



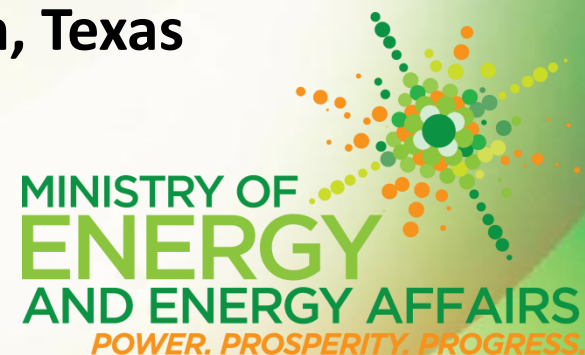
THE GOVERNMENT OF
THE REPUBLIC OF
TRINIDAD AND TOBAGO

The Ministry of Energy and Energy Affairs

Exploration Opportunities for Trinidad and Tobago Deep Atlantic Area (TTDAA)

IP and Nape Expo 2012 - Houston, Texas

<http://energy.gov.tt/>





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Overview

- Introduction to Trinidad and Tobago
Introduction to TTDAA
- What has changed?
- Taxation and Fiscal regime
- Speculative Model Chosen
- Studies undertaken and planned
- Analysis of Deep water Blocks



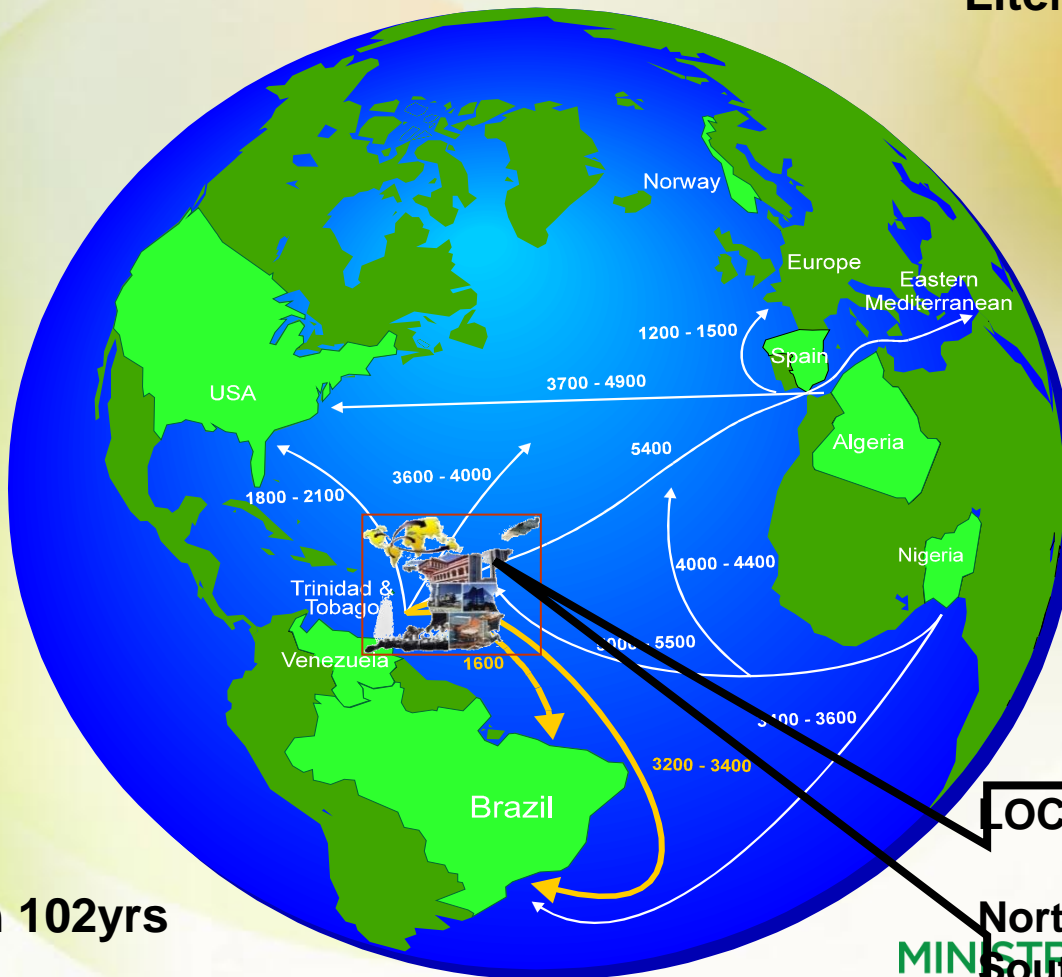
Gas utilisation began 50 yrs ago
Current Gas Production 4.2bcf/d

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Population - 1.3M

Labor Force - 0.5M

Literacy Rate - 88%



Commercial oil production began 102yrs ago
Current Production- 91,000 bopd

LOCATION

Northeast of Venezuela
 Southernmost of Caribbean
 Total Area - 1,864sq. mile
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About Us

- Discovered by Christopher Columbus in 1498
- Became a British Colony in 1802
- Mixture of races - African, East Indian, Chinese, Syrian, Lebanese
 - Celebrates 13 Holidays including Christmas, Divali, Eid-ul-Fitr





About Us

- Climate - wet and dry season
- Temperatures from 70-93 degrees
 - Trinidad is more industrialized
 - While Tobago focuses on Tourism and other Service Industry
 - Fun-loving people
- Strong focus on education





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Government of Trinidad and Tobago's Focus

- Sustainable development of the energy industry
- Provision of a competitive framework for investment
- Provision of gas for expansion of downstream industries
- Rebalance oil and gas production
- Enabling greater participation of nationals and national enterprises in the energy sector



Country Objectives

- Effective and optimal monetizing of the natural resources
- Security of country's energy supplies
- Protection and preservation of the environment
- Establishment of research initiative
- Training and development of nationals



What does Trinidad offer?

- Liberalised currency system
- Well established legal traditional system
- Equitable taxation system
- Open and transparent decision making system
- Stable democratic government
- Competitive fiscal incentives



What does Trinidad Offer?

- Substantial petroleum reserve base
- Competitive gas pricing regime
- Strategically located in the Atlantic Basin with strong markets close by
- Highly skilled labor force
- Well developed land and harbor infrastructure



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TTDAA

The Trinidad and Tobago Deep water acreage encompasses an area 40,000 square kilometers , with water depths ranging between 1000 to 3500 metres. The area is divided into 36 blocks and has had limited exploration and was first offered by Competitive Bidding in 2006. The acreage is east of Trinidad's currently producing oil and gas fields; though different play types are expected.



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Birth of TTDA 2D

Memorandum of understanding between Government of the Republic of Trinidad and Tobago (GORTT) and eleven (11) multinational energy companies with Petrotrin standing in as the 12th but acting as the Project Manager on behalf of MEEA (procurement / tendering / client representation)

- Engaged in several years of prior industry interest and support especially after deepwater exploration campaign of the late 1990s. MOU finally secured in 2002 with Veritas having eventually won the tender to shoot with Robertson doing the processing
- Cost of survey including final deliverable product was calculated at US\$500,000 per participant with the mandate of putting out a “ultradeep water” Competitive Bid Round by 2006



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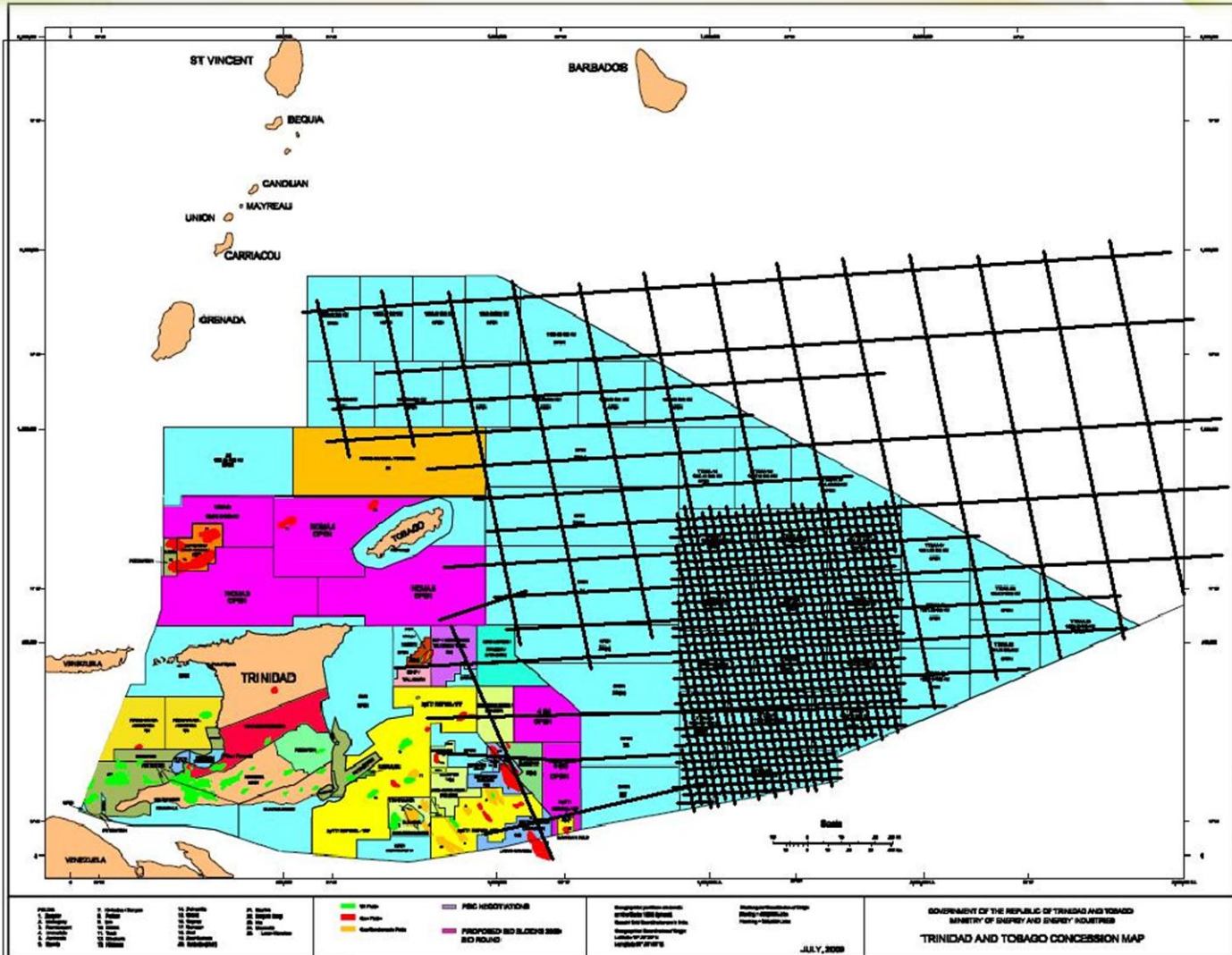
Birth of TTDA 2D

- First attempt in conducting a full scale exploration and reconnaissance of the deep waters within the sovereign limits of Trinidad and Tobago marine acreage
- Touted as the “final frontier” for the hopeful discovery of a new oil and gas province
- Approximately 12,337 line km in length acquired in a 4 x 4 km grid including long regional lines



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TTDAA 2002 2D Survey Outline (12300 line km approx) Concession Map Overlay





What has changed?

TTDAA 2006 -> 2010 -> 2011/12

Taxation

1. Reduced Taxation terms
2. Improved Fiscal regime
3. No Signature Bonus
4. No State carry-on participation
5. Streamlined Competitive Bid Process

Technical

1. Increased size of blocks (800 to 1000 sqkm)
2. Additional seismic survey (PGS 2D)
3. Reprocessing (Time and Depth) of 12,300 line km TTDAA 2D by Spectrum
4. Commissioned comprehensive Deepwater Study by DGA Consultants
5. New GXT reprocessing of Span Lines
6. New EMGS survey proposed
7. Increased Data Package Contents



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Competitive Bidding Process

Technical Review of Open Acreage

Nomination - companies can indicate blocks of interest

Blocks offered for competitive bidding-
Competitive Bidding Order (CBO)

Bids evaluated and recommendations made
Technical Evaluation Committee Overview Committee, Cabinet

Blocks awarded;
Production Sharing Contract signed



Deep Water Exploration Commercial Terms (re-emphasised)

Conventional styled (non taxable) PSCs, with the following features:

- GORTT's Share of Profit Petroleum are in lieu of **taxes** with exception of the payment of Withholding Taxes and Stamp Duty
- Ring-fenced – There will be no consolidation
- Profit Shares are biddable, matrices will be open with no constraints to bidding (Production is incremental)
- Financial Obligations are fixed in the Contract
- Cost Recovery Limit fixed at 60%
- No carried Participation
- Fair Market Value as defined in Petroleum Taxes Act is utilised for the pricing of gas



Deep Water: Profit Share Matrices

Crude Oil

Price MBOPD	A	B	C	D
	< \$50.00	\$50.00 - \$75.00	\$75.00 - \$100.00	> \$100.00
	%			
< 75	X	X	X	X
75 - 100	X	X	X	X
100 - 150	X	X	X	X
150 - 200	X	X	X	X
> 200	X	X	X	X

Natural Gas

Price MMCFD	A	B	C	D
	< \$4.00	\$4.00 - \$6.50	\$6.50 - \$9.00	> \$9.00
	%			
< 200	X	X	X	X
200 - 350	X	X	X	X
350 - 500	X	X	X	X
500 - 750	X	X	X	X
750 - 1,000	X	X	X	X
> 1,000	X	X	X	X

X represents the Governments Share of Profit Petroleum which is biddable

Windfall Feature:

$$BR + 70\% * [(P - US\$100.00) / P] * (1 - BR)$$

Where:

BR is the base rate at Column

D

P is the market price

Cost Recovery: 60%

No carried participation

Windfall Feature:

$$BR + 70\% * [(P - US\$9.00) / P] * (1 - BR)$$

Where:

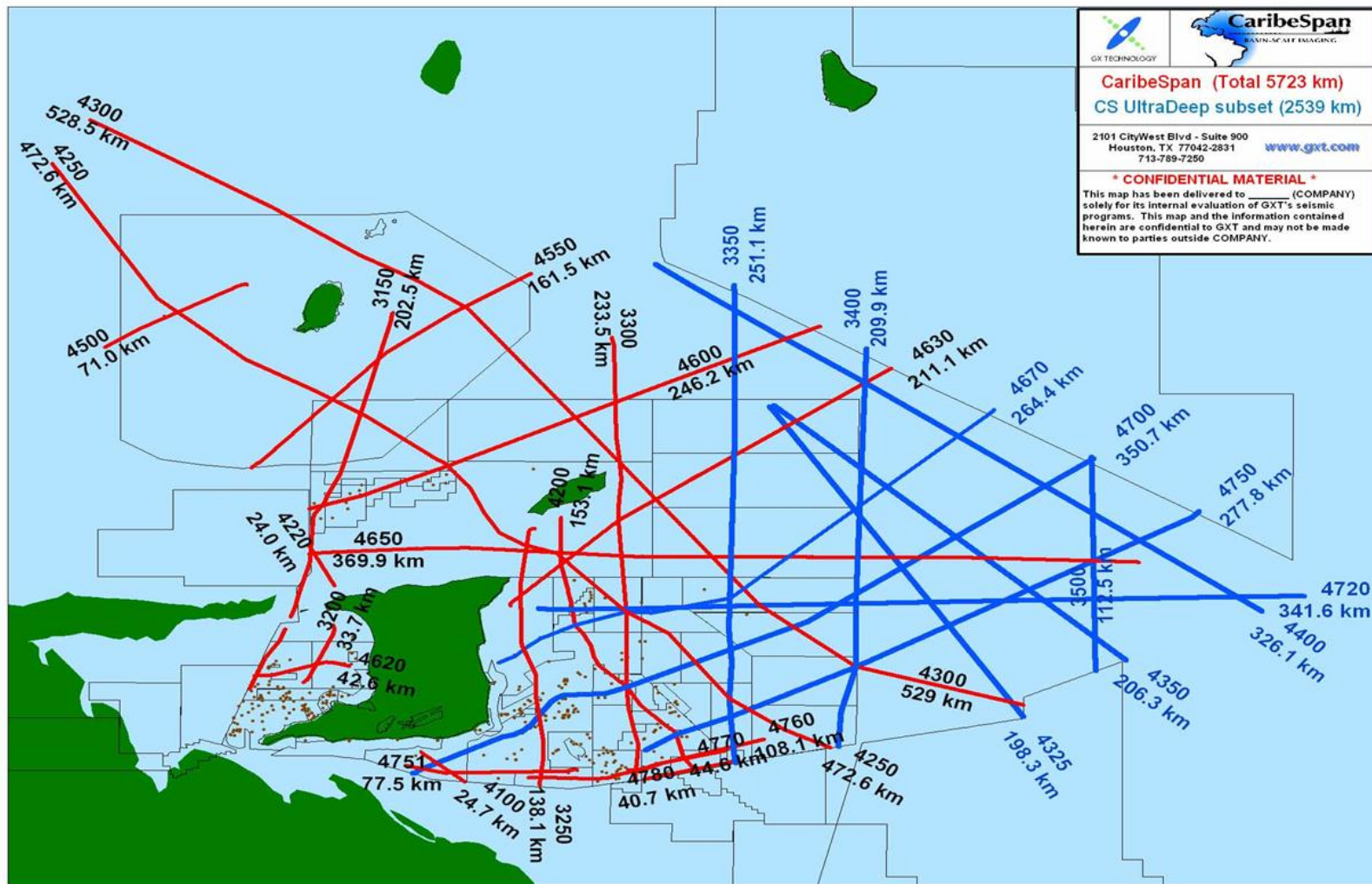
BR is the base rate at Column

D

P is the market price



GXT Span 2D Lines 2004 (Depth Reprocessing in 2011 – Cretaceous Imaging)





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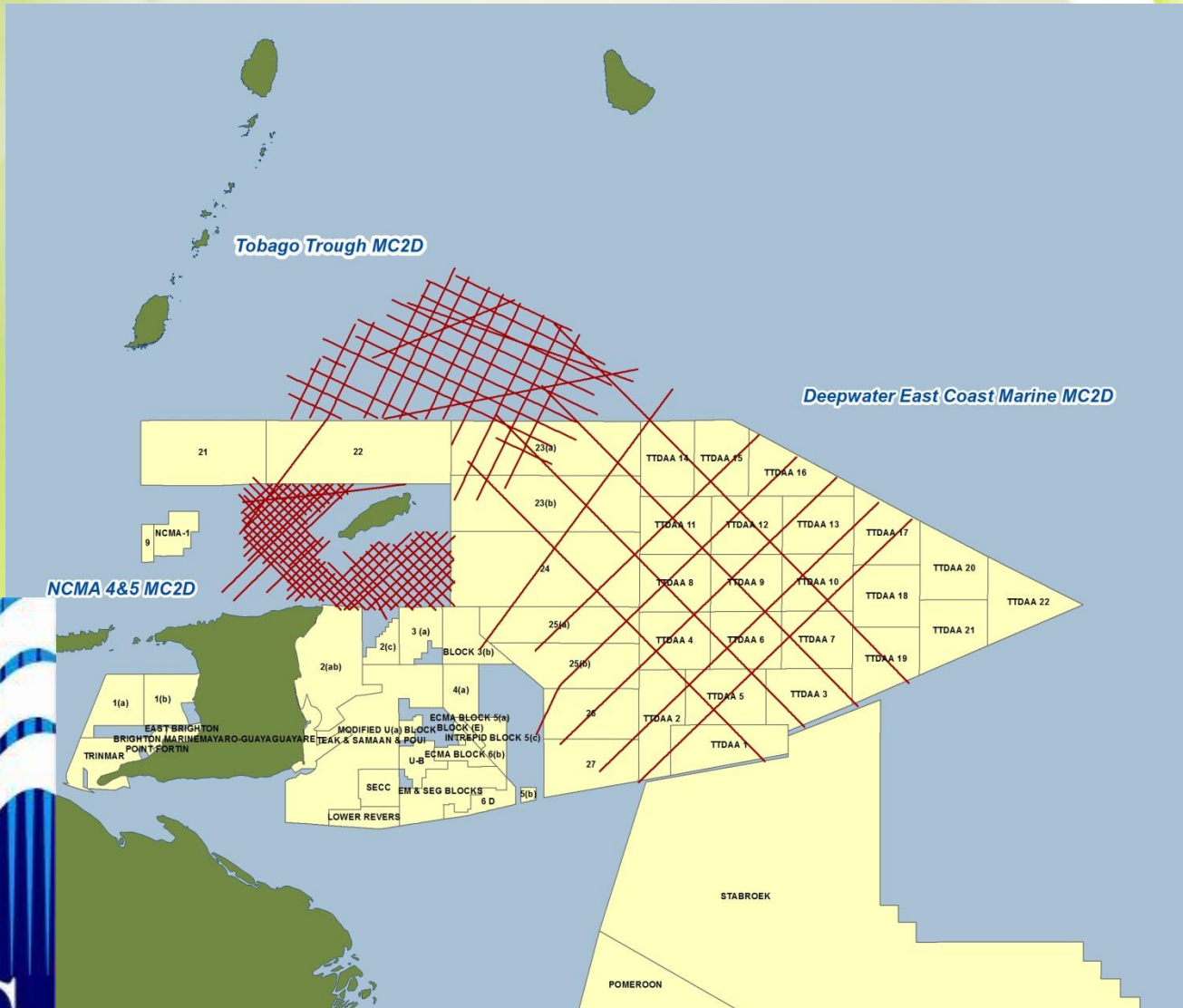
Reprocessing Objectives

- Improved Pre-processing, to include Noise and Multiple attenuation .
- Improved velocity models, to include Lateral velocity variations in Tertiary,(mobile shale vs basement or sandstones), and focus on Imaging the Cretaceous.
- The PSDM will image deeper than the current 18km Max Depth will be 40km.
- RTM and/or Beam PSDM will be tested as possible replacement to Kirchhoff PSDM
- Create Depth/Interval Velocity Volume for the survey area



PGS 2008 MC2D – 6834 line km

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BioSTRATIGAPHIC ASSOCIATES TRINIDAD LIMITED

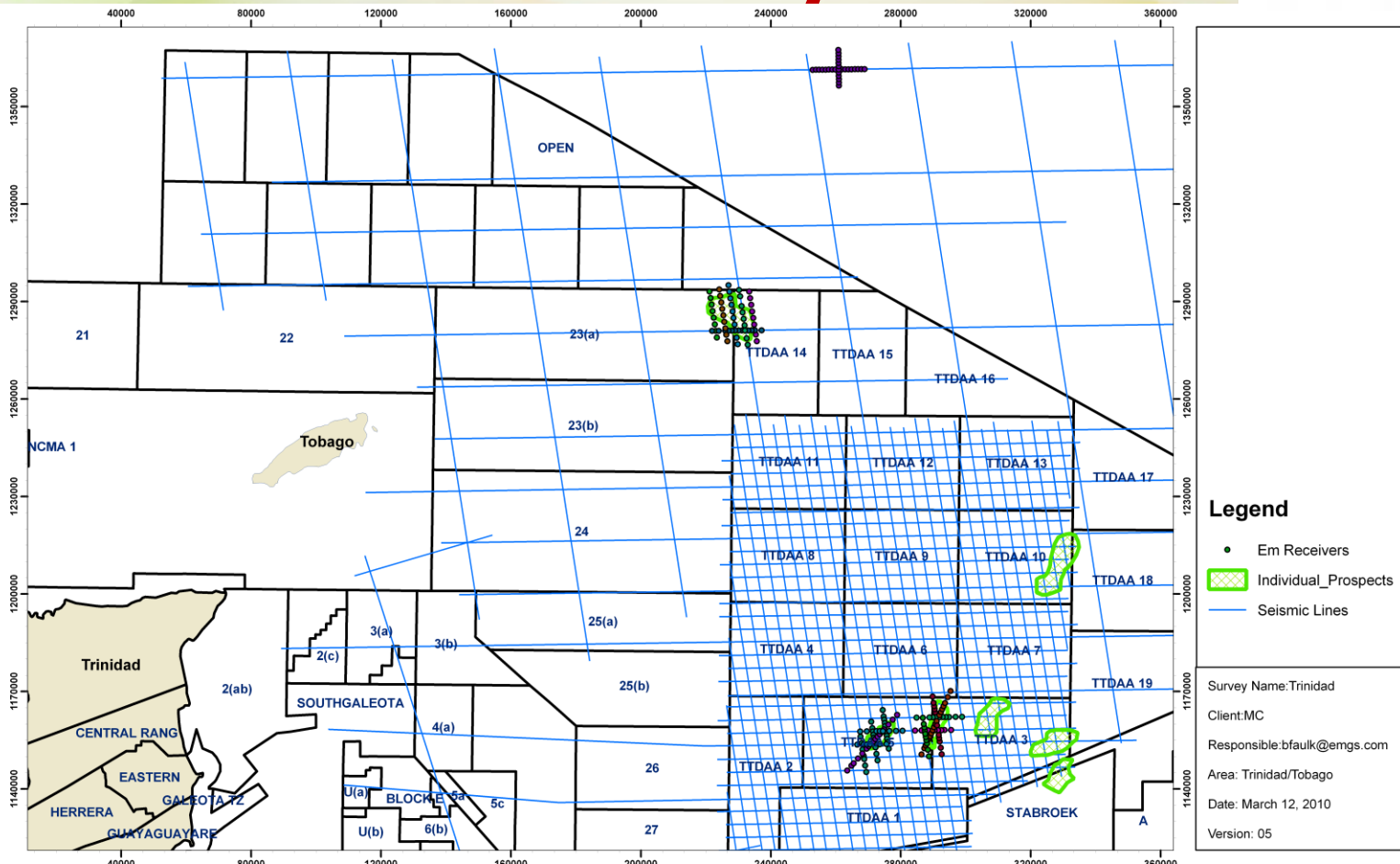
The focus of this study is to provide an integrated biostratigraphic database on the Late Neogene sequences that can be utilised for sequence stratigraphic interpretation, shelf to deep water well correlation, and environmental modelling and tie to the deep water seismic grid



Planned EM Deep Water Survey



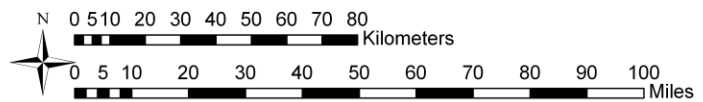
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Legend

- Em Receivers
- ▭ Individual_Prospects
- Seismic Lines

Survey Name: Trinidad
 Client: MC
 Responsible: bfaulk@emgs.com
 Area: Trinidad/Tobago
 Date: March 12, 2010
 Version: 05



Comments:
 WGS-84 UTM Zone 21 South
 ArcGIS mxd File: New_Trinidad.mxd



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Dynamic Global Advisors

Trinidad Joint Study Team Phase I Report

A New Look at Eastern Deepwater Trinidad;
Seismic Interpretation & Exploration Potential

Available from DGA

Trinidad Joint Study Team Phase II Report

Basin to Leads – Risks and Reserves:
Exploration Potential of the Trinidad & Tobago Deep Atlantic
Area

Available from MEEA




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Dynamic Global Advisors

The results of the technical studies have established play concepts, analogues with other basins, identifying leads and potential hydrocarbon reserves

- Used extensive Columbus Basin Wells
- Seismic included GXT Span Lines and TTDA 2D
- Interpretation, Modeling, Volumetrics and Risking was done. All outputs and deliverables included

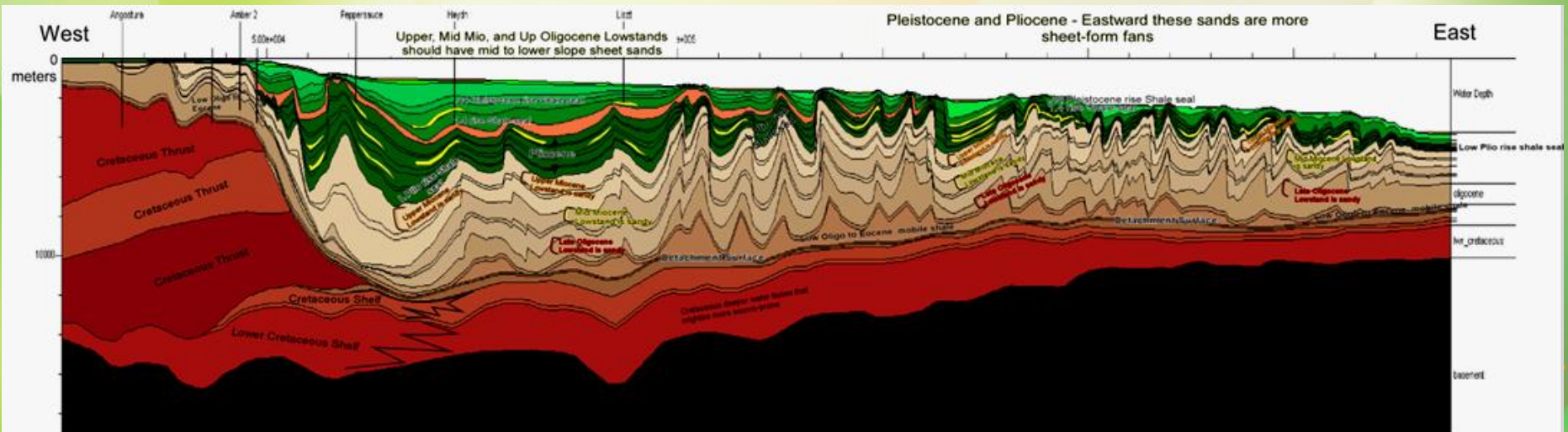
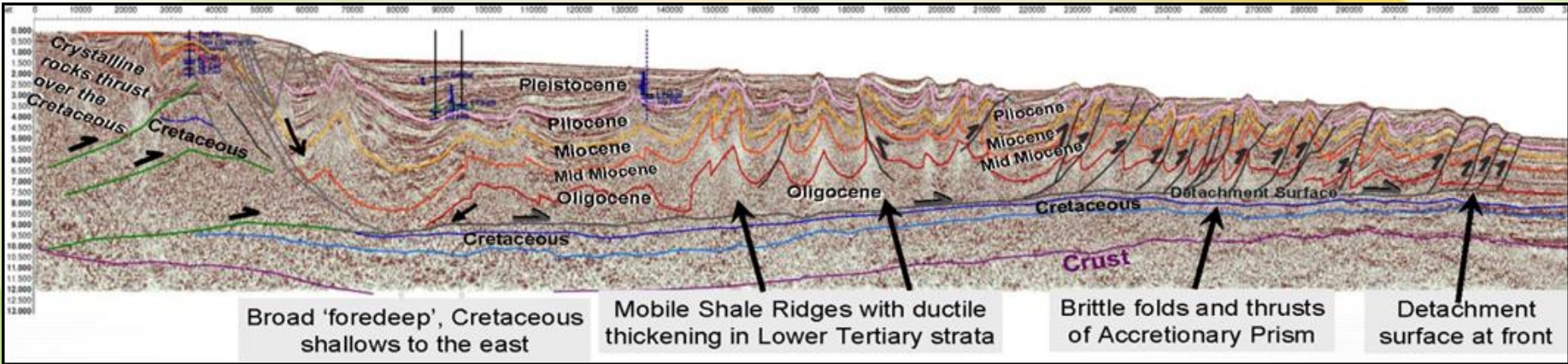


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DGA Full Workflow and Results Provided





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Spectrum TTDA 2D Reprocessing 2010 - Why Reprocess?

Spectrum

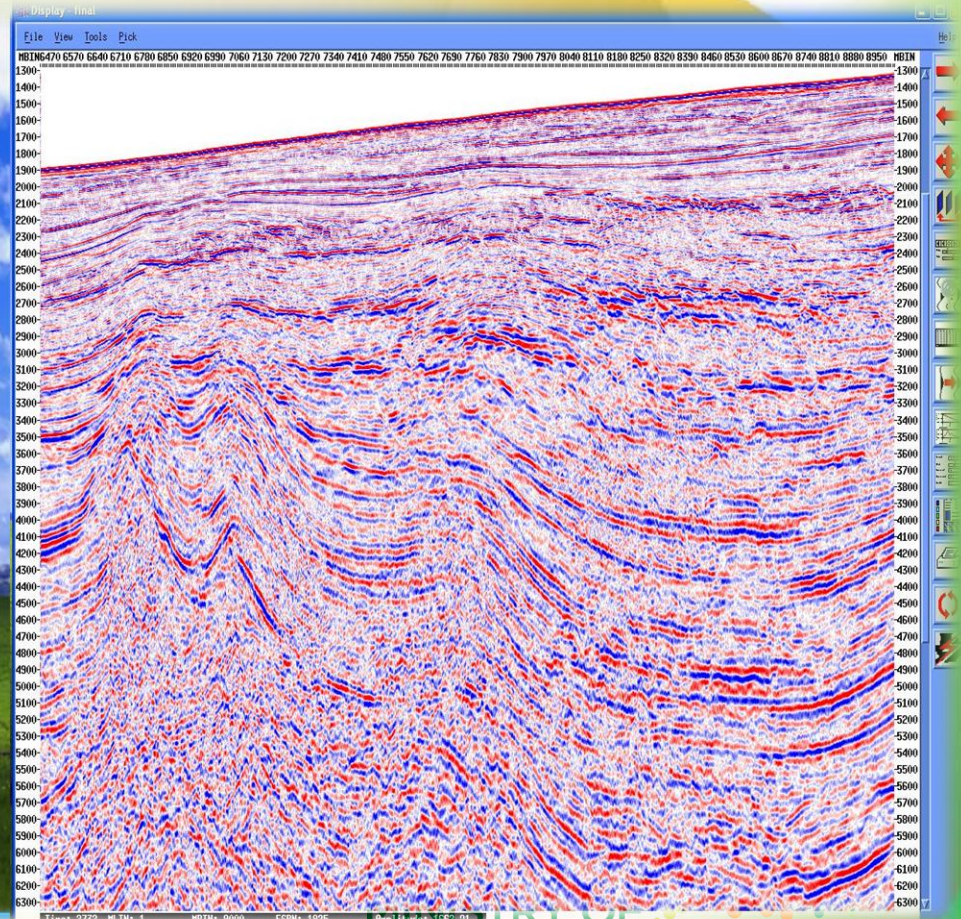
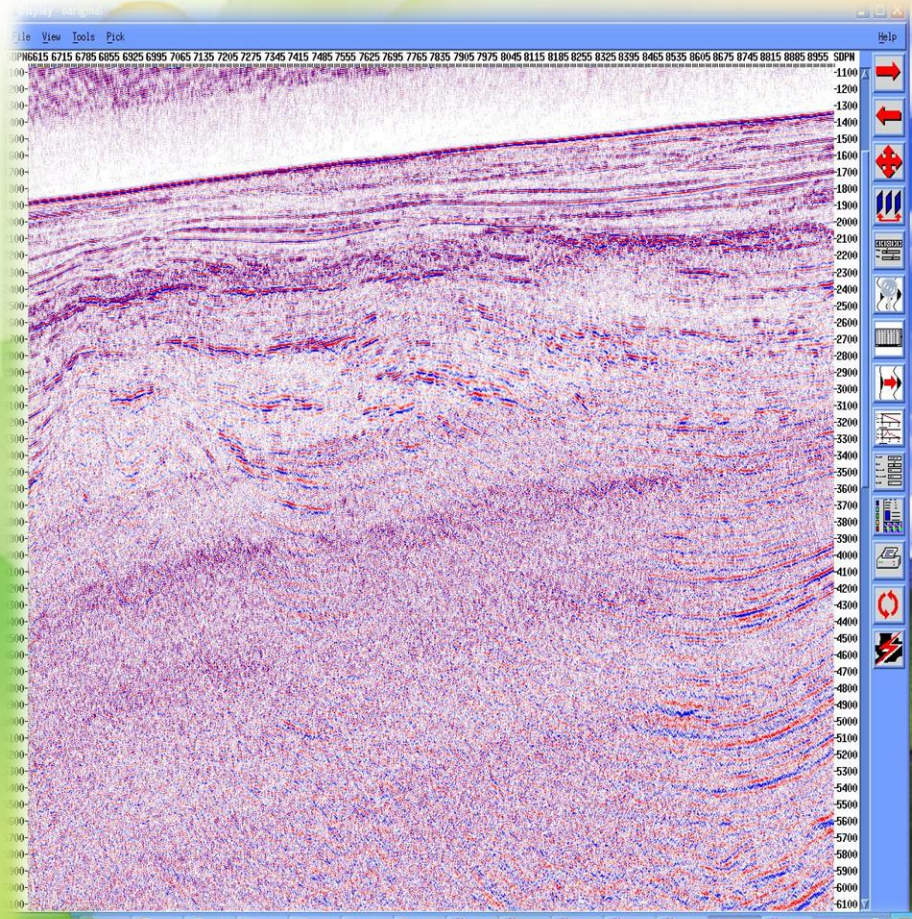
- To vastly improve the subsurface quality of the 2002 Trinidad and Tobago Deep Atlantic (TTDAA) 2D Survey data in the Deepwater Acreage
- Further de-risking Trinidad and Tobago Deep Water potential with respect to the new 2010 Deep Water Competitive Bid Round
- Represents the future of the energy industry
- Encourage deepwater participation inclusive of the eleven companies of the original programme



Original vs Final Migration



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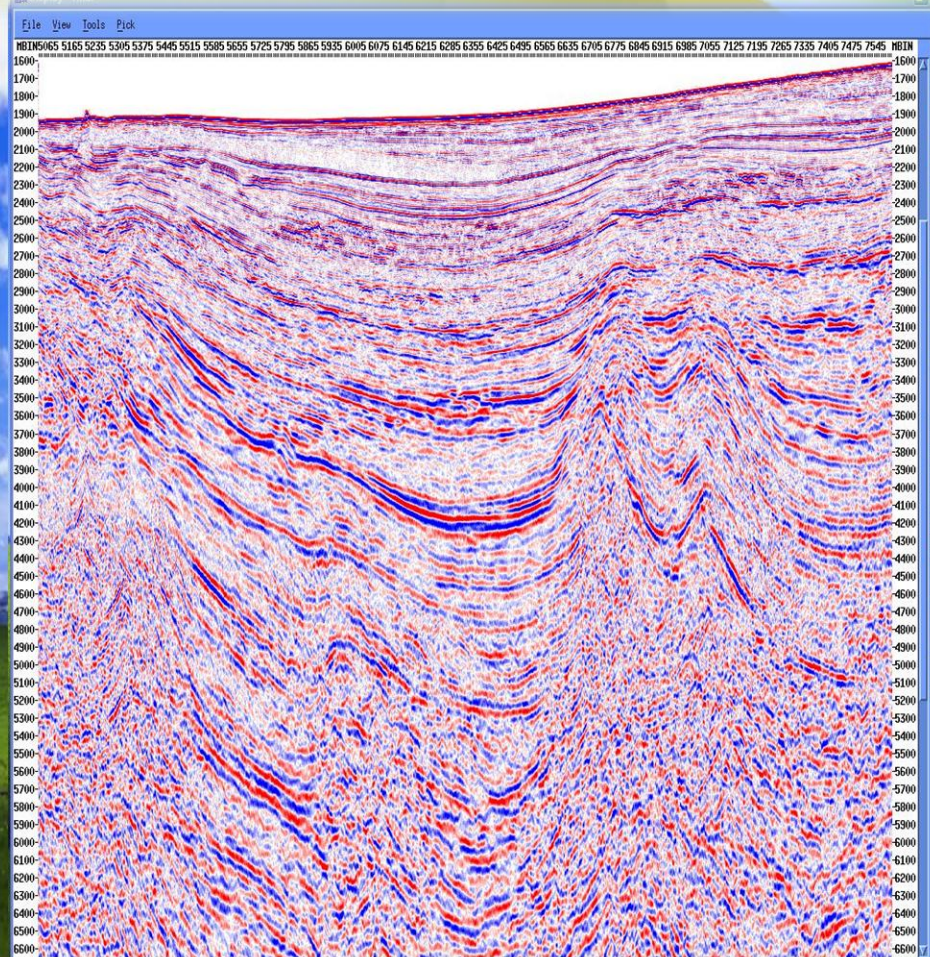
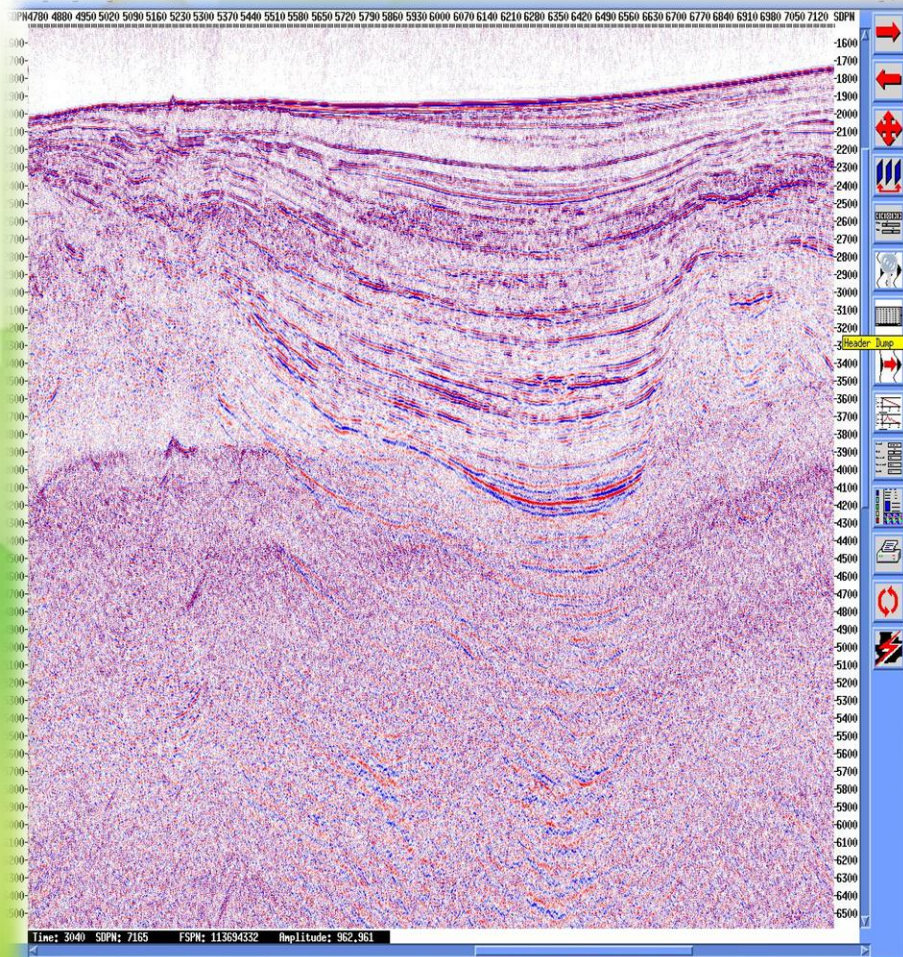




Original vs Final Migration



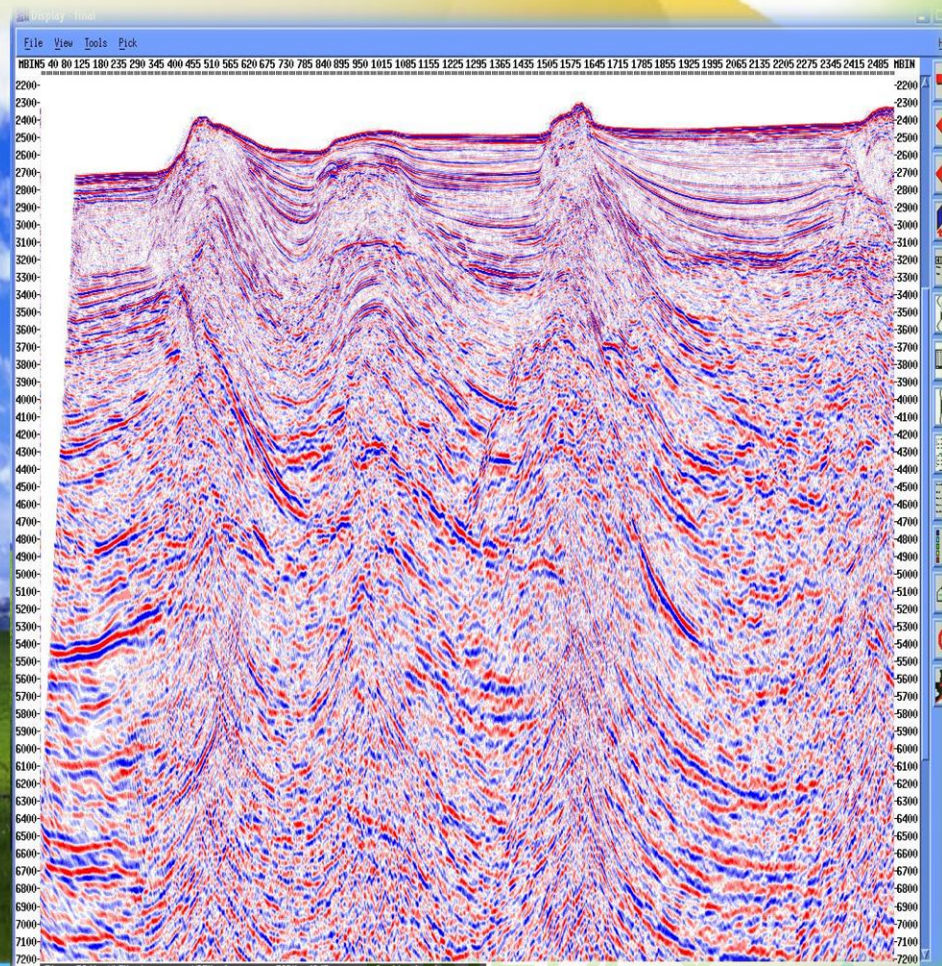
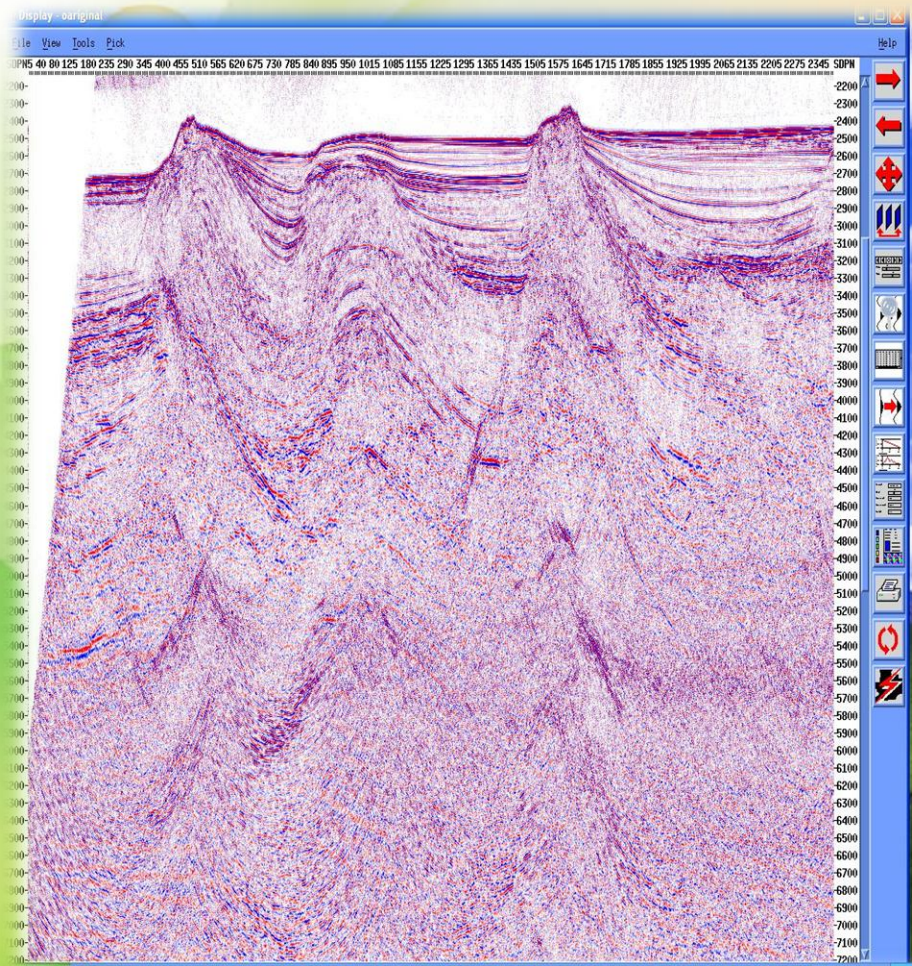
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Original vs Final Migration

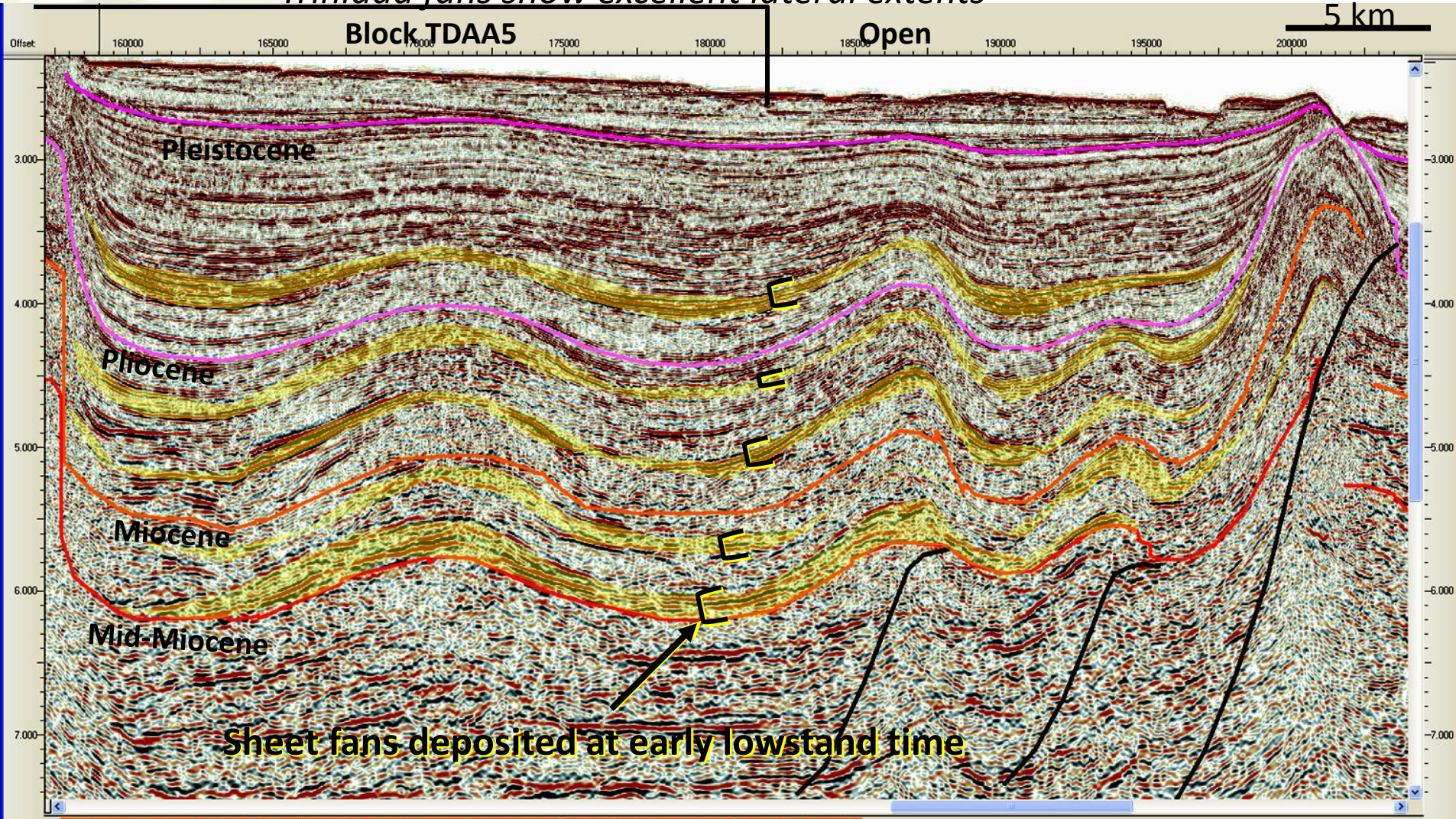
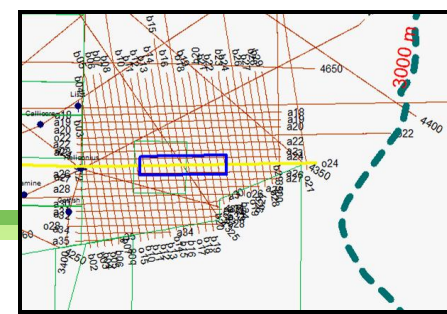




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Sheet Fans Provide Multiple Reservoir/Seal Targets

- *Trinidad fans show excellent lateral extents*



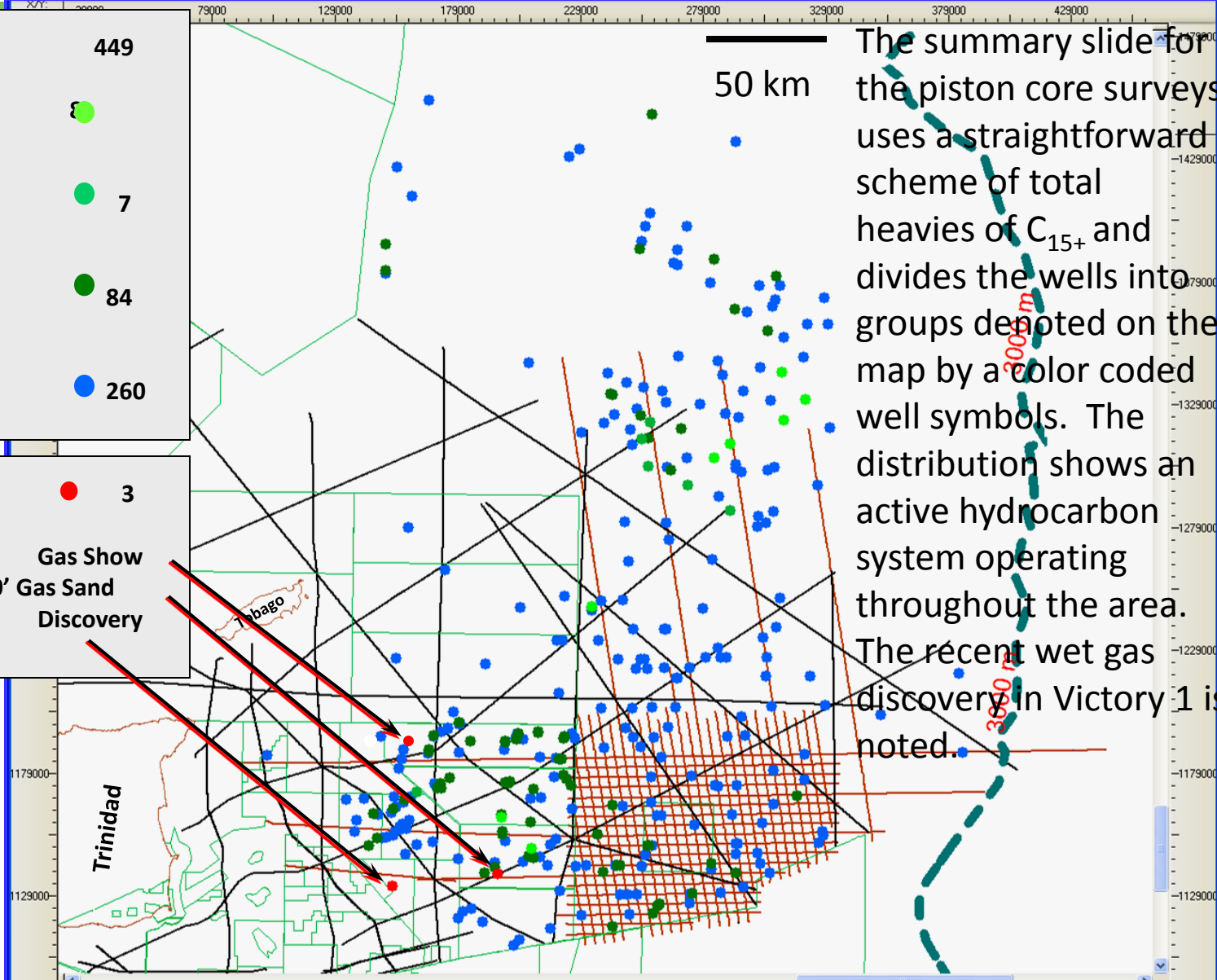


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Trinidad Piston Cores Show Live Oil and an Active Hydrocarbon System

Total Piston Cores	449
Cores with Live Oil Shows	8
Cores with C15+ Heavies GT 10000 units	7
Cores with C15+ Heavies GT 1000-LT 10000 units	84
Cores with C15+ Heavies LT 1000 units	260

Gas Shows / Discoveries	3
Pepper Sauce 1	
Dynamine 1	
Victory 1	
Gas Show	
30' Gas Sand Discovery	



The summary slide for the piston core surveys uses a straightforward scheme of total heavies of C₁₅₊ and divides the wells into groups denoted on the map by a color coded well symbols. The distribution shows an active hydrocarbon system operating throughout the area. The recent wet gas discovery in Victory 1 is noted.



Accretionary Prism Oil

➤ Source

- Naparima Hill and Gautier fluids
- Need to be in upper to middle Miocene to avoid biodegradation

➤ Seal

- Excellent seals exist in the Pliocene and Pleistocene
 - No reason not to expect these seals further offshore
- Traps do not appear to be overpressured to fracture seals

➤ Reservoir

- Proven reservoirs in Sandy Lane to Oligocene

➤ Trap

- Look for early forming traps
 - Recent movement on traps is risky but seals are ductile (high Poisson's ratio)



Accretionary Prism Oil

➤ **Timing**

- Timing is good for oil generation
- Movement of the Eocene/Oligocene mobile shale controls both seal and heating rate of source rocks
 - Constraining this movement will have a strong impact on both seal and timing

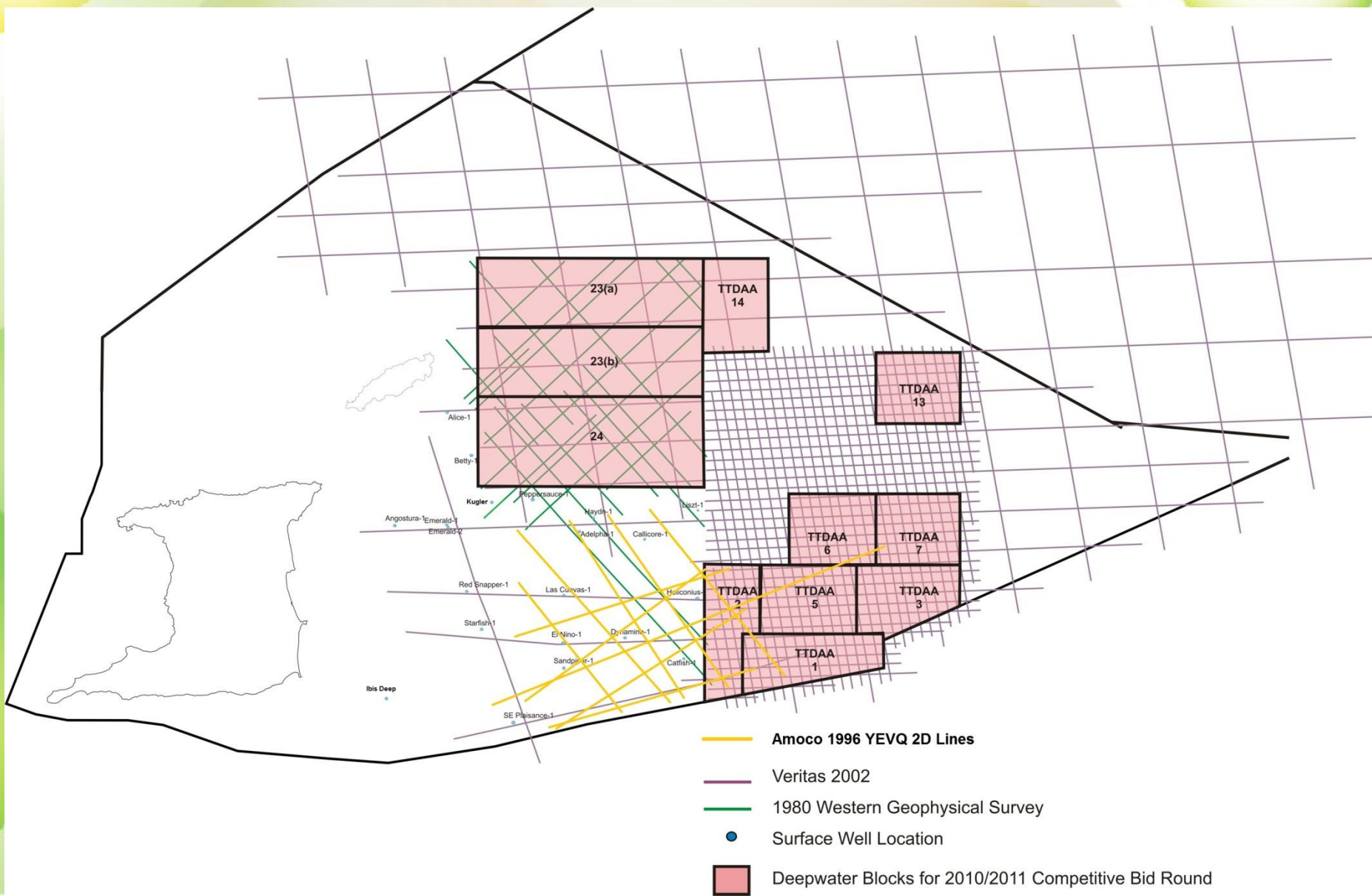
➤ **Petroleum system will be leaking**

- All of Columbus basin is leaking
 - Filling faster than it is leaking
- Late movement of faults affect seals
 - Mitigated by ductile shales in Pliocene and Pleistocene

- Cool basin means any prospect can be tested between biodegradation limits and the source rock



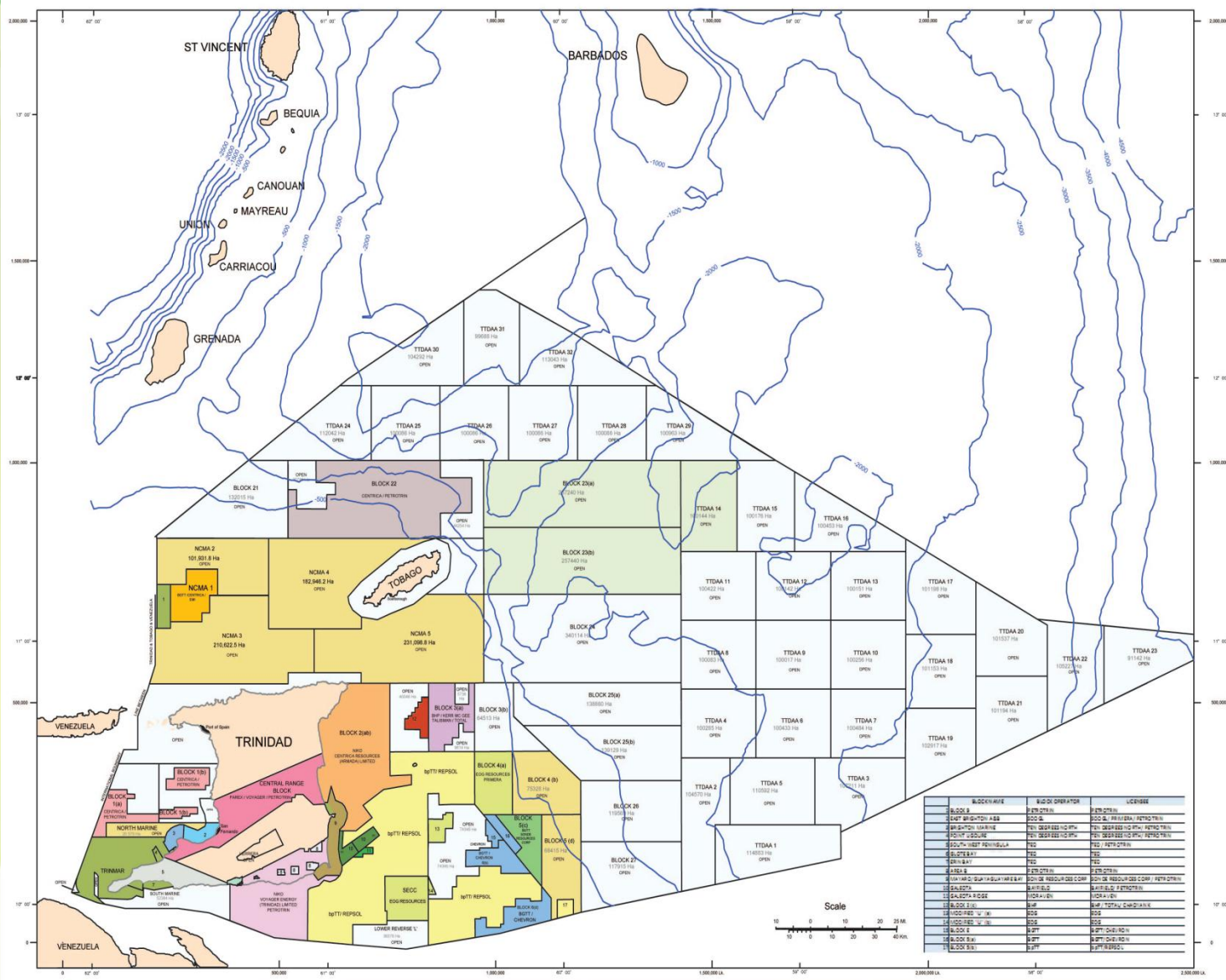
Comprehensive Data Package





Competitive Bidding 2011/2012

- Blocks for nomination are coloured light blue.
- There are currently 36 deep water blocks available.
- Companies are asked to nominate a maximum of five blocks





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New 2012 Deep Water Round

- The 2012 Deep Water Bid Round
 - Opening – March 2012
 - Closing – July 2012
- A maximum of six blocks will be offered – based mainly on your nomination
- Terms and Conditions but will be announced soon



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Data Viewing Room

The Data Room is located at Level 23 of the offices of the Ministry of Energy and Energy Industries, International Waterfront Centre, Tower C, Port of Spain and viewing can be arranged between 8am to 4pm by appointment ([see contacts below](#)).

The Data Room can comfortably accommodate about four individuals, although there is no restriction on the numbers at any one time. It is equipped with a dual monitor workstation running Landmark's Seisworks and Stratworks software and this can be used to examine available well and seismic surveys. The quantity and quality of data will vary by acreage and is determined by several factors including past exploration, proximity to producing blocks and legal data requirements. Every effort will be made to ensure that a representative and current dataset is available for viewing.



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