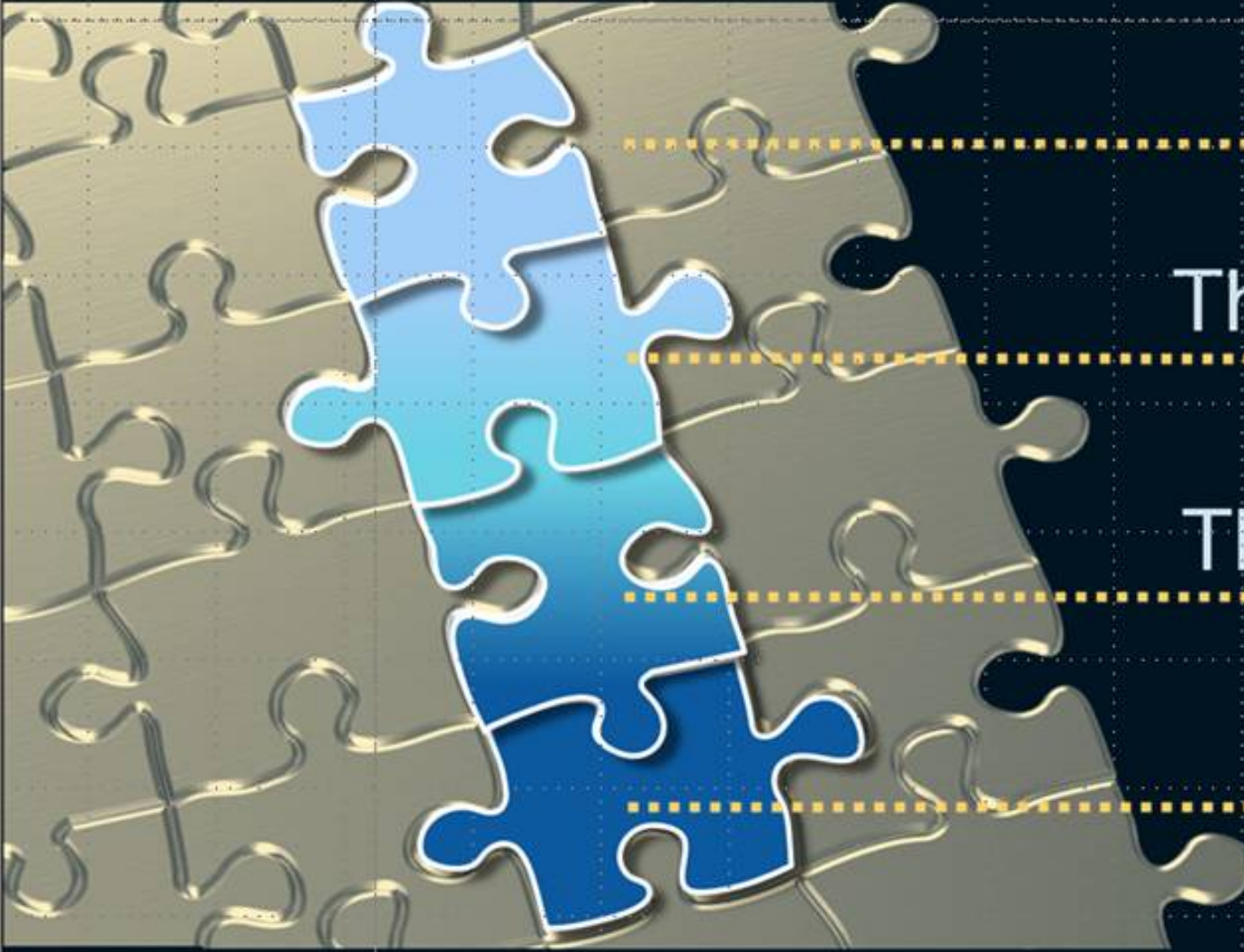


**100+ Seismic
Surveys and
50,000+ km²
processed in-
house**



The Kaleidoscope Project: Breaking the Sound Barrier in Seismic Imaging

Kaleidoscope Project



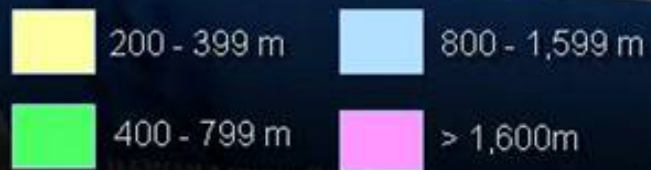
Context

The Problem

The Solution

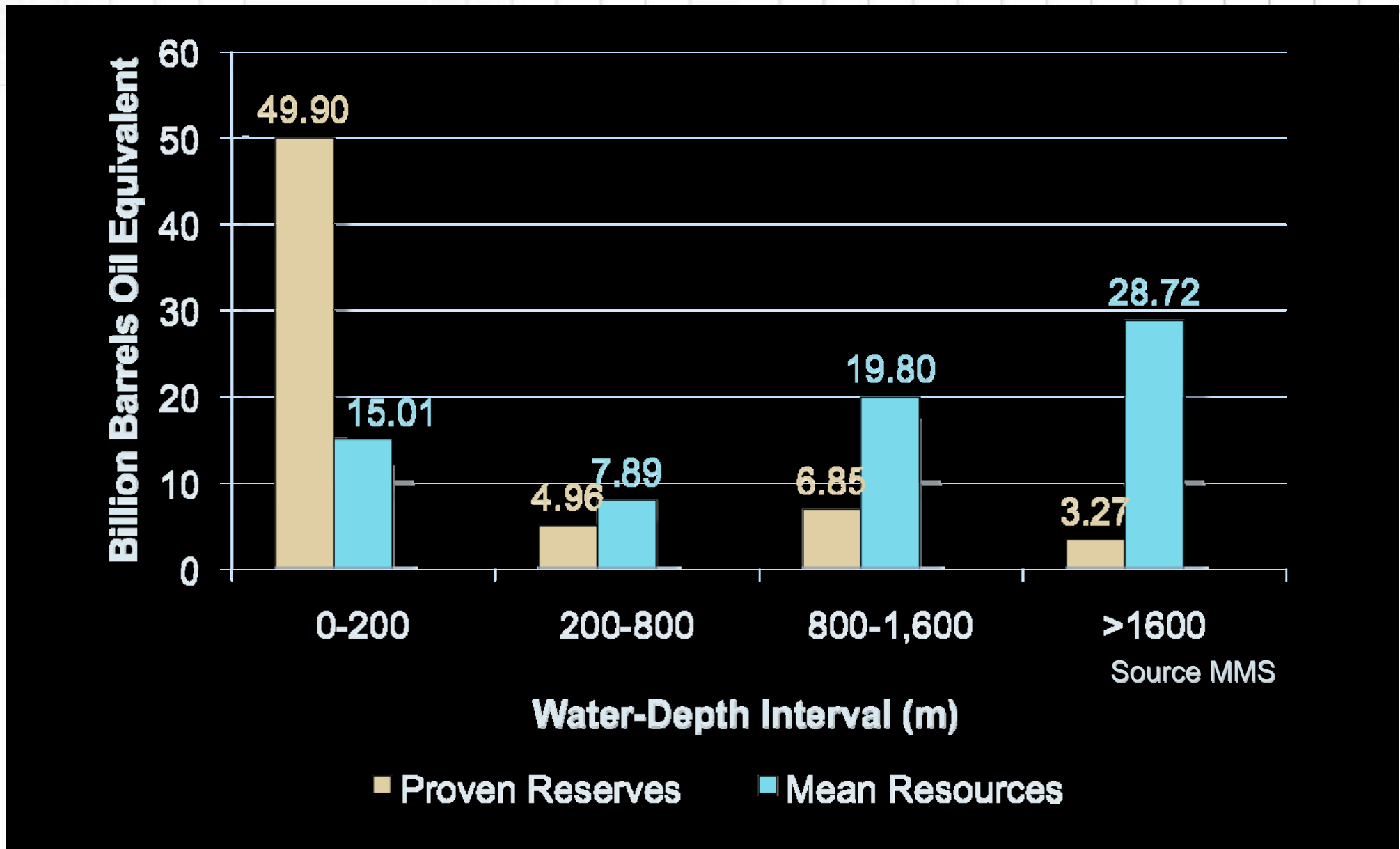
The Value

Context information

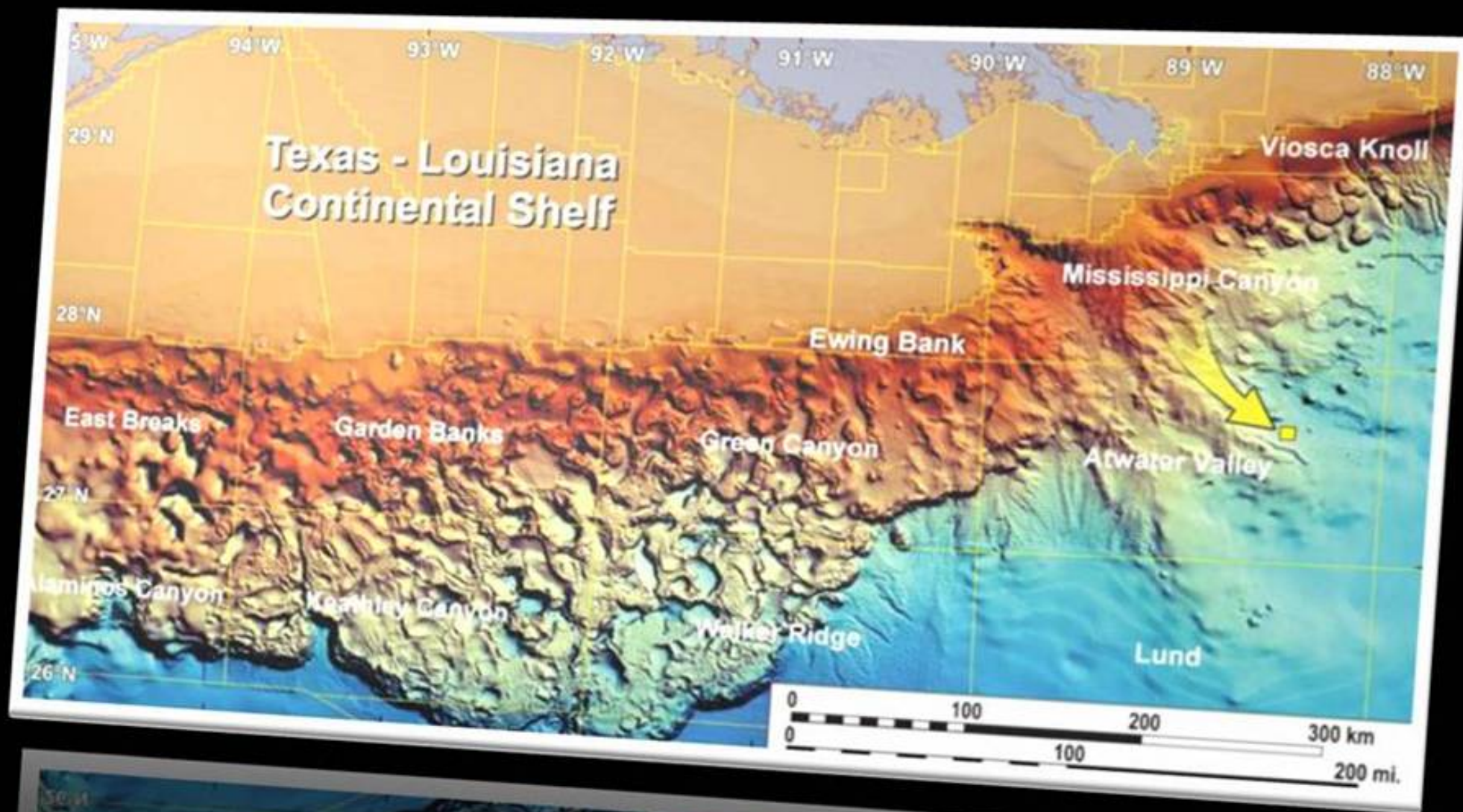


Source MMS

Ultimate expected reserves US GOM

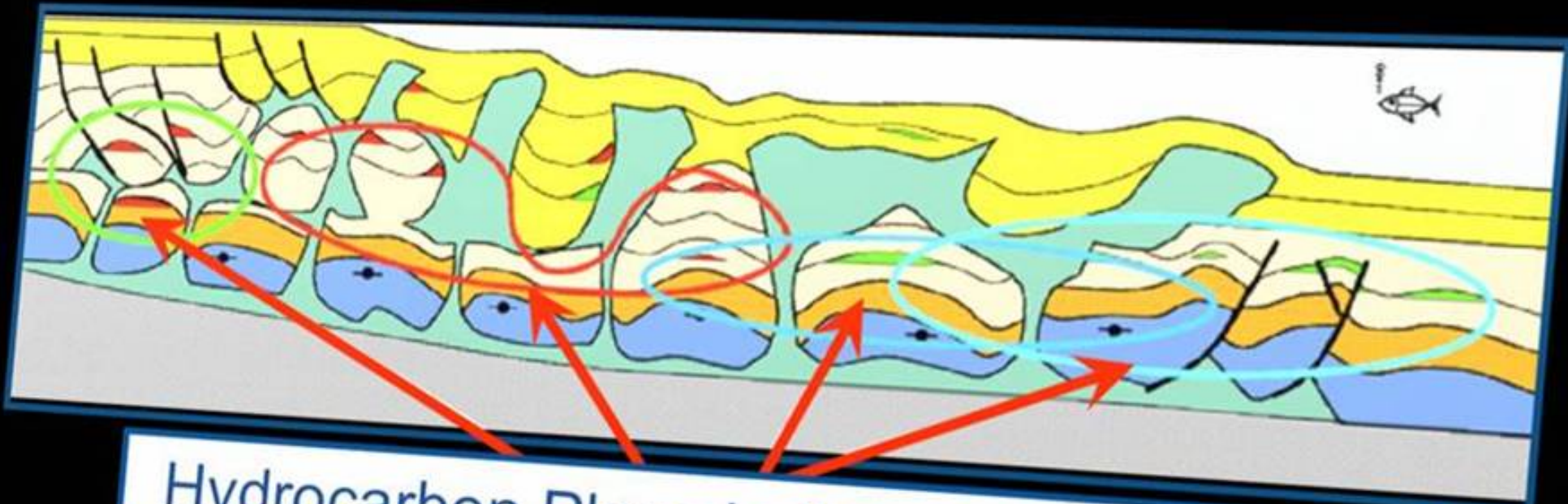


US GOM Sea bottom topography



Source: oceanexplorer.noaa.gov

Exploration Plays in the US GOM

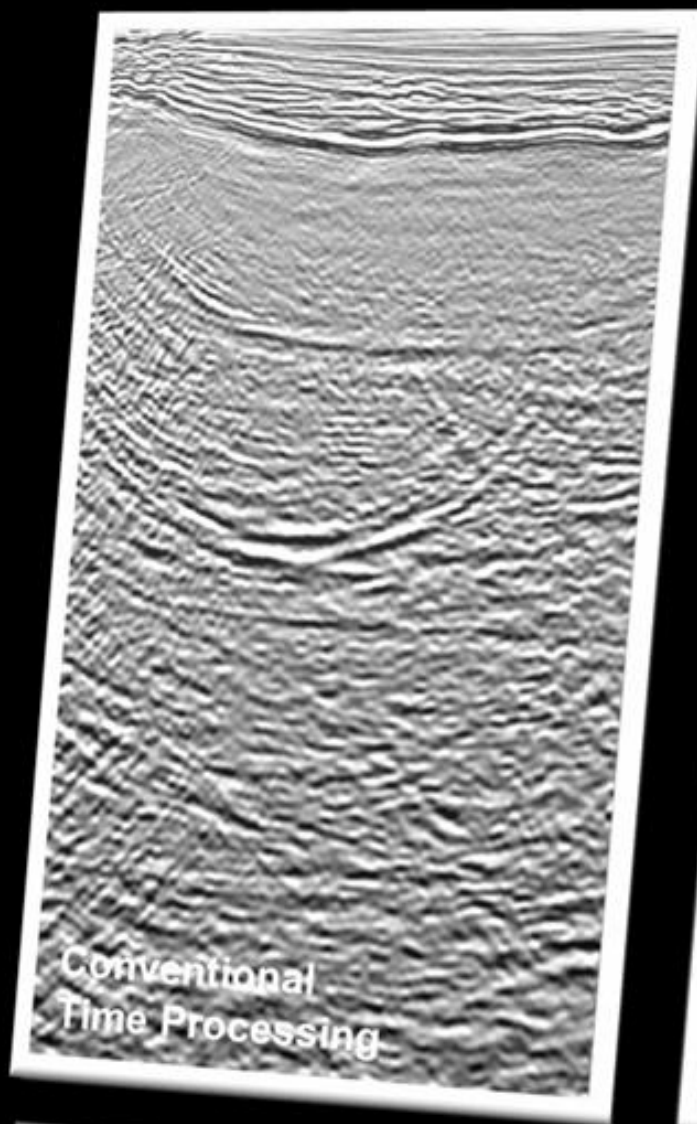


Hydrocarbon Plays in the Gulf of Mexico

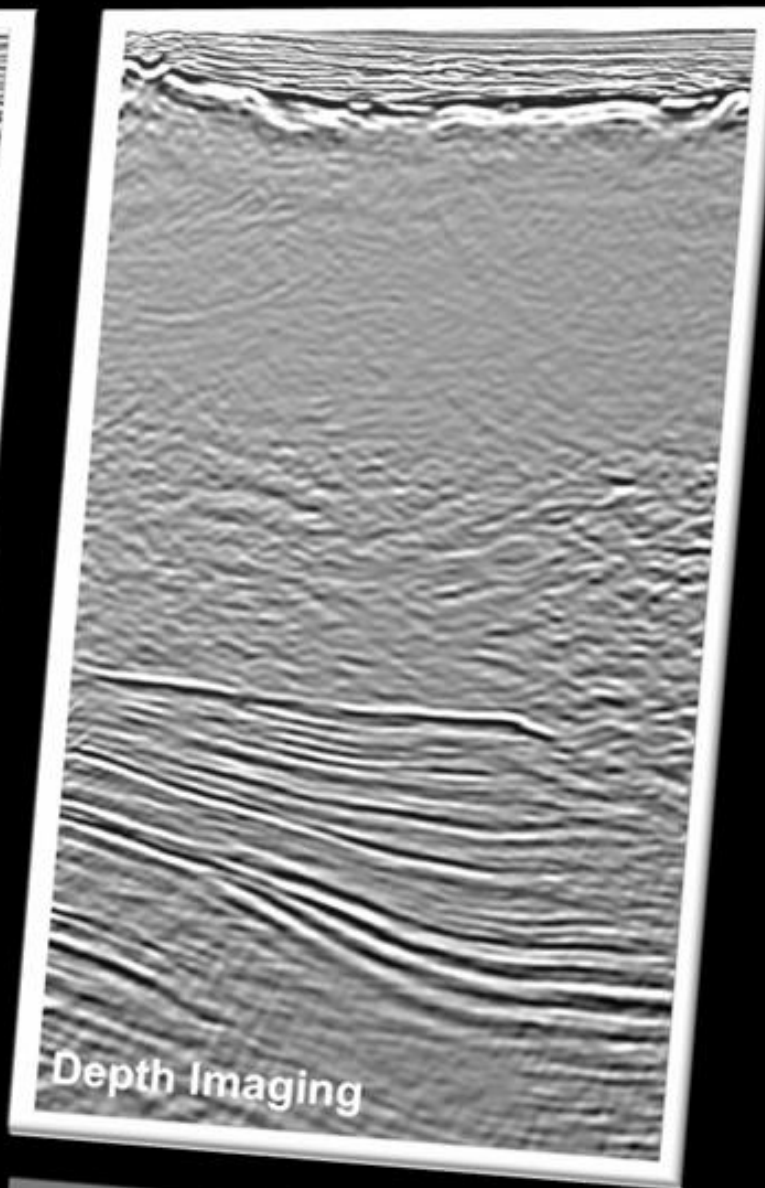
Hydrocarbon Plays in the Gulf of Mexico

Cartoon by Greg Guidry, Shell

Subsalt Imaging in the US GOM



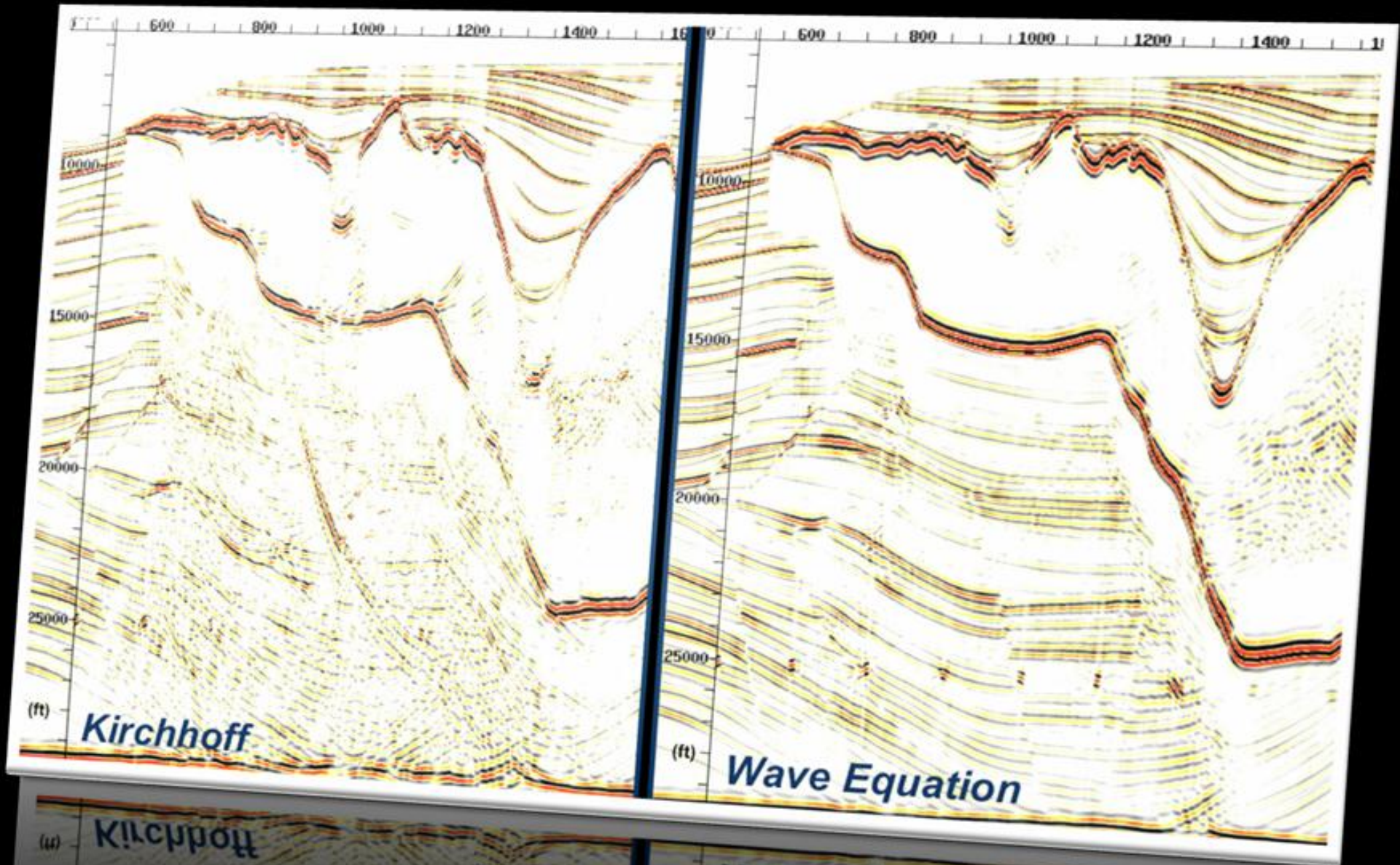
Conventional
Time Processing



Depth Imaging

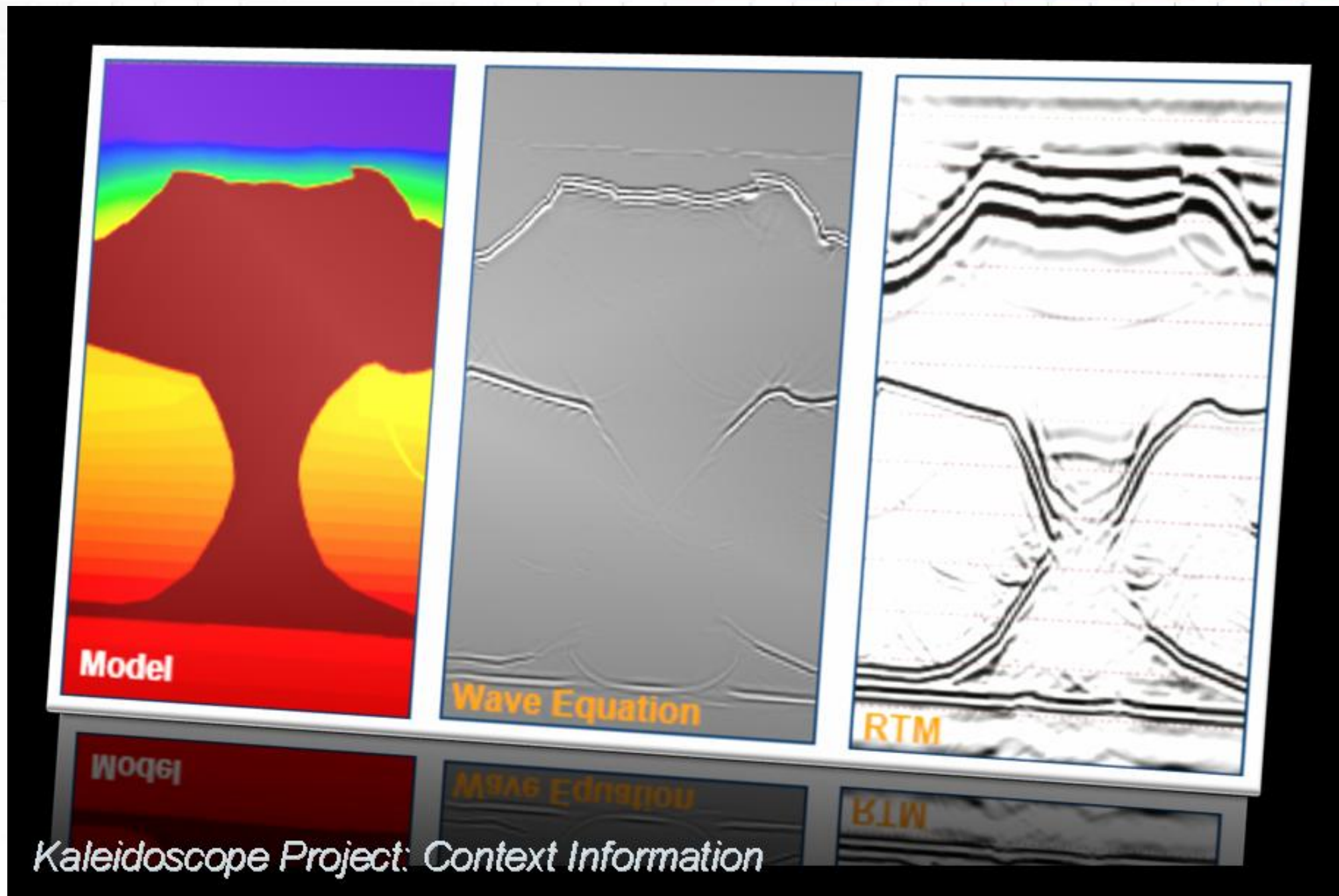
Kaleidoscope Project: Context Information

Kirchoff vs. Wave Equation



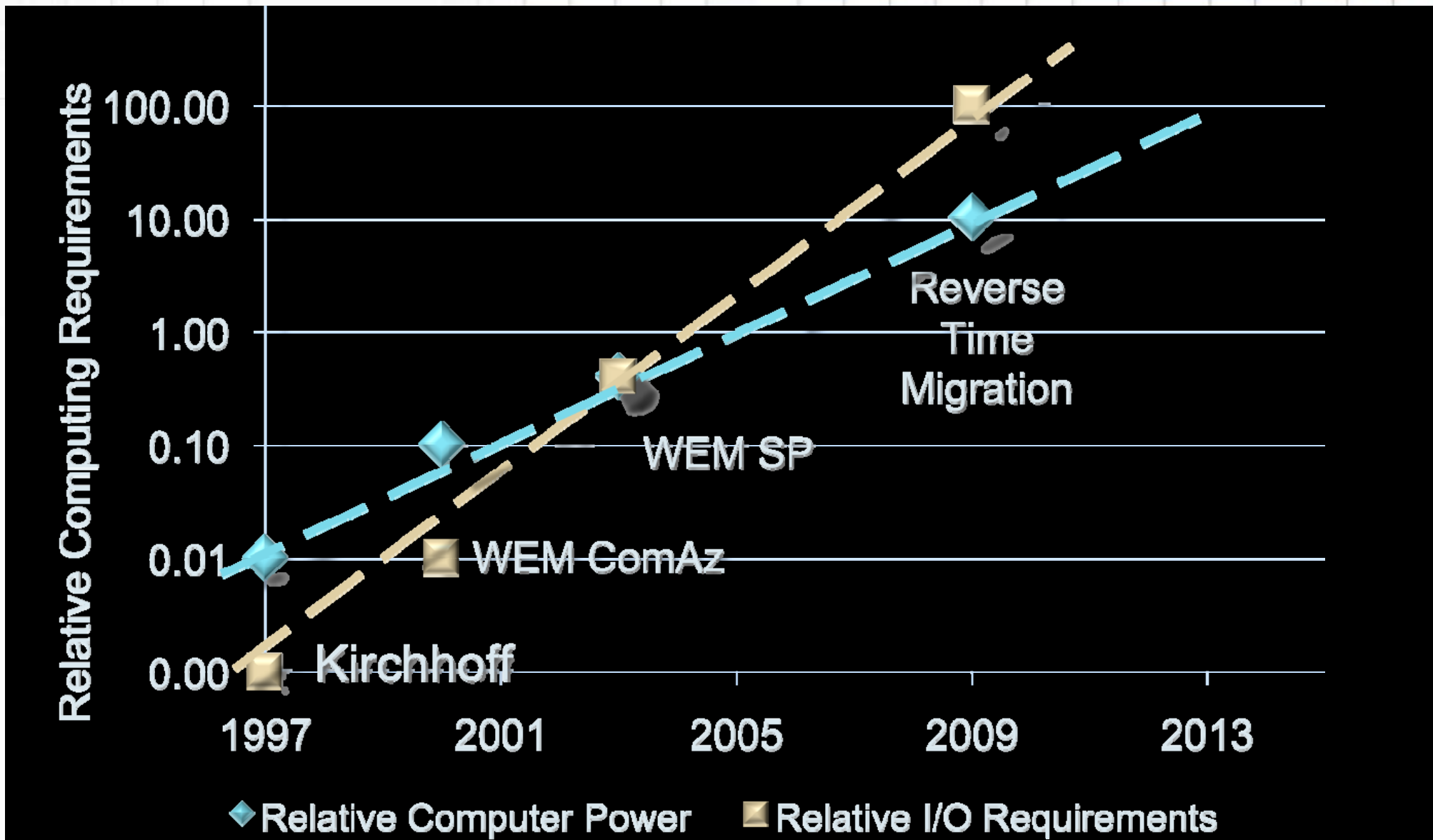
Kaleidoscope Project: Context Information

...it can be even more difficult...



Kaleidoscope Project: Context Information

Imaging algorithm Compute Requirements



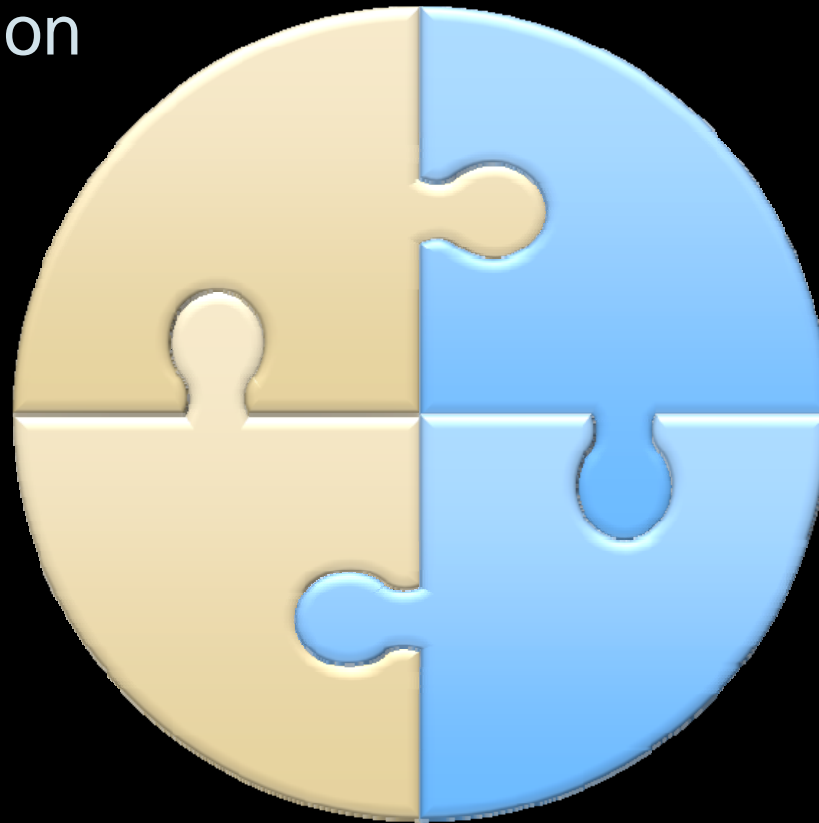
Kaleidoscope Project: The Problem

The problem



Subsalt Exploration
Success Ratios
Decline

Required New
Imaging
Algorithms



Computer Power
needed Not
Available

COTS
Technology for
New Platforms

Kaleidoscope Project: The Problem

Suite of Imaging Tools

Hardware
& Software

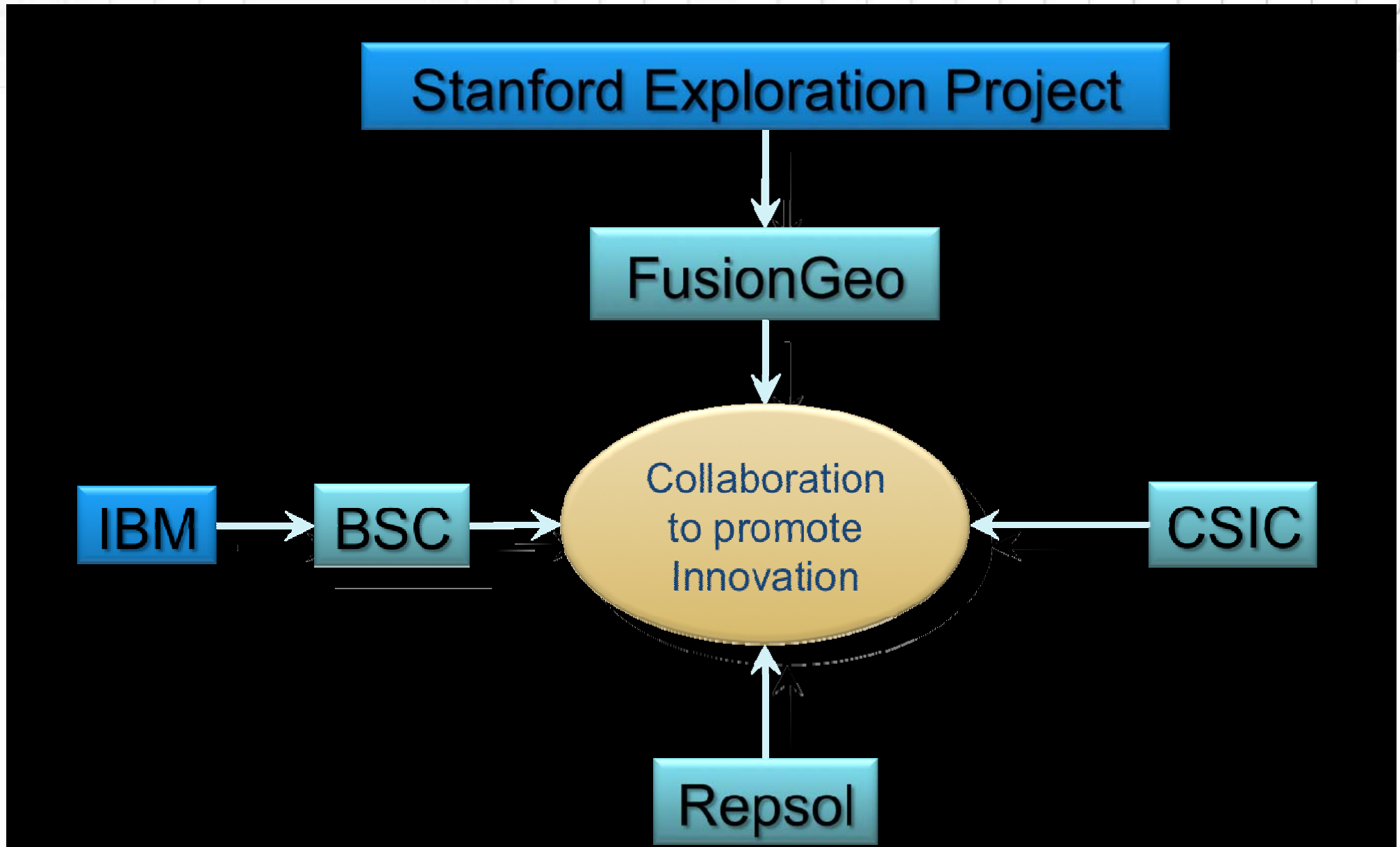


Speed &
Power



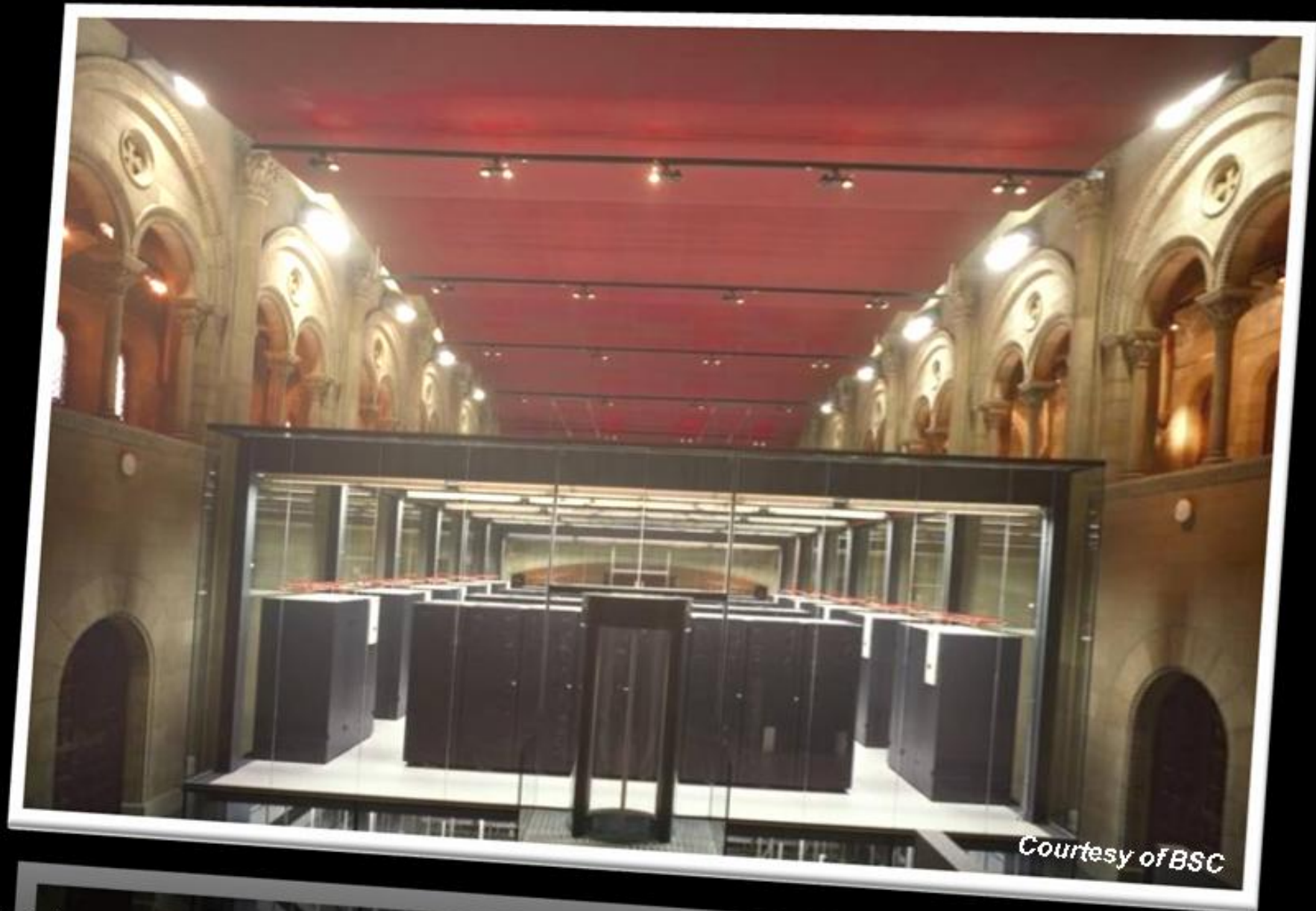
Kaleidoscope Project: The Solution

Kaleidoscope Project



Kaleidoscope Project: The Solution

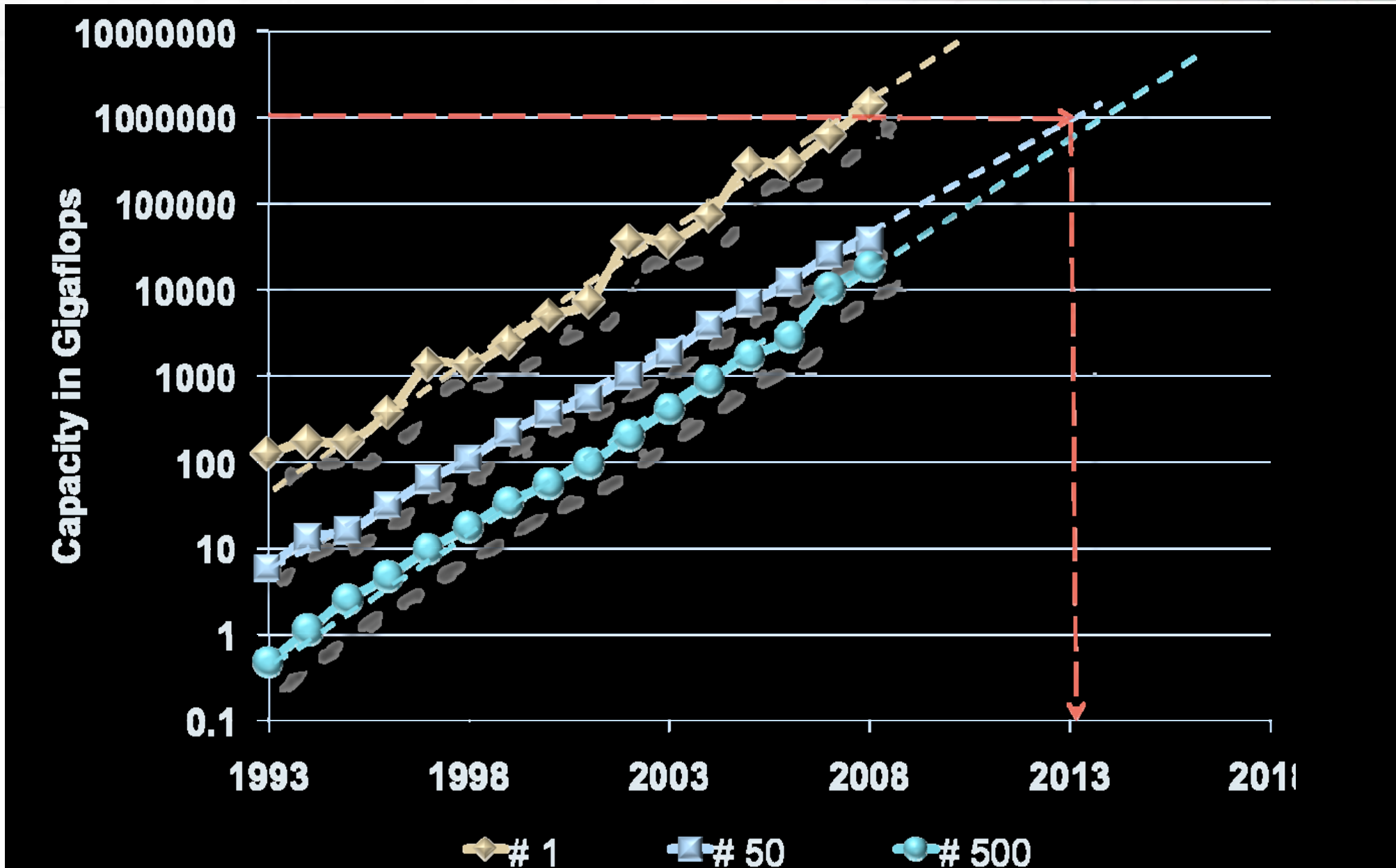
Mare Nostrum Supercomputer



Courtesy of BSC

Kaleidoscope Project: The Solution

Top 500 Supercomputing Evolution



Kaleidoscope Project: The Solution

Source: Top500.org

Sustainable Petascale Capacity Requires:



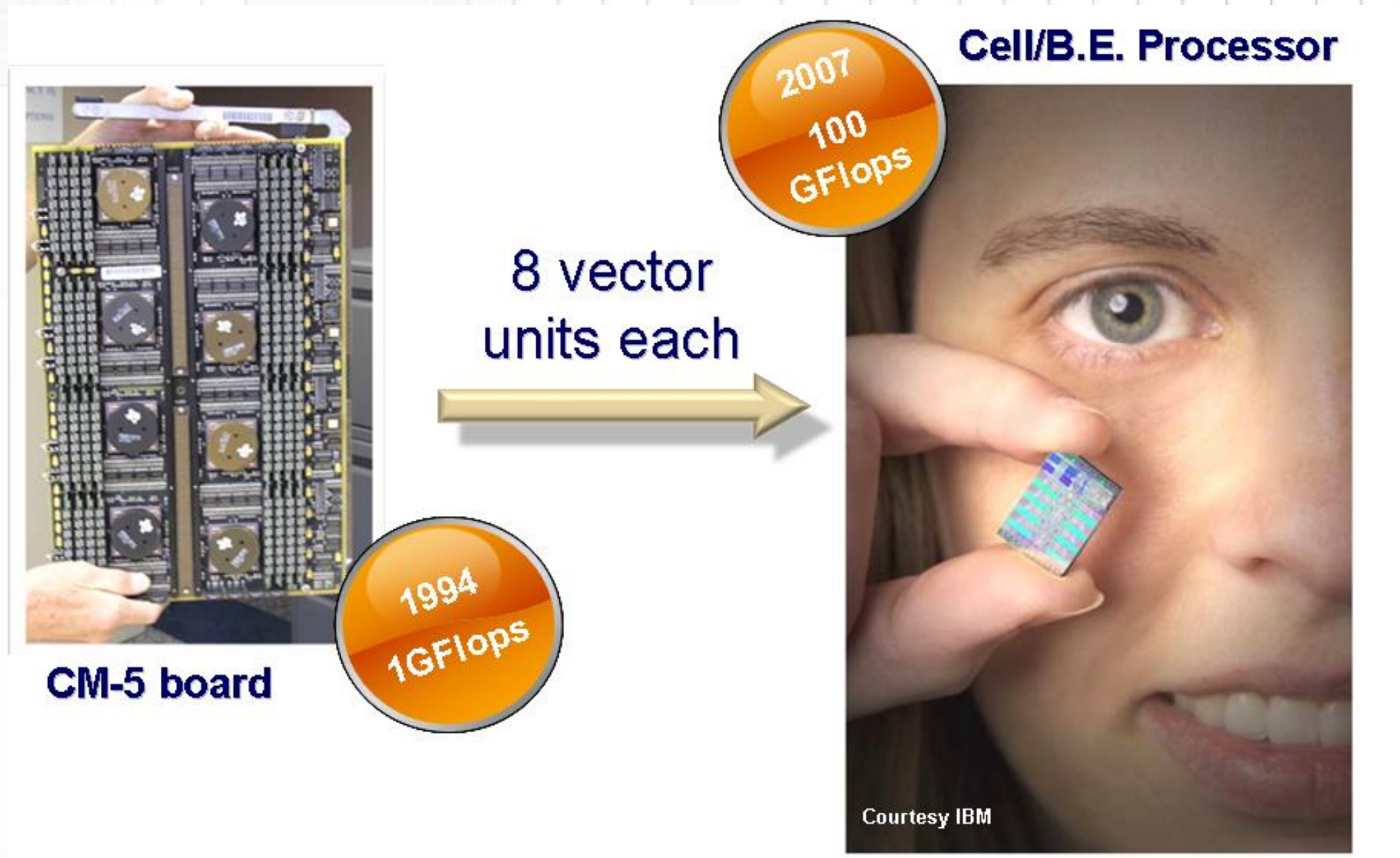
Support for Hand Optimization of Codes

Low Power Requirements

Based in COTS Technology

Multicore Processing Element

The Cell/B.E. Processor

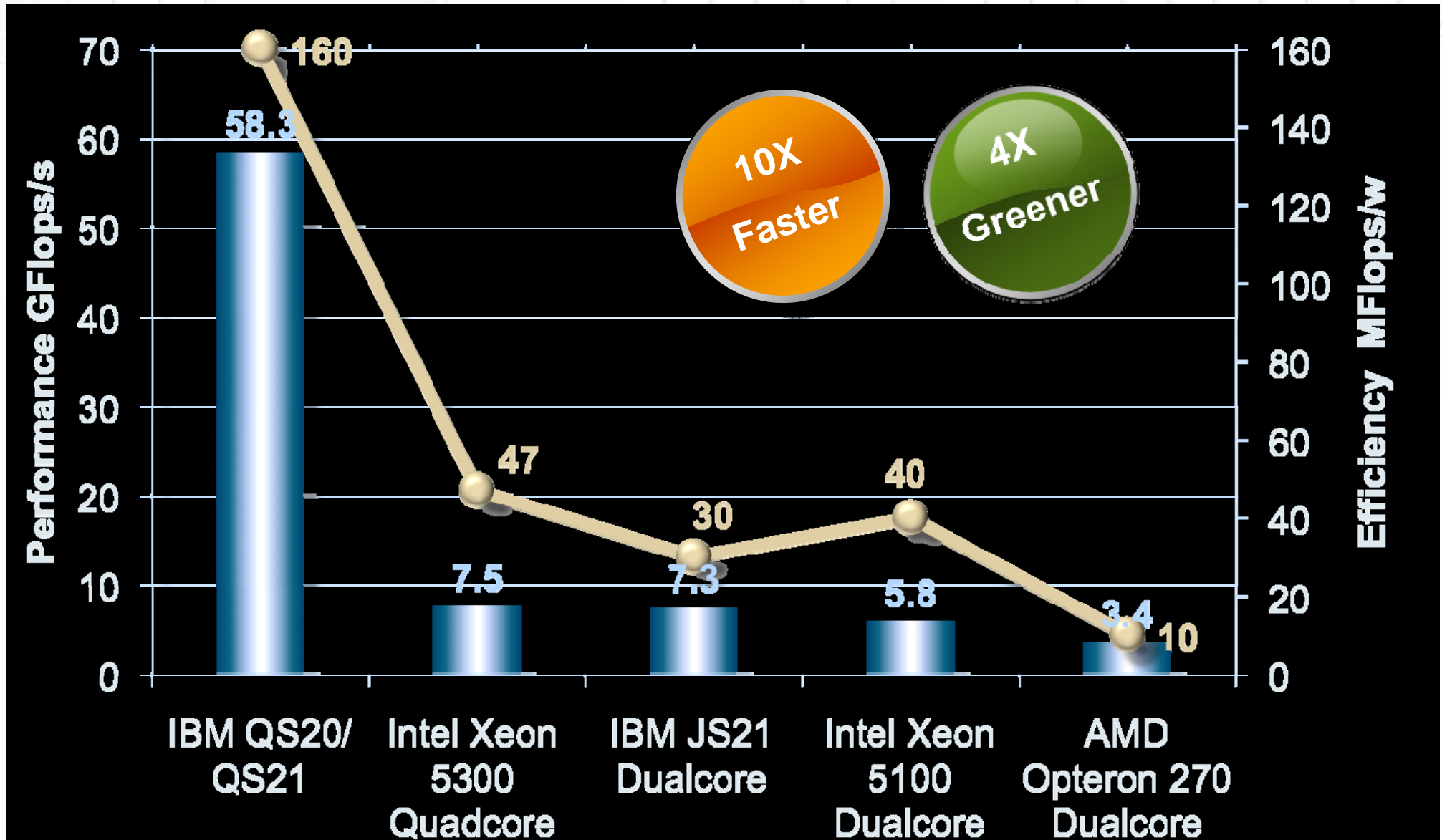


Kaleidoscope Supercomputer



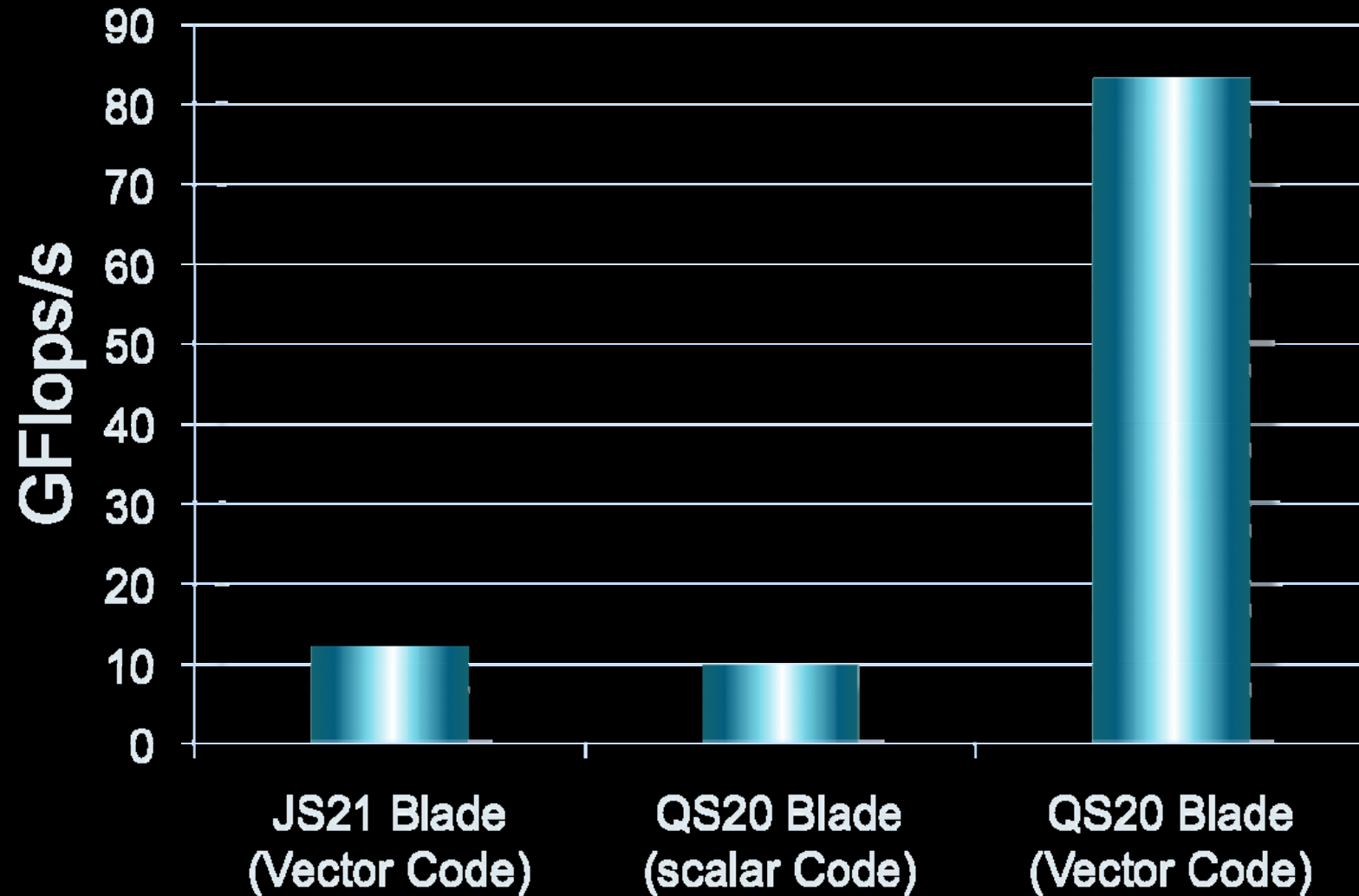
Kaleidoscope Project: The Solution

Repsol RTM Performance



Kaleidoscope Project: The Solution

Scalar vs. Vector RTM Performance



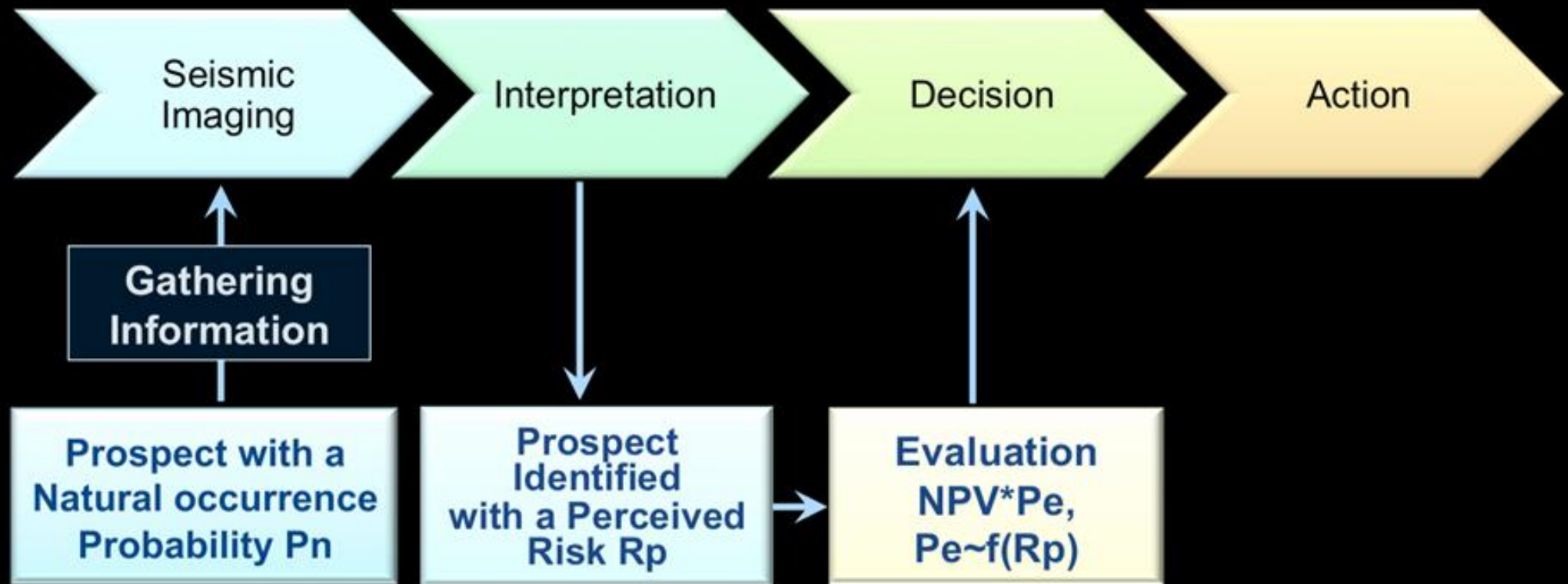
Imaging in the other Platforms

	Seismic Application	Speedup	Status	Cons.	Prog. Lang.
FPGA's	2D Kirchhoff PSTM ⁽¹⁾	11x	Test	Memory for data	HDL
	2D Seismic Modeling ⁽²⁾	3x			
	2D Shot Profile WE ⁽³⁾	10x			
GPGPU's	3D Kirchhoff PSDM ⁽⁴⁾	27x	Test	Memory and Bandwidth	CUDA C++
	3D Seismic Modeling ⁽⁵⁾	12x			
	3D Shot Profile WE ⁽⁶⁾	10x			
Cell /BE	3D Reverse Time Migration ⁽⁷⁾	10x	Production	No Constrain	C++ and Fortran Tools

- 1) He et al. (2004)
- 2) He et al. (2007)
- 3) Pell et al. (2007)
- 4) Morton et al. (2008)
- 5) Loddoch et al. (2008)
- 6) Deschizeaux et al. (2007)
- 7) Ortigosa et al. (2008)

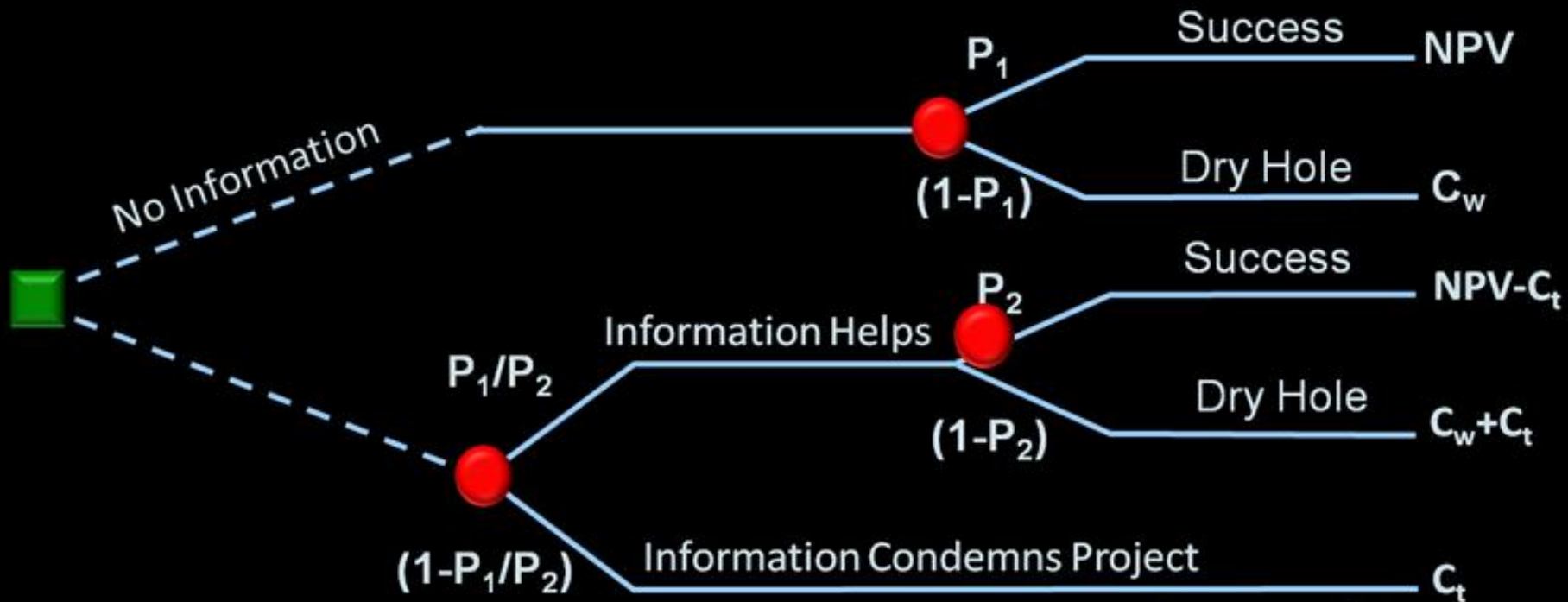
Kaleidoscope Project: The Solution

Gambling vs. Missed Opportunity



Kaleidoscope Project: The Value

Better Images for Better Decisions

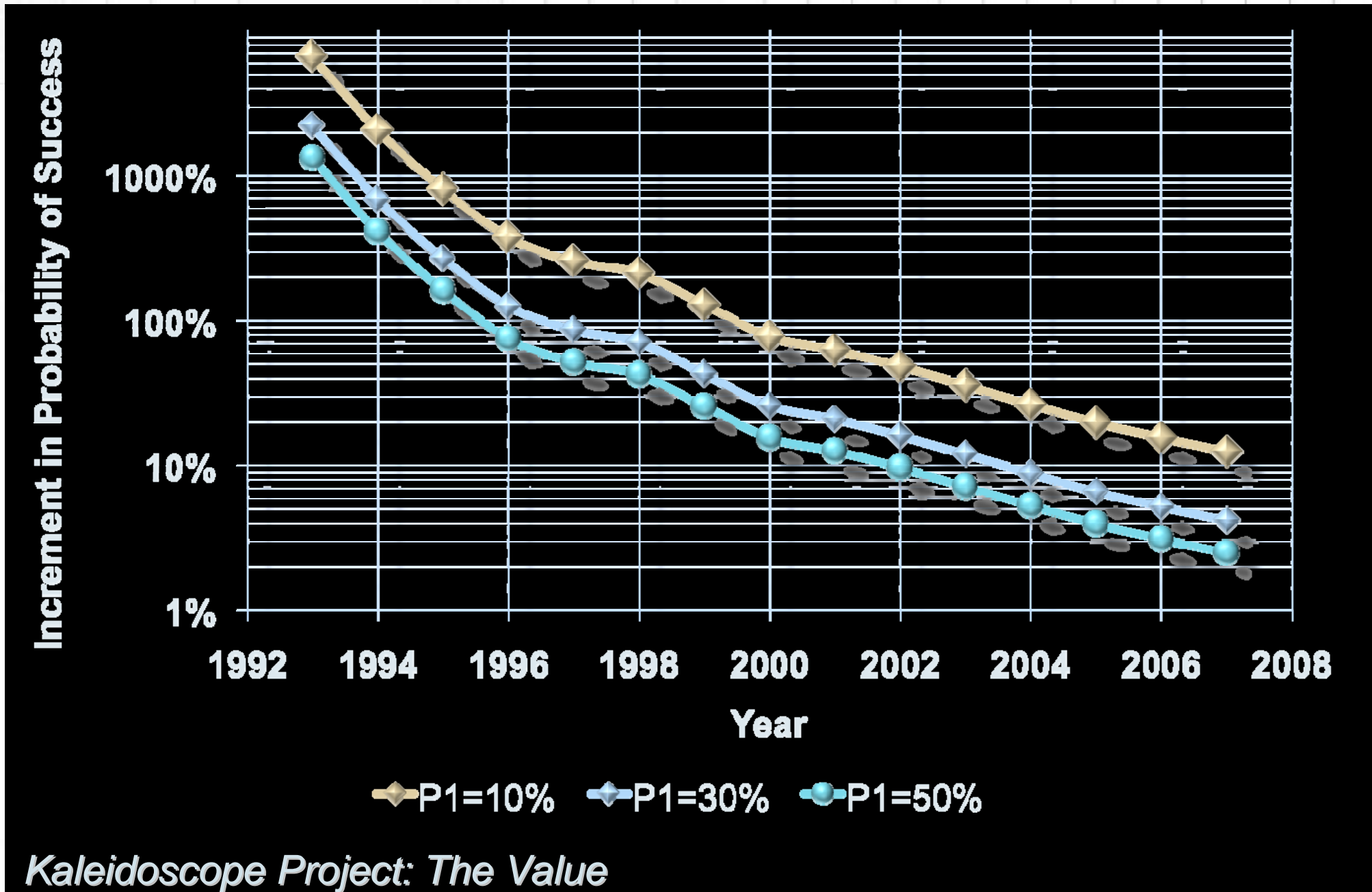


$$\Delta EMV > 0 \text{ if } I_{ps} > k(P) * \frac{(NPV + C_w)}{C_t \div 25}$$

↑ x4 ↑ x10
↓ C_t ÷25

Kaleidoscope Project: The Value

The Right Moment to Invest in Imaging



Project impact



E&P

FOX BUSINESS

COMPUTERWORLD

THE WALL STREET JOURNAL.

**spectrum
online**
For Tech Insiders

**OIL & GAS
JOURNAL**

THE AMERICAN OIL & GAS
REPORTER

EL PAÍS

upstreamonline

TV NET

FT

**pesa
news**

NNTV
SUA PLATAFORMA DE NOTÍCIAS

oilIT.com



**New Technology
magazine**

Offshore

**Oil and Gas
Investor**

Awards



- Computerworld
- IEEE Winner 2008
- Finalist 2008 EE Times ACE Awards
- Finalist 2008 Awards Petroleum Economist

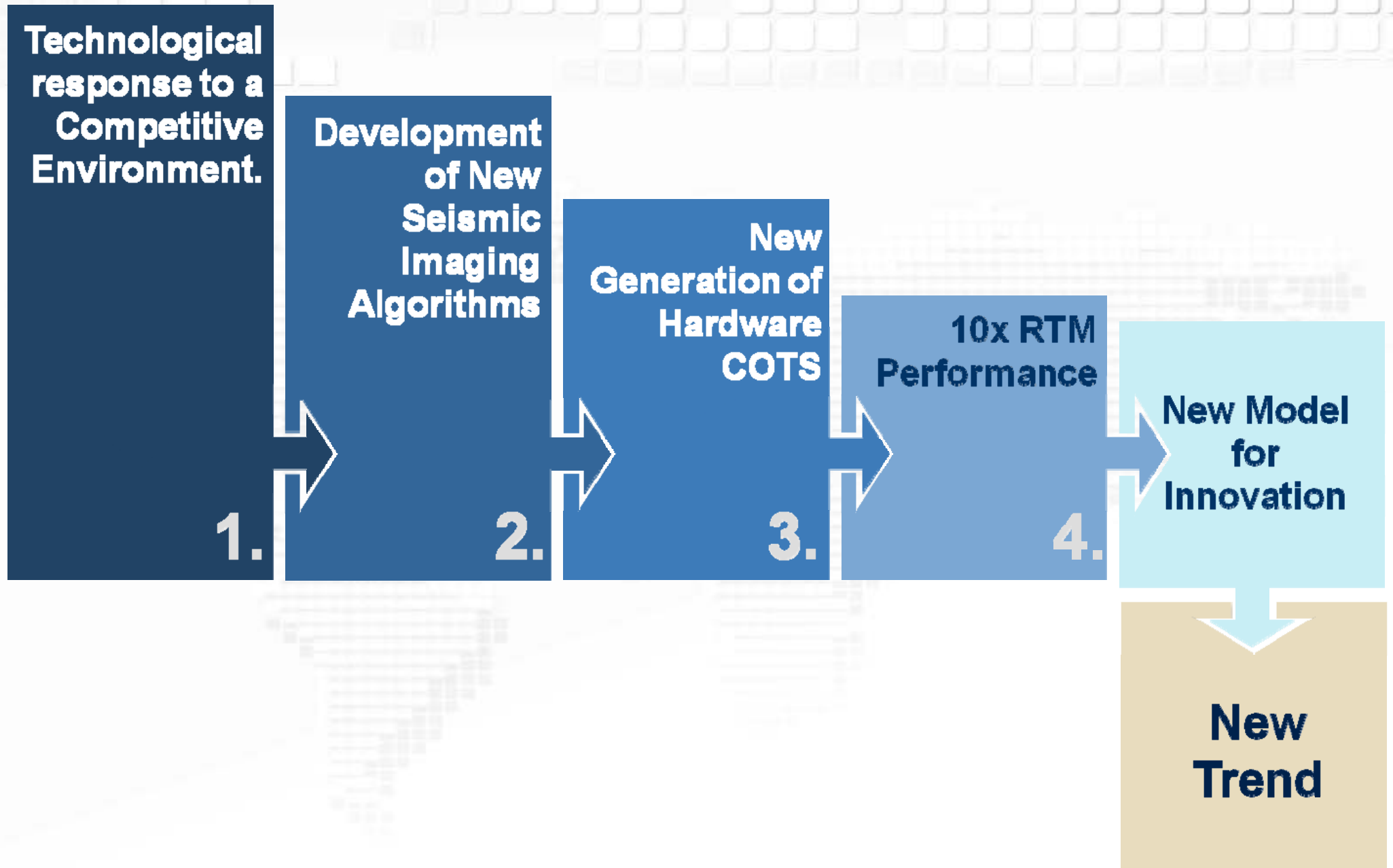
COMPUTERWORLD

ieee
spectrum

EETIMES

**PETROLEUM
ECONOMIST**
THE AUTHORITY ON ENERGY

Summary and Conclusion



REPSOL



Addressing the Challenge of Evolving Technology

Francisco Ortigosa
Geophysics Director

Repsol YPF
Houston Investors Field Trip

December 2008

REPSOL



Repsol E&P

Nemesio Fernández-Cuesta

Executive VP E&P

Repsol YPF

Houston Investors Field Trip

December 2008

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Agenda



- 1 Diagnosis 2004**
- 2 Achievements 2005-2008**
- 3 Growth Plan to 2012**
- 4 Final thoughts**

1 **Diagnosis 2004**

2 **Achievements 2005-2008**

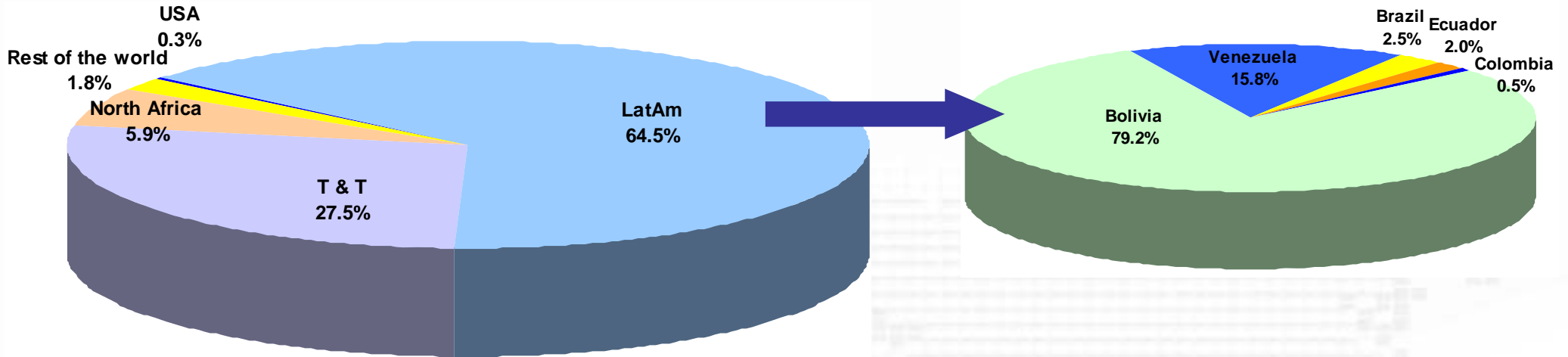
3 **Growth Plan to 2012**

4 **Final thoughts**

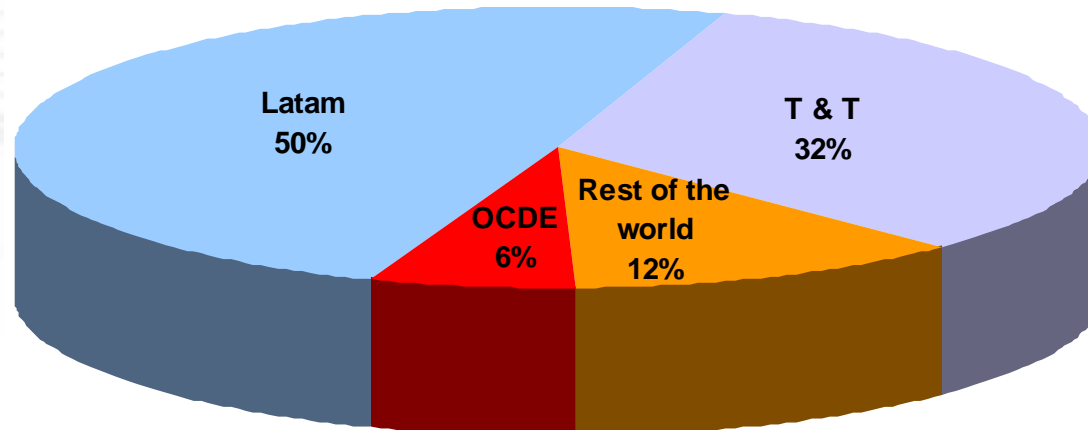
Diagnosis 2004: Focus on LatAm, scarce presence in OECD



Proved Reserves in 2004 (Net Boe)



E&P Capital Employed in 2004



Diagnosis 2004:

Needs of skilled professionals, method and organization



Human Resources

- 699 qualified employees (*) in E&P (Out of YPF-Argentina)
- 214 are Reservoir Engineering, Geologists and Geophysics
- Shortage of qualified employees for expected growth
- A single technical training program is not defined and implemented

Organization

- Need of improvement on Organization
- Exploration units decentralized
- Lack of standard methodologies/processes

YPF

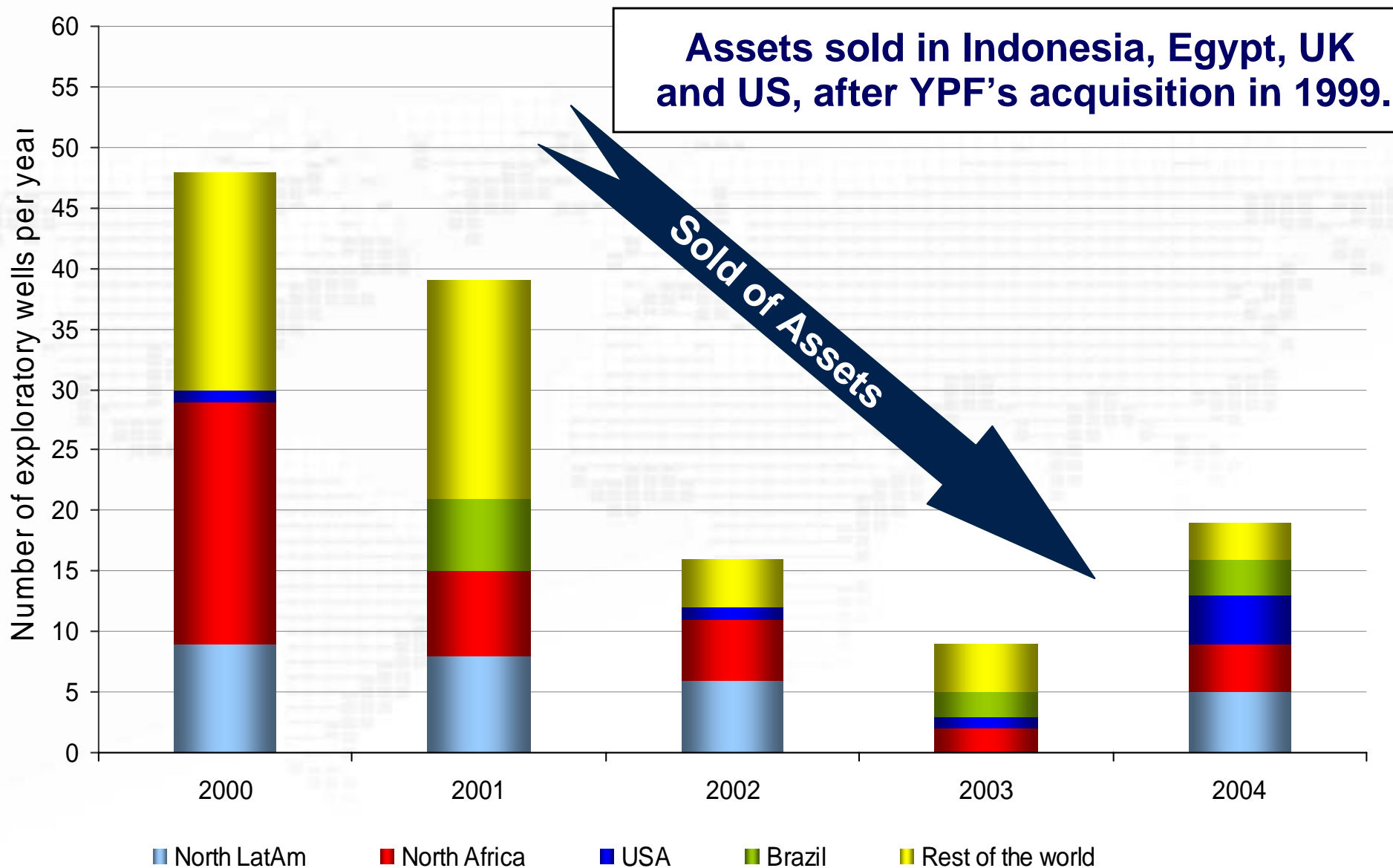
- Strong weight of YPF in the E&P. In 2004 YPF represented:
 - 63% of the capital employed
 - 48% of the proved reserves
 - 24% of the exploration investments
 - 64% of the development investments

(*) Number of employees include only technical staff, not included administrative and support staff.

Diagnosis 2004: Need to increase exploration activity



Number of Exploratory Wells drilled



Agenda



1 Diagnosis 2004

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Growth in Methodology (2005-2008)



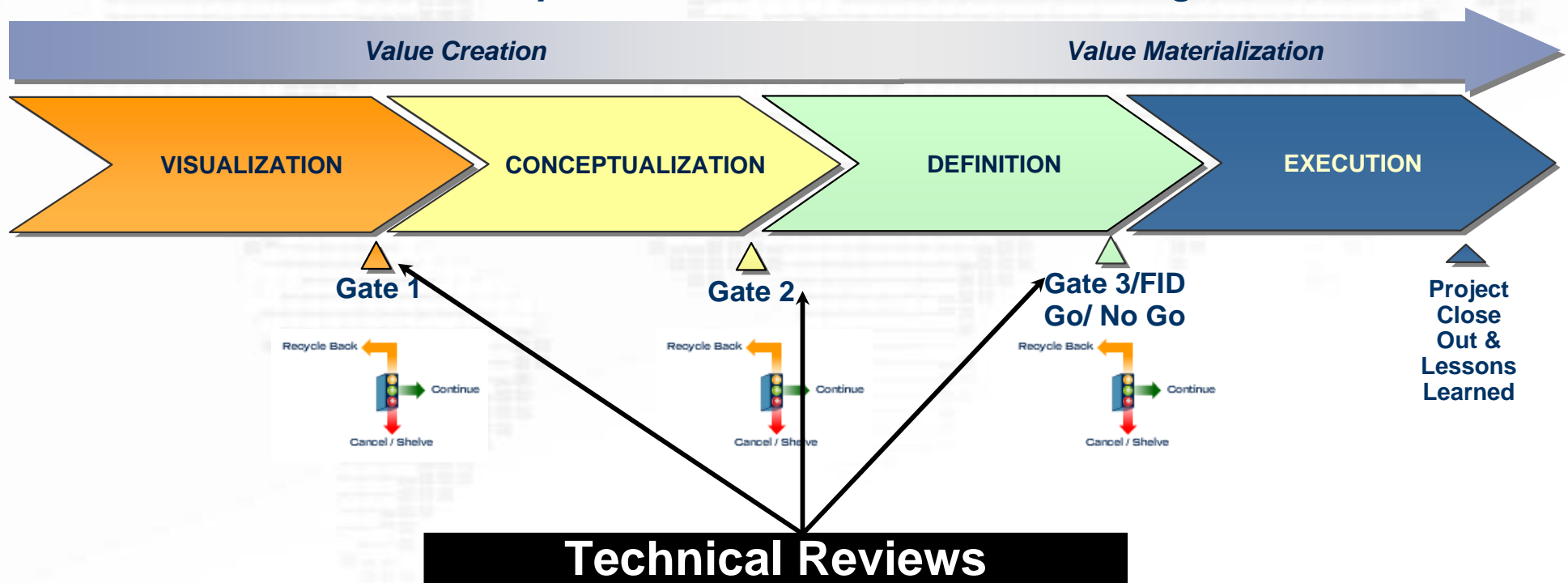
Organization

- Worldwide organization
- Establishment of Exploration Unit with worldwide scope
- Redesign of all business processes
- Reorganization of business units and regional reporting units
- Standard methodologies and processes applied throughout E&P
- Establishment of Quality Assurance Controls and Technical Reviews with worldwide competences in Exploration/Development and Production
- YPF: Separate organizations with the objective of YPF generating its own cash flow to finance its operations

Establishment of Quality Assurance

- Quality Assurance groups for exploration and development projects
- Technical Reviews...
- ...within Integrated Project Management (GIP) Processes

A decision driven process: “No more no less at the right time”

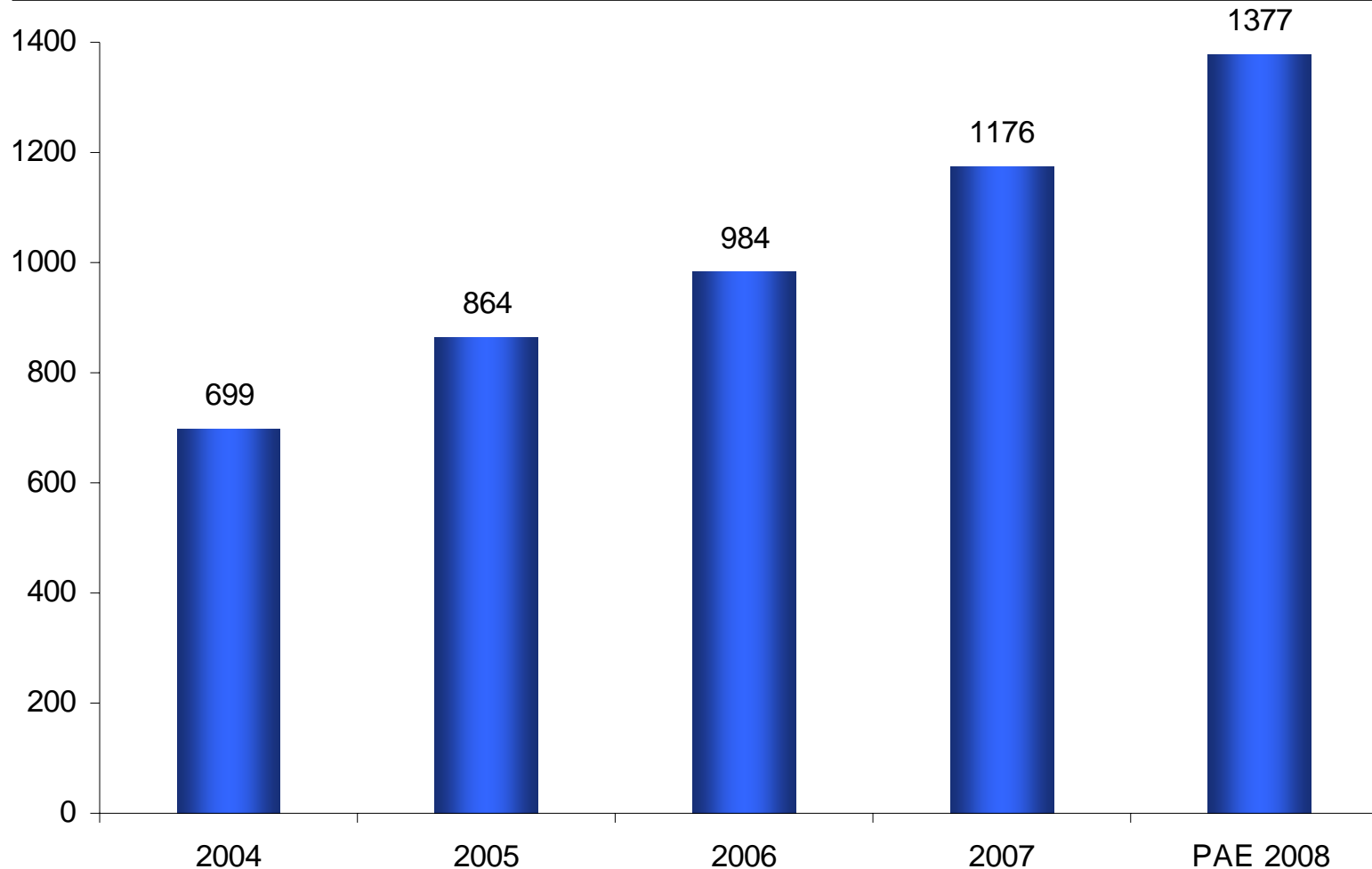


Growth in people and technical skills (2005-2008)



Technical staff evolution (*)

- 678 qualified employees incorporated to the Upstream in 2005-2008
- 237 of them are Reservoir Engineering, Geologists and Geophysics



(*) Number of employees include only technical staff, not included administrative and support staff.

Growth in People and Technical Capability



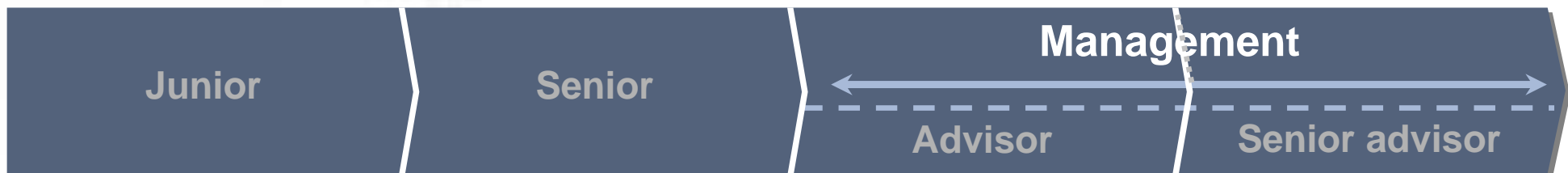
Technical Knowledge

TRAINING PATHWAYS	Number of Training Courses 2008
<ul style="list-style-type: none"> • Exploration Geology • Exploration / Development Geophysics • Development Geology 	9
<ul style="list-style-type: none"> • Reservoir engineering • Petrophysics 	8
<ul style="list-style-type: none"> • Production engineering • Maintenance engineering 	8
<ul style="list-style-type: none"> • Facilities engineering 	7
<ul style="list-style-type: none"> • Drilling & WO 	3
<ul style="list-style-type: none"> • Transversal <ul style="list-style-type: none"> ✓ Petroleum Business ✓ Project Management (GIP) ✓ HSE 	9

Technical Capability

- Single technical training program with a global learning plan
- Increase technical capabilities and contribute to E&P business growth as a whole
- Guide employees through the “technical” development in their field / specialty
- Enable the creation of an attractive and competitive value proposal to retain the current employees and to attract new candidates

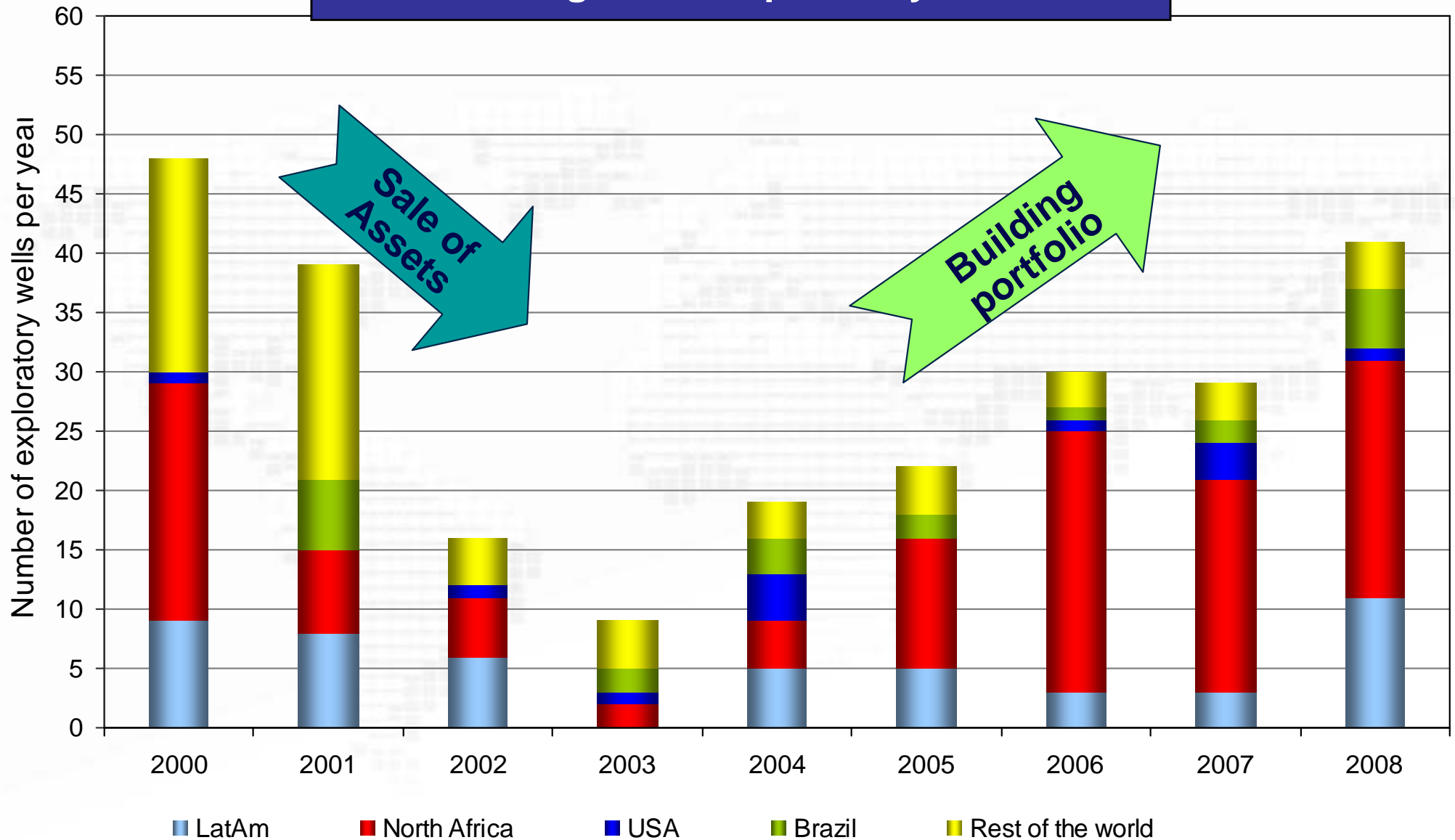
Total Courses 44



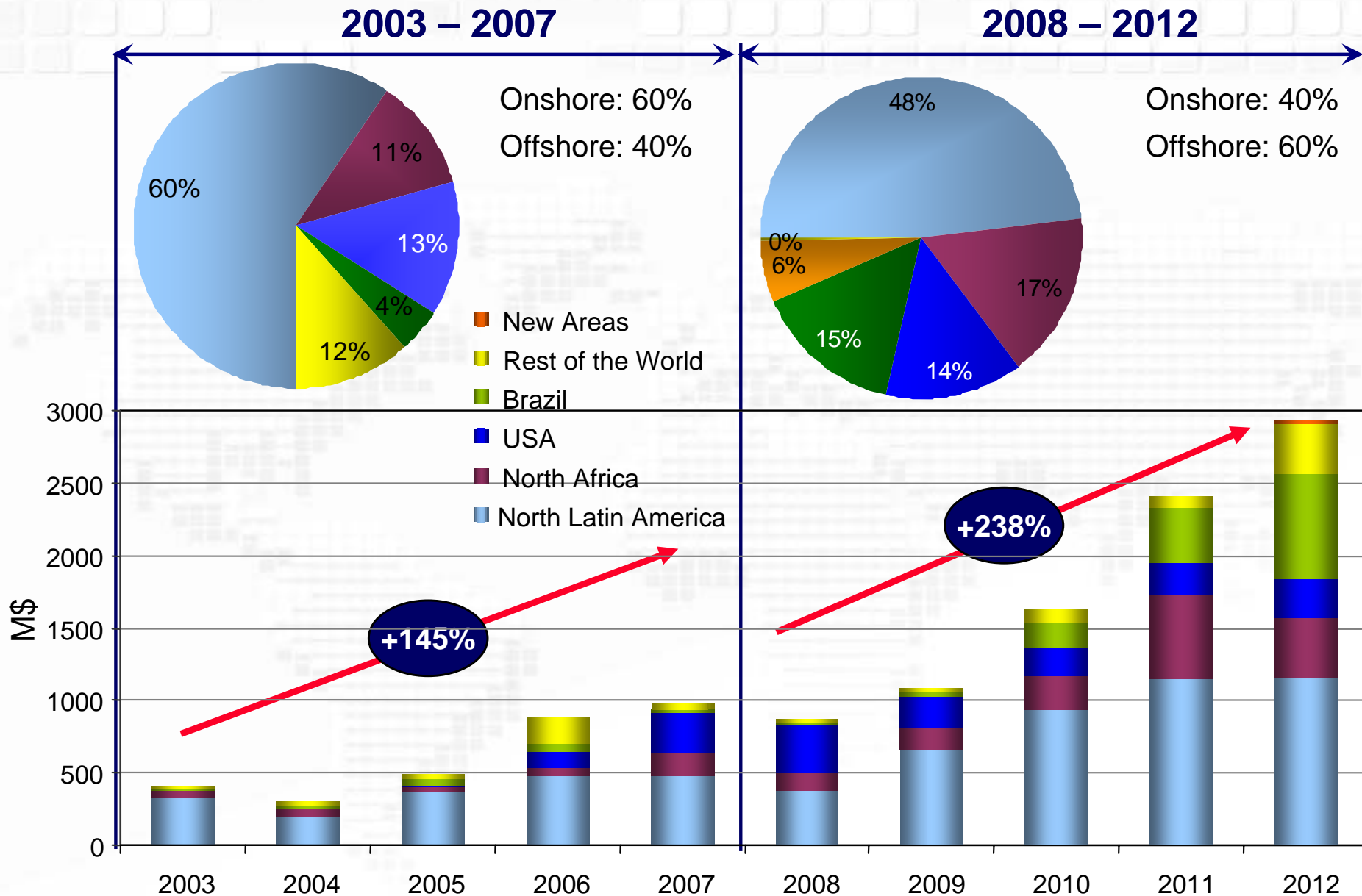
Growth in Exploration: Exploratory wells drilled (2000-2008)



Beyond 2009 the target is to maintain an average of 35 exploratory wells.



Growth in Development Investments



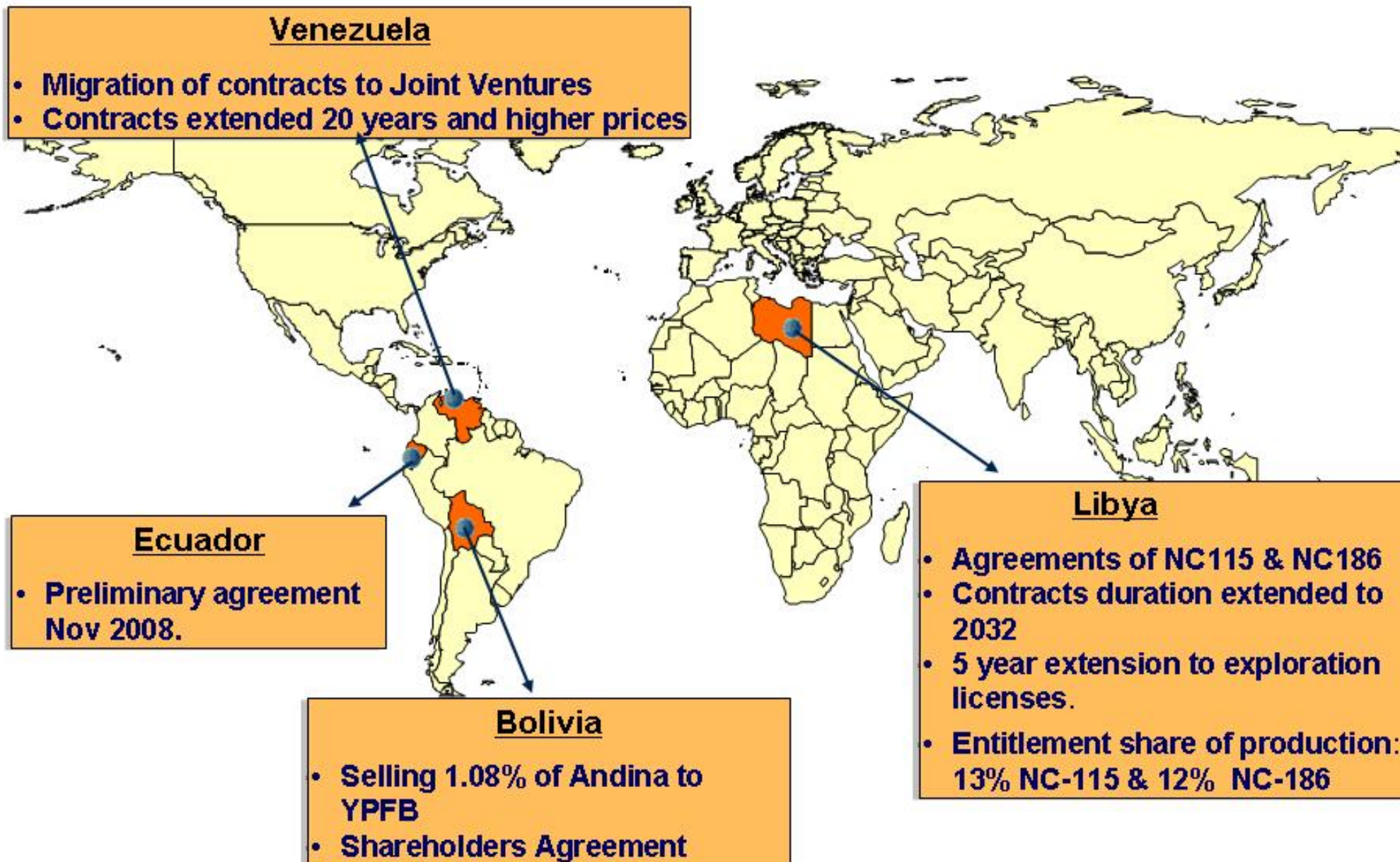
Growth based on specific Technology

- Improve quality of subsurface image and capabilities in Seismic Processing. Subsalt plays. (Kaleidoscope Project)
- Phased approach in increasing operational Deep-Water capabilities:
 - Moving from operating exploration from 600m to 2,800m
 - Agreements for future co-operation with leading companies (Chevron / Petrobras)



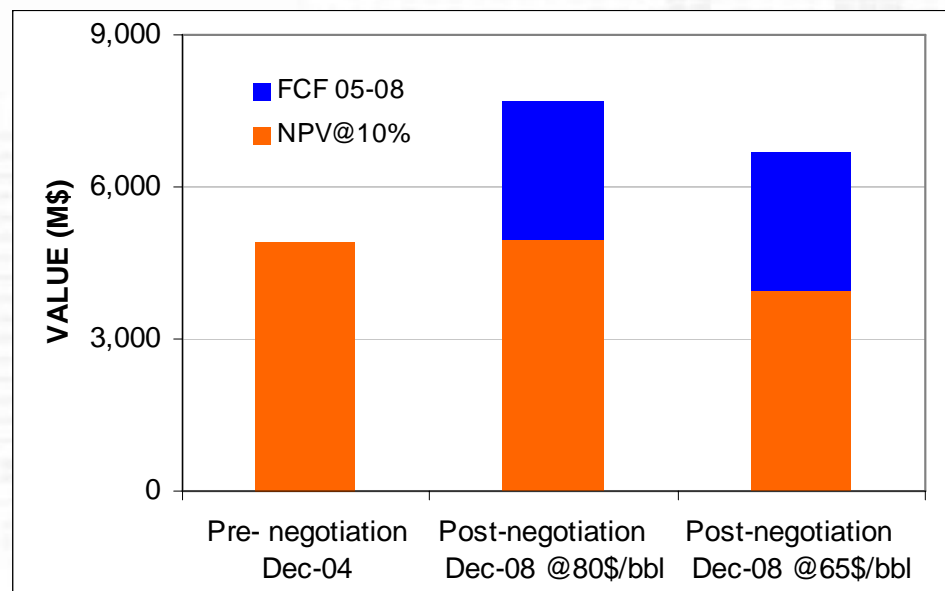
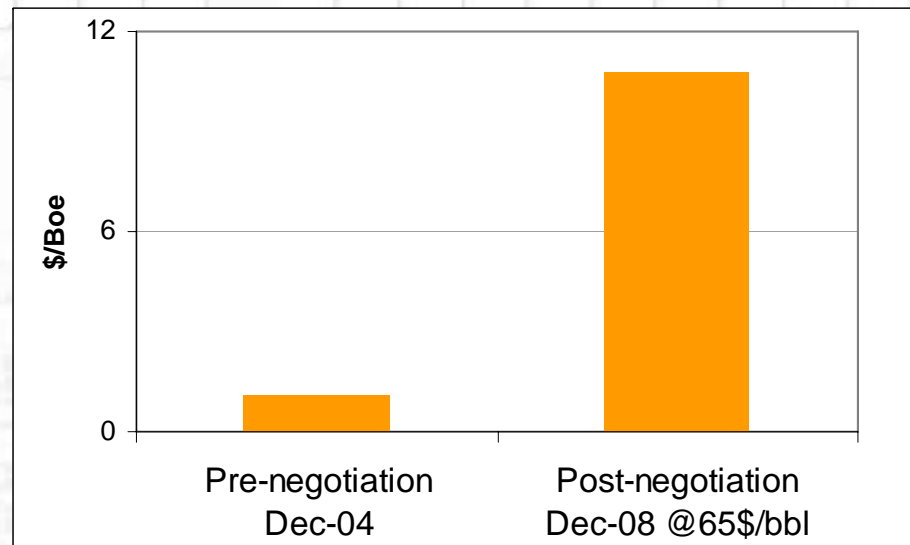
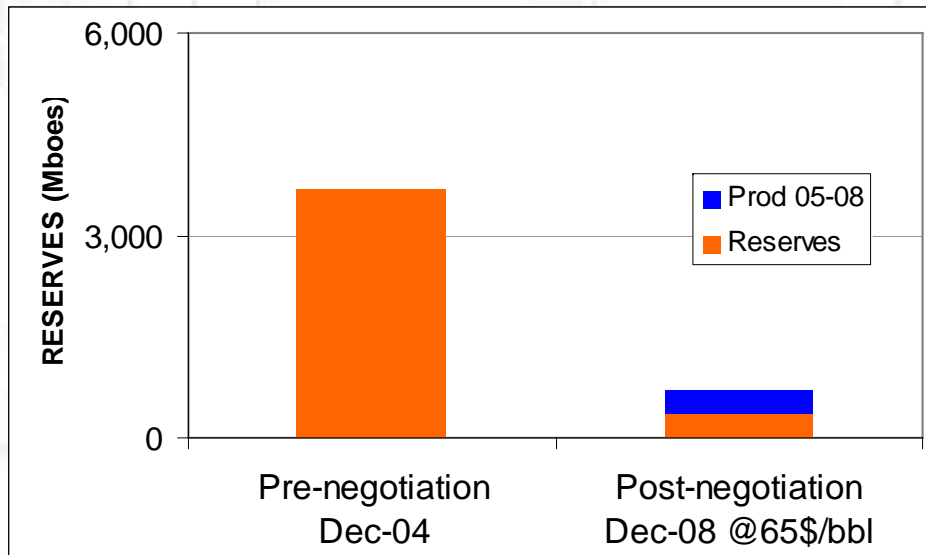
Contract's renegotiations

Maintain assets value: goal achieved



Contract's renegotiations

Maintain assets value: goal achieved



Upstream: Core Areas



Traditional Core areas

... difficulties to continue growth



New Core areas ... opportunities



Platform to future growth....

North Africa

Limited acreage available and limited profitability due to new current contracts

North LatAm

Fiscal instability (Venezuela, Ecuador, Bolivia)

Trinidad: low potential available; **Peru:** Good acreage with high future potential

Colombia: opportunities with limited potential; **Cuba, Guyana y Suriname:** evaluating its potential. Good strategic position in case of success.

US Gulf of Mexico

High Potential blocks obtained in Lease Sale 205 and 206

Active market with Farm-in opportunities. High technical knowledge of the area (Kaleidoscope project)

Brazil

2nd company in terms of acreage, after Petrobras. Strategic position in high potential plays "Pre-Salt". Carioca-Guará discoveries

Alaska

Good strategic position with large acreage in the area

Canada and Norway

3 blocks awarded in Newfoundland and Labrador Canada Offshore Area. Bids offers in 20th Licensing Round and APA 2008 in Norway

West Africa

Several blocks in interesting areas (Sierra Leone, Liberia, similar to Mahogany play)

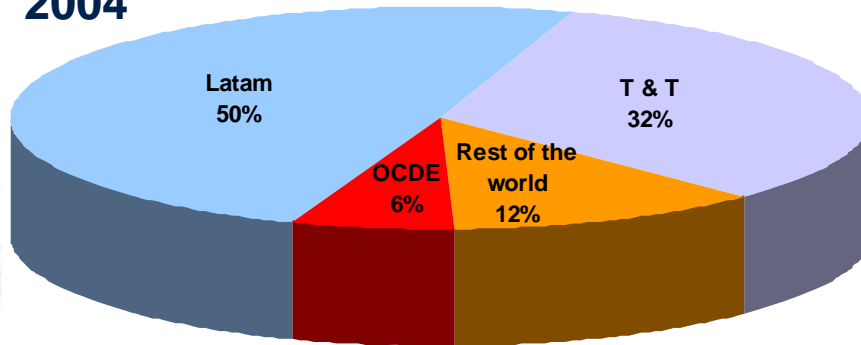
Gas in Peru, Brazil and Bolivia

Rebalance Group portfolio towards OECD and core businesses

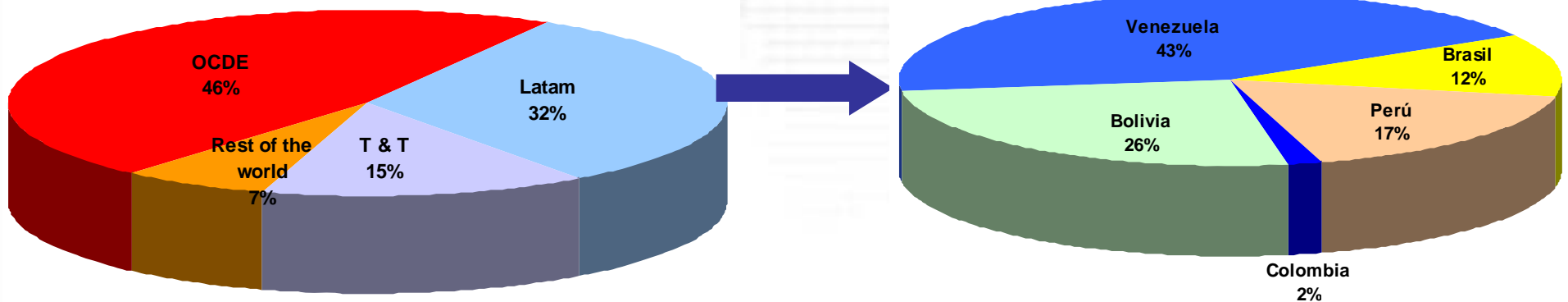


Capital Employed

2004



Sept 2008



Top ten discoveries (IHS)

Improved Upstream performance



IHS Top 10 worldwide discoveries in 2008 (up to September 08)

Country	Basin	Block / Field
Brazil	Santos basin	Iara
Brazil	Santos basin	Jupiter
Brazil	Santos basin	Guara
Peru	Ucayali basin	Kinteroni 1X
Bolivia	Chaco basin	Huacaya
Brazil	Santos basin	Bem-te-vi
Iran	Zagros province	Balaroud 1
Australia	Bonaparte basin	Blackwood (MEO) 1
Egypt	Nile Delta basin	Satis 1
Russia	Mangyshlak basin	Tsentralnoye

Repsol 3 discoveries among Top 10

Repsol main discoveries 2005 - September 2008

Country	Basin	Block / Field
Brazil	Santos basin	Carioca
Brazil	Santos basin	Guara
Peru	Ucayali basin	Kinteroni 1X
Peru	Ucayali basin	Buenvista, Delfin, Raya
Bolivia	Chaco basin	Huacaya
Libya	Murzuq basin	NC-115, NC-186: I/R
Libya	Murzuq & Sirte basin	NC 186: J, K, L, Q, Y, NC-200: E, G, H, NC-210: A,B,C
Trinidad y Tobago	Columbus basin	Coconut
Colombia	Llanos basin	Rondon, Capachos
Argelia	Reganne	Reganne 5, 6, Kahlouche, AZSE-2

Agenda



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Ten key growth projects plus exploration drive organic growth of Core businesses



Downstream



Bilbao (Spain)
700 M€



Cartagena (Spain)
3,200 M€

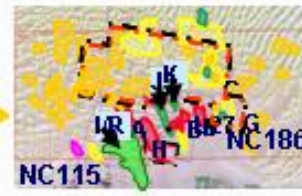


Sines (Portugal)
850 M€

Upstream



GK/Shenzi (GoM)
700 M€



Libya I/R
100 M€



Block 39/57 (Peru)
350 M€



Regganne (Algeria)
450 M€



Carioca-Guará (Brazil)
500 M€



Exploration
575 (1) M€ pa

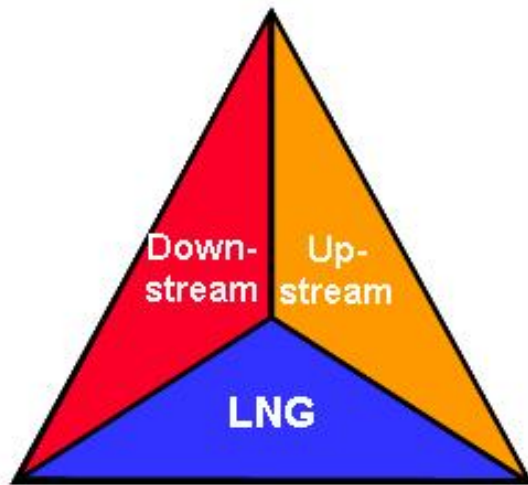
LNG



Peru LNG
400 M€



Canaport (Canada)
300 M€



X CapEx 2008-2012

Combined CapEx for key growth projects + exploration: € 12.3 B
High rate of return of 10 key growth projects: IRR > 15%

(1) Does not include €1.9B development investment associated to exploration discoveries

Upstream strategic lines and investment targets



CapEx 2008-12
(€ B)



Note: All figures exclude Argentina

(1) Includes other minor investments

(2) Exploration

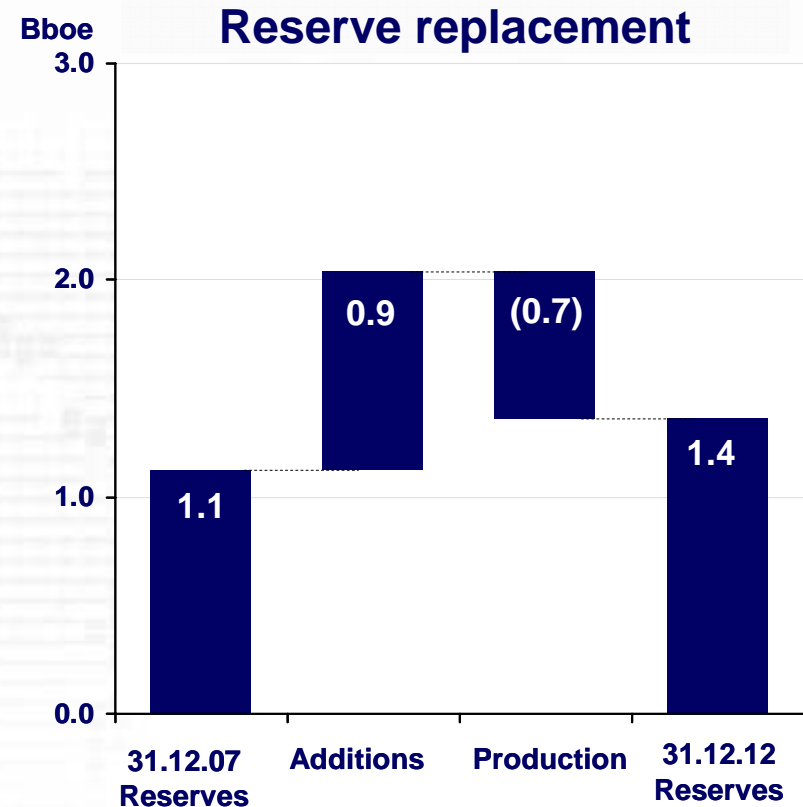
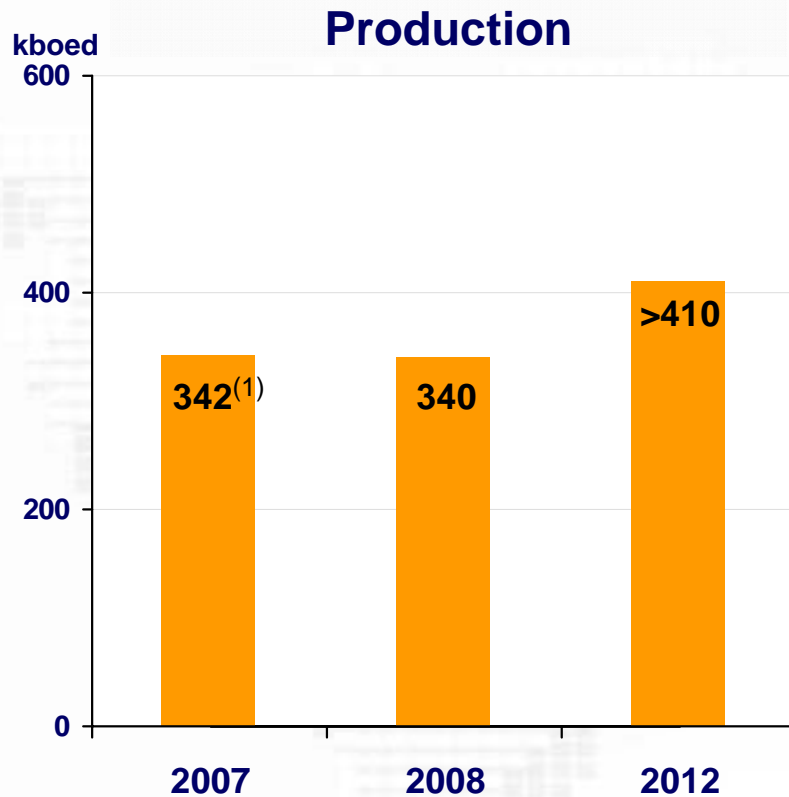
(3) Development associated to exploration discoveries

Strategic targets 2012: Upstream



**Production Growth 2008-12:
>5% p.a.**

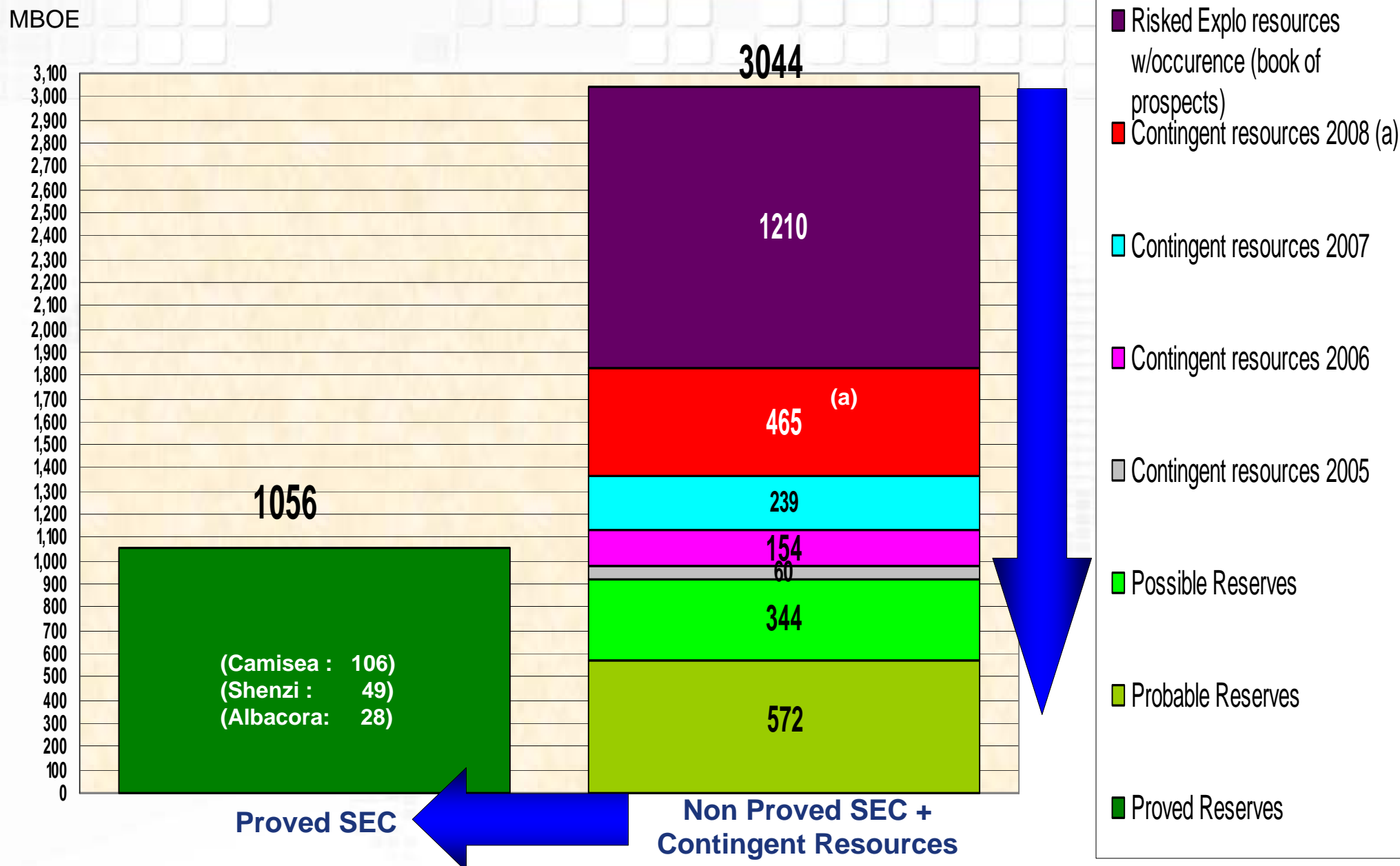
RRR: > 125%



(1) Adjusted for new contracts in Bolivia

Note: All figures exclude Argentina

Proved Reserves, non Proved Reserves and Contingent Resources @ 30.Jun.08 (Mboe)



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The company is better positioned to compete in the future due to:

- Rebalanced and diversified portfolio with more presence in OECD countries
- Improve in methodology, organization and processes, increase in technical professionals, more technical knowledge with trainings pathways, improved operational capabilities
- Technological achievements
- Flexibility to operational and markets environmental changes

Closing the gap for winning the future

REPSOL



Repsol E&P

Nemesio Fernández-Cuesta

Executive VP E&P

Repsol YPF

Houston Investors Field Trip

December 2008