Sergipe Basin, Old Oil Province Reborn*

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Important Data

<table>
<thead>
<tr>
<th>Type of Field</th>
<th>2014</th>
<th>2014</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore giant field</td>
<td>2 Bbbl</td>
<td>1963-1965</td>
<td>TD=700 m</td>
</tr>
<tr>
<td>Shallow-water small fields</td>
<td>3 Mbbl</td>
<td>968-1971</td>
<td>WD=30-80 m</td>
</tr>
<tr>
<td>Deep-water small field</td>
<td>50 Mbbl</td>
<td>1899</td>
<td>WD=1100-1600 m</td>
</tr>
<tr>
<td>Deep-water giant field</td>
<td>3 Bbbl+?</td>
<td>2010-2013</td>
<td>WD=2300 m</td>
</tr>
</tbody>
</table>

Selected References


Selected Websites


SERGIPE BASIN

• TECTONIC SETTING
• SURFACE GEOLOGY
• STRATIGRAPHY
• STRUCTURAL GEOLOGY
• PETROLEUM SYSTEMS
• EXPLORATION HISTORY
SERGIPE BASIN

NORTHEAST BRAZILIAN RIFT BASINS

PROTEROZOIC FOLD BELT

CRETACEOUS MARGINAL BASIN

www.energy-pedia.com
GEOLOGIC MAP

UPPER PROTEROZOIC GRANITES

UPPER PROTEROZOIC SCHISTS & PHYLLITES

CRETACEOUS MARGINAL BASIN

Mohriak 2003
SERGIPE BASIN: ONSHORE & NARROW SHELF

PROTEROZOIC BASEMENT

45,000 km$^2$

Image Landsat © 2013 MapLink
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
PENNSYLVANIAN OUTWASH ON BASEMENT
PERMIAN SHELF SANDSTONE
UPPER JURASSIC BRAIDED BARS
HAUTERIVIAN DELTA FRONT
BARREMIAN BRAIDED BARS
LOWER APTIAN LACUSTRINE TURBIDITES

Foto: Adeylan Santos
ALBIAN SHOAL GRAINSTONES
SANTONIAN SLOPE MUDSTONES
1947-1963: 42 WELLS, MINOR DISCOVERIES
SURFACE MAPPING & ANALOGIC SEISMIC

BIG DISCOVERY: CARMÓPOLIS, 700 m,
2 Bbbl OIL 22° API
PLACING A WILDCAT

Secção Geológica entre os Poços RCst-1-Se e SJst-1-Se

Bacia Sergipe - Alagoas

RCst-1-Se

Locação

Sjst-1-Se

Fig. 4

Secção Estrutural do Campo Petrolífero de Cantagallo

Colômbia

Marques 1965
CARMÓPOLIS FIELD, 156 km²

APTIAN ALLUVIAL SANDSTONES & CONGLOMERATES
UPPER PROTEROZOIC FRACTURED SCHISTS
NEOCOMIAN DELTAIC SANDSTONES

Ponte 1980
CARMÓPOLIS

8 km

18 km
Sergipe, Nova Provincia Petrolifera

VIDA NOS CLUBES
CARMÓPOLIS FIRST OIL, 1964
OIL FROM CARMÓPOLIS, 1965
CARMÓPOLIS, 1966
1968
CARMÓPOLIS FIELD, 50 YEARS
CARMÓPOLIS, 1600 WELLS, 22,000 B/D
2D SEISMIC, 1967
1964 – 1971: 113 WELLS
DIGITAL 2D SEISMIC

SMALL DISCOVERIES IN SHALLOW WATER,
OIL 32º API
P-1, THE FIRST OFFSHORE RIG IN BRAZIL
GUARICEMA OIL FIELD, WD=30 m, 2,000 B/D
TENDER SHIP

STANDING RIG  ROLLING, PITCHING, HEAVING SHIP

www.offshoreenergytoday.com
THE BELL CHOPPER
Upper Cretaceous/Paleocene Turbidites

Lower Cretaceous Fluvial/Alluvial
Lower Cretaceous Source Rocks

Campos Neto et al. 2007
1972 - 1988: 154 WELLS
2D & 3D SEISMIC

FIRST DEEP WATER DISCOVERY, WD=1111 m
PIRANEMA OIL FIELD, WD=1111 m, 14,000 B/D
SERGIPE BASIN

SCHEMATIC GEOLOGICAL SECTION
MOSQUEIROS LOW

NEOGENE DEEP WATER
PALEOGENE DEEP WATER
MAASTRICHTIAN DEEP WATER
SANTONIAN SLOPE CARBONATES
LATE APTIAN - CENOMANIAN CARBONATES
APTIAN SALT
APTIAN CLASTICS
BARREMIAN-NEOCOMIAN RIFT

http://archives.datapages.com
SERGIPE BASIN OIL+GAS PRODUCTION

YEARLY PRODUCTION IN THOUSAND BARRELS, 1974-2012

http://cenariosdesenvolvimento.blogspot.com.br/2013/08/a-producao-de-petroleo-em-sergipe-nos.html
CARMÓPOLIS OIL PRODUCTION, B/D

AGENCIA NACIONAL DO PETRÓLEO
OIL PRODUCED UP TO 2012

CARMÓPOLIS 480 Mbbl
SHALLOW WATER FIELDS 108 Mbbl

ANP 2013
1989 – 2009: 77 DRY WELLS
2D & 3D SEISMIC

SERGIPE, A MATURE BASIN?
CHANNELIZED UK TURBIDITES?

Mohriak et al. 2000
http://archives.datapages.com/data/specpubs/memoir73/m73ch20/images/ch20f09.htm
2010 – 2013: 21 WELLS

NEW DEEP WATER DISCOVERIES
WD=2300 m, OIL 38° API
DEEP WATER DISCOVERIES, WD=2,300 m
DEEP WATER DISCOVERIES, WD=2,300 m
50 YEARS FROM ONSHORE TO THE DEEP

ONSHORE GIANT FIELD, 2 Bbbl, 1963-1965, TD=700 m

SHALLOW WATER SMALL FIELDS, 3 Mbbl, 1968-1971, WD=30-80 m, TD=3000 m

DEEP WATER SMALL FIELD, 50 Mbbl, 1988, WD=1100-1600 m, TD=5000 m

DEEP WATER GIANT FIELD, 3 Bbbl+?, 2010-2013, WD=2300 m, TD=6500 m
PETROBRAS=60%, IBV (INDIA)=40%
PRODUCTION TO START IN 2018

Mapa da área de Barra na Bacia Sergipe-Alagoas. Imagem: Agência Petrobras
EM DATA

ELEVATED RESISTIVITY = OIL

LOW RESISTIVITY = DRY

www.emgs.com/brasil
SERGIPE BASIN, 1945-2012

Wells in Sergipe Sub-basin

- CP
- GA
- PN
- BA

Number of wells

Year


0 5 10 15 20 25 30 35 40 45 50

Onshore wells
Offshore wells

SURFACE MAPPING
ANALOGIC SEISMIC
2D SEISMIC 3D SEISMIC

ANP 2013
PETROBRAS RECENT DISCOVERIES
SERGIPE ALAGOAS BASIN, BRAZIL

Carmopolis Field
1 BBOIP

Diagrammatic Section

Oil & Gas Discoveries
3 BBOIP?
DW turbidites, 38° API

DIAGRAMMATIC CROSS SECTION

Petrobras Discoveries
WD: +2,500 meters

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Roberto Garcia-Solozano

Source Rock and Migration Path

Basement Complex

Not to Scale

www.nejasayoil.com/2013/10/ultimos-descubrimientos-de-petrobras-en.html
SERGIPE BASIN
SERGIPE BASIN

GUARICEMA 1968
PIRANEMA 1988
BARRA 2010

DEEPER BURIAL?

UPPER CRETACEOUS/PALEOCENE TURBIDITES
LOWER CRETACEOUS SOURCE ROCKS

Modificado de Mohriak et al., 1998.

www.cprm.gov.br
1963 CARMÓPOLIS
+ 113 WELLS IN 8 YEARS
= GUARICEMA, DOURADO, CAMORIM
+ 154 WELLS IN 17 YEARS
= PIRANEMA
+ 98 WELLS IN 24 YEARS
= BARRA, MURIÚ, FARFAN, CUMBE
NEVER GIVE UP!
THANK YOU... fjfeijo@uol.com.br