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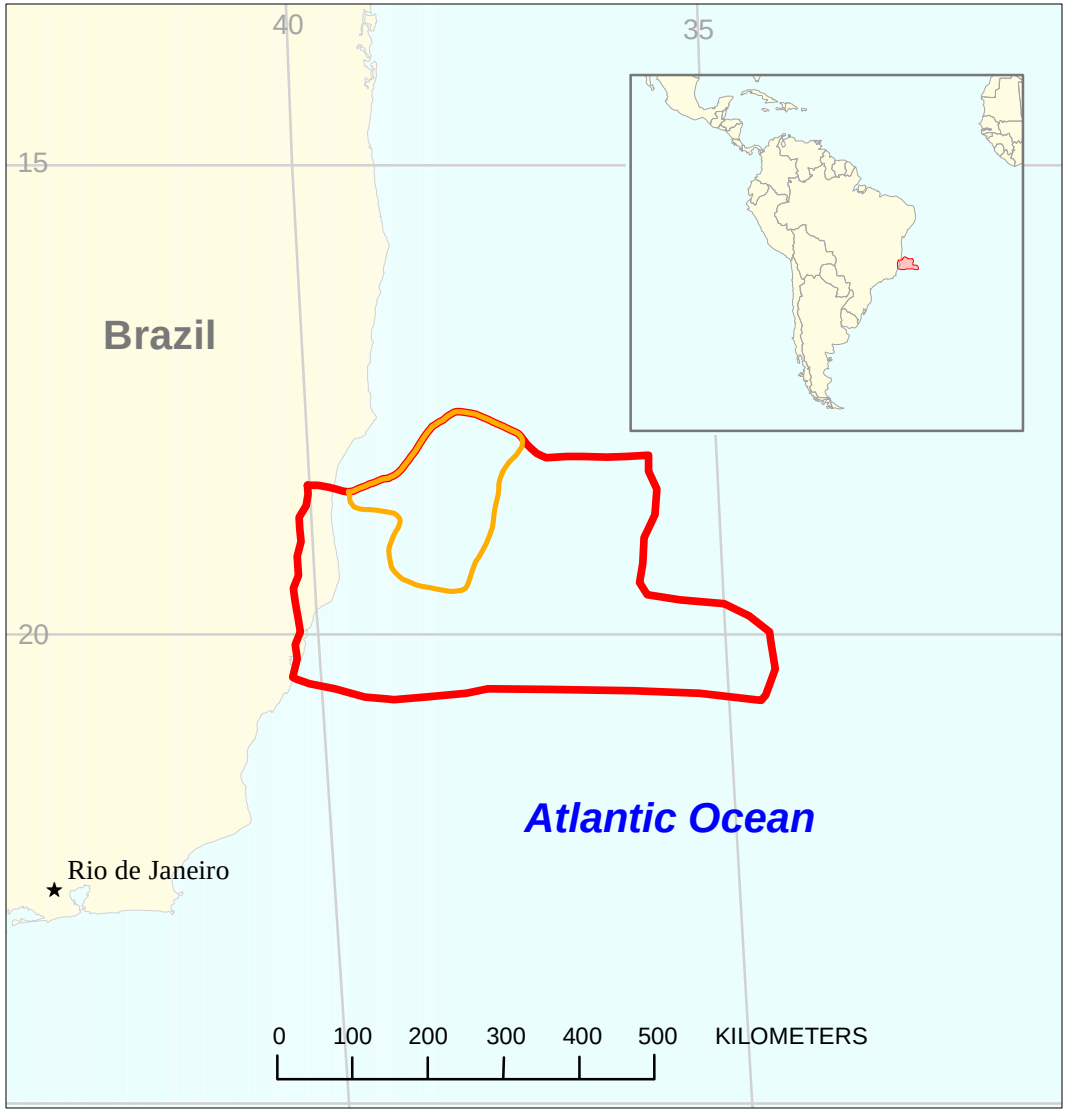
Abrolhos Sub-Volcanic Structures
Assessment Unit 60340103



Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

USGS PROVINCE: Espirito Santo Basin (6034) **GEOLOGIST:** C.J. Schenk

TOTAL PETROLEUM SYSTEM: Cretaceous Composite (603401)

ASSESSMENT UNIT: Abrolhos Sub-Volcanic Structures (60340103)

DESCRIPTION: This assessment unit is defined by structural traps interpreted to exist beneath the western part of the volcanic rocks of the Eocene Abrolhos Volcanic Complex in the offshore of the Espirito Santo Basin. The assessment unit is defined by the extent of the volcanics.

SOURCE ROCKS: Source rocks are postulated to include mudstones of the Late Cretaceous Urucutuca Formation, and possibly mudstones of the Aptian Alagoas Formation.

MATURATION: Maturation of Algoas shales and Urucutuca shales is estimated to have occurred locally during emplacement of volcanics in the Eocene, and regionally later than the Eocene.

MIGRATION: Migration is estimated to have been largely vertical from the source shales into turbidite reservoirs.

RESERVOIR ROCKS: Major reservoirs are postulated to be lowstand turbidite sandstones that are involved in the structures below the volcanic rocks. The structures below the volcanics may also contain fractured shale reservoirs.

TRAPS AND SEALS: Traps are mainly anticlines and faulted anticlines formed during a compressional event in the Eocene, possibly related to tectonics along the Vitorio fracture zone. Extensional structures are also present below the volcanic complex. Seals are mainly intraformational mudstones.

REFERENCES:

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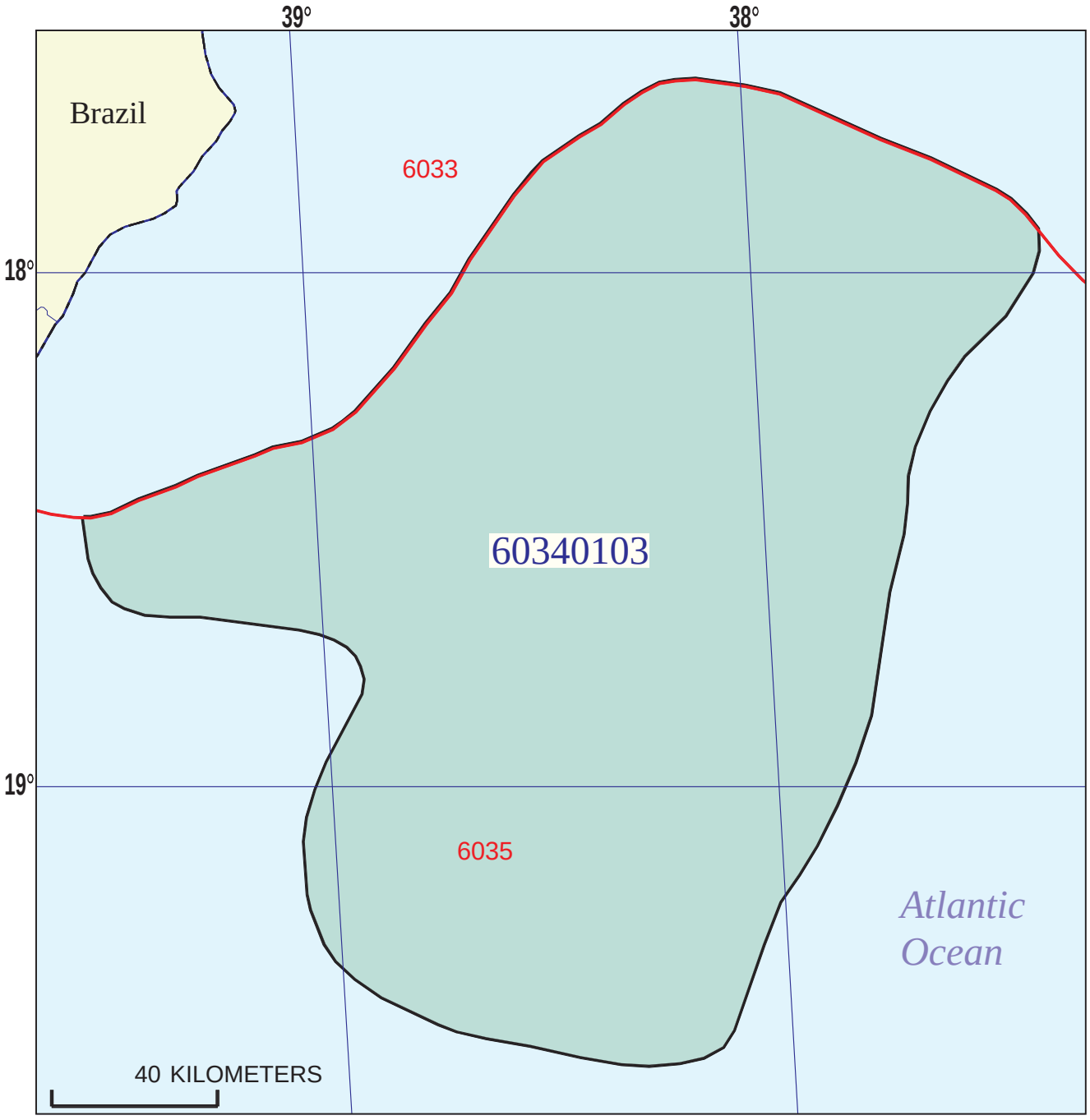
Estrella, G., Mello, M.R., Gaglianone, P.C., Azevedo, R.L.M., Tsubone, K., Rossetti, E., Concha, J., and Bruning, I.M.R.A., 1984, The Espirito Santo Basin (Brazil) source rock characterization and petroleum habitat, *in* Desmaison, G., and Murris, R.J., eds., Petroleum Geochemistry and Basin Evaluation: American Association of Petroleum Geologists Memoir 51, p. 253-271.

Van der Ven, P.H., Cunha, C.H.R., and Biassusi, A.S., 1998, Structural styles in the Espirito Santo-Mucuri Basin, southeastern Brazil, *in* Mello, M.R., and Yilmaz, P.O., eds., 1998 American Association of Petroleum Geologists International Conference and Exhibition: Extended Abstracts Volume, p. 374-375.



Abrolhos Sub-Volcanic Structures
Assessment Unit - 60340103

EXPLANATION

- Hydrography
- Shoreline
- 6034 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60340103 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

SEVENTH APPROXIMATION
NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT
DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:……..	11/17/99		
Assessment Geologist:……..	C.J. Schenk		
Region:……..	Central and South America	Number:	6
Province:……..	Espirito Santo Basin	Number:	6034
Priority or Boutique……	Boutique		
Total Petroleum System:……	Cretaceous Composite	Number:	603401
Assessment Unit:……..	Abrolhos Sub-Volcanic Structures	Number:	60340103
* Notes from Assessor			

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?……. 10 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…….. Oil: 0 Gas: 0
Established (>13 fields) _____ Frontier (1-13 fields) _____ Hypothetical (no fields) X

Median size (grown) of discovered oil fields (mmboe):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____
Median size (grown) of discovered gas fields (bcfg):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size……	1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	0.9
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	0.8

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 0.72

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size…… 1.0

UNDISCOVERED FIELDS

Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

Oil fields:……min. no. (>0)	1	median no.	7	max no.	20
Gas fields:……min. no. (>0)	1	median no.	18	max no.	55

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

Oil in oil fields (mmbo)……min. size	10	median size	30	max. size	3500
Gas in gas fields (bcfg):……min. size	60	median size	180	max. size	21000

Assessment Unit (name, no.)
Abrolhos Sub-Volcanic Structures, 60340103

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1300	2600	3900
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	22	44	66
Oil/gas ratio (bo/mmcfg)……			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)……	20	35	50
Sulfur content of oil (%)……			
Drilling Depth (m) ……	1000	2000	4500
Depth (m) of water (if applicable)……	50	150	200

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	1000	2500	5500
Depth (m) of water (if applicable)……	50	150	200

Assessment Unit (name, no.)
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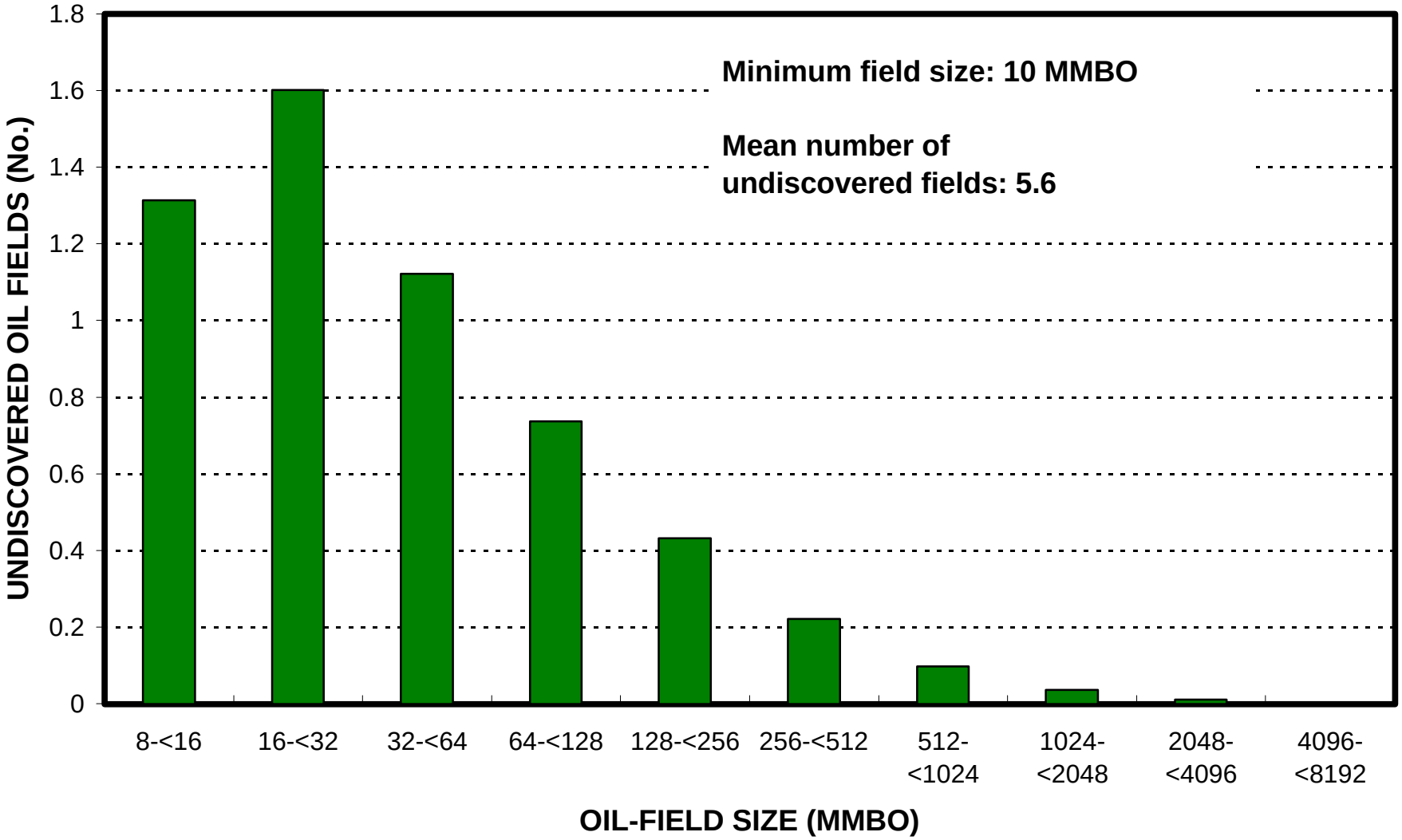
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Brazil represents 100 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		100	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		100	

Abrolhos Sub-Volcanic Structures, AU 60340103
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution