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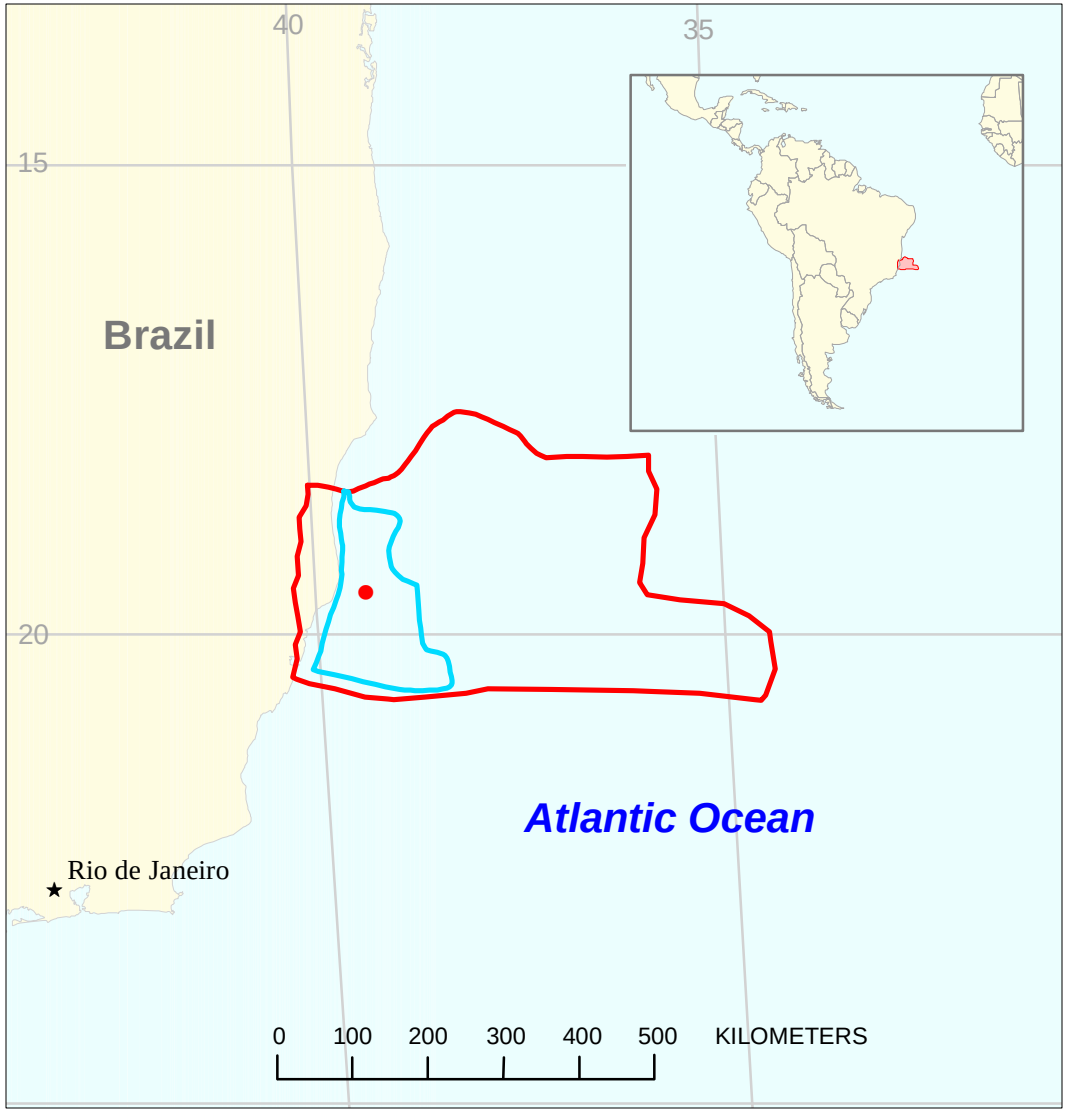
Late Cretaceous-Tertiary Slide Blocks and Turbidites Assessment Unit 60340102



Late Cretaceous-Tertiary Slide Blocks and Turbidites Assessment Unit 60340102
Espirito Santo Geologic Province 6034

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: Late Cretaceous-Tertiary Slide Blocks and Turbidites (60340102)

DESCRIPTION: This assessment unit is defined by turbidite reservoirs that may occur from the Espirito shelf break seaward to the downdip limit of Alagoas salt. The southern limit is defined by the Vitorio Arch, and the eastern limit is largely defined by the margin of the Abrolhos Volcanic Complex. This assessment unit contains salt domes and other salt structures, and slide blocks of clastics and carbonates originating from the shelf area.

SOURCE ROCKS: Source rocks are postulated to be Mariricu shales (Aptian) and Urucutuca mudstones (Late Cretaceous). Alagoas shales are mainly Type II organics with TOC as much as 4 percent, whereas Urucutuca mudstones contain mainly Type III organics.

MATURATION: Maturation of the Alagoas and Urucutuca shales is estimated to have occurred at the time of volcanic rock emplacement locally (Late Cretaceous to Eocene), or following volcanic activity regionally (post-Eocene).

MIGRATION: Migration is postulated to be mainly vertical from the source shales into turbidite reservoirs and into carbonate and clastic reservoirs in slide blocks.

RESERVOIR ROCKS: Major reservoirs are postulated to be Late Cretaceous and Tertiary turbidite sandstones, where large channelized turbidite lobes were deposited in lows formed by salt withdrawal, listric faults, and salt domes. Slide blocks containing potential Albian carbonates and shelf sand reservoirs are also present in this assessment unit.

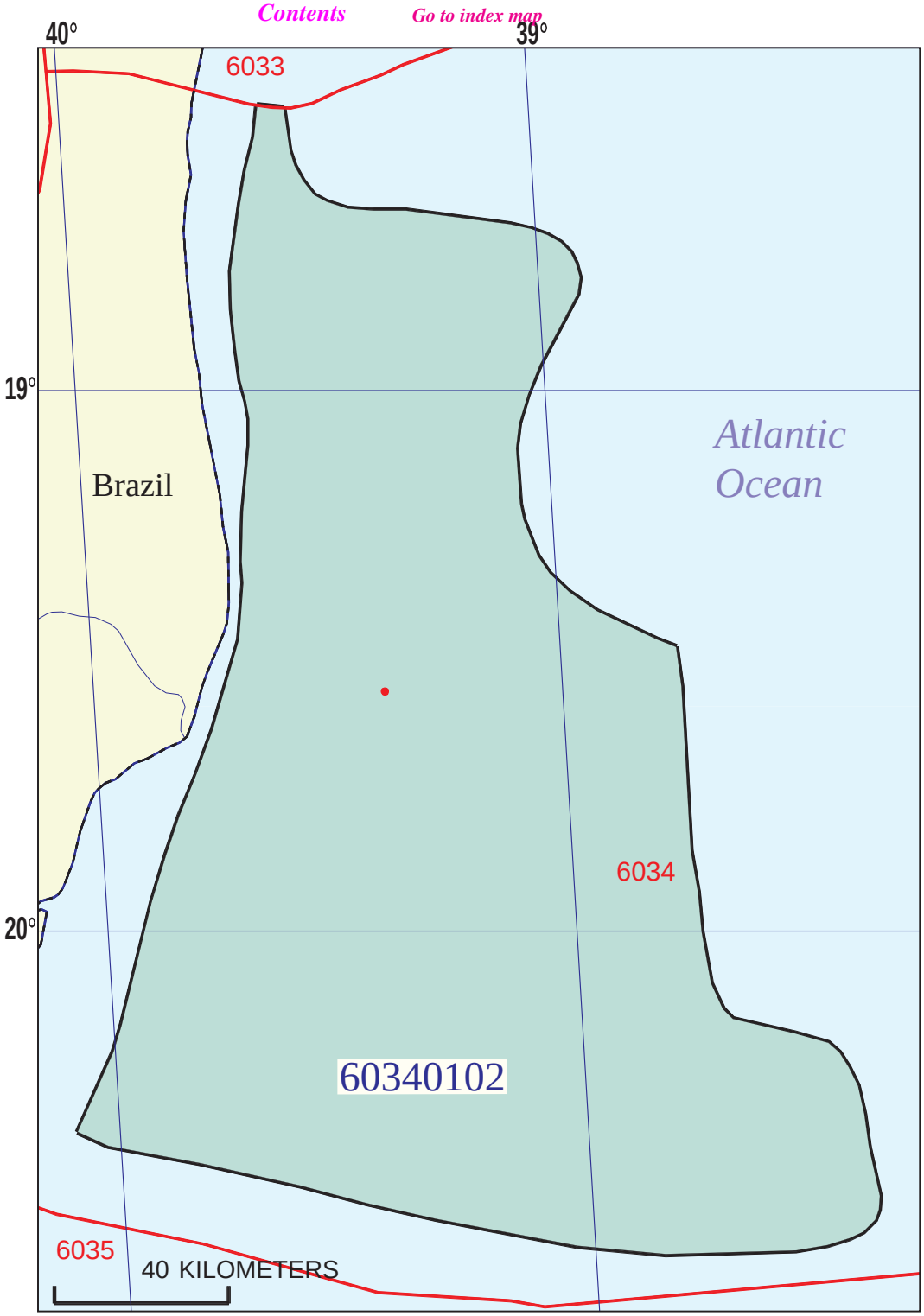
TRAPS AND SEALS: Traps in this assessment unit are mainly related to salt movement, forming folds, anticlines, and faulted anticlines. Traps are also related to the presence of numerous slide blocks of shelf clastics and carbonates.

REFERENCES:

D'Avila, R.S.F., Biassusi, A.S., Guirro, A.C., and Brandao, J.R., 1998, Urucutuca-Urucutuca(?); a new petroleum system in Espirito Santo Basin, Brazil, *in* Mello, M.R., and Yilmaz, P.O., eds., 1998 American Association of Petroleum Geologists International Conference and Exhibition, Rio de Janeiro: Extended Abstracts Volume, p. 102.

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, Rio de Janeiro: Extended Abstracts Volume, p. 374-375.



Late Cretaceous-Tertiary Slide Blocks and Turbidites Assessment Unit - 60340102

EXPLANATION

- Hydrography
- Shoreline
- 6034 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60340102 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:……	Late Cretaceous-Tertiary Slide Blocks and Turbidites	Number:	60340102
* Notes from Assessor	MMS growth function. Partial analog Campos Basin, Late Cretaceous-Tertiary Turbidites (60350101).		

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. 6 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: 1
Established (>13 fields) _____ Frontier (1-13 fields) X Hypothetical (no fields) _____

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……	1.0
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 1.0

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.	25	max no.	75
Gas fields:……min. no. (>0)	1	median no.	35	max no.	100

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	6	median size	30	max. size	3500
Gas in gas fields (bcfg):……min. size	36	median size	180	max. size	21000

Assessment Unit (name, no.)
Late Cretaceous-Tertiary Slide Blocks and Turbidites, 60340102

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1100	2200	3300
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)……	20	600	2000

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)……	20	600	2000

Assessment Unit (name, no.)
Late Cretaceous-Tertiary Slide Blocks and Turbidites, 60340102

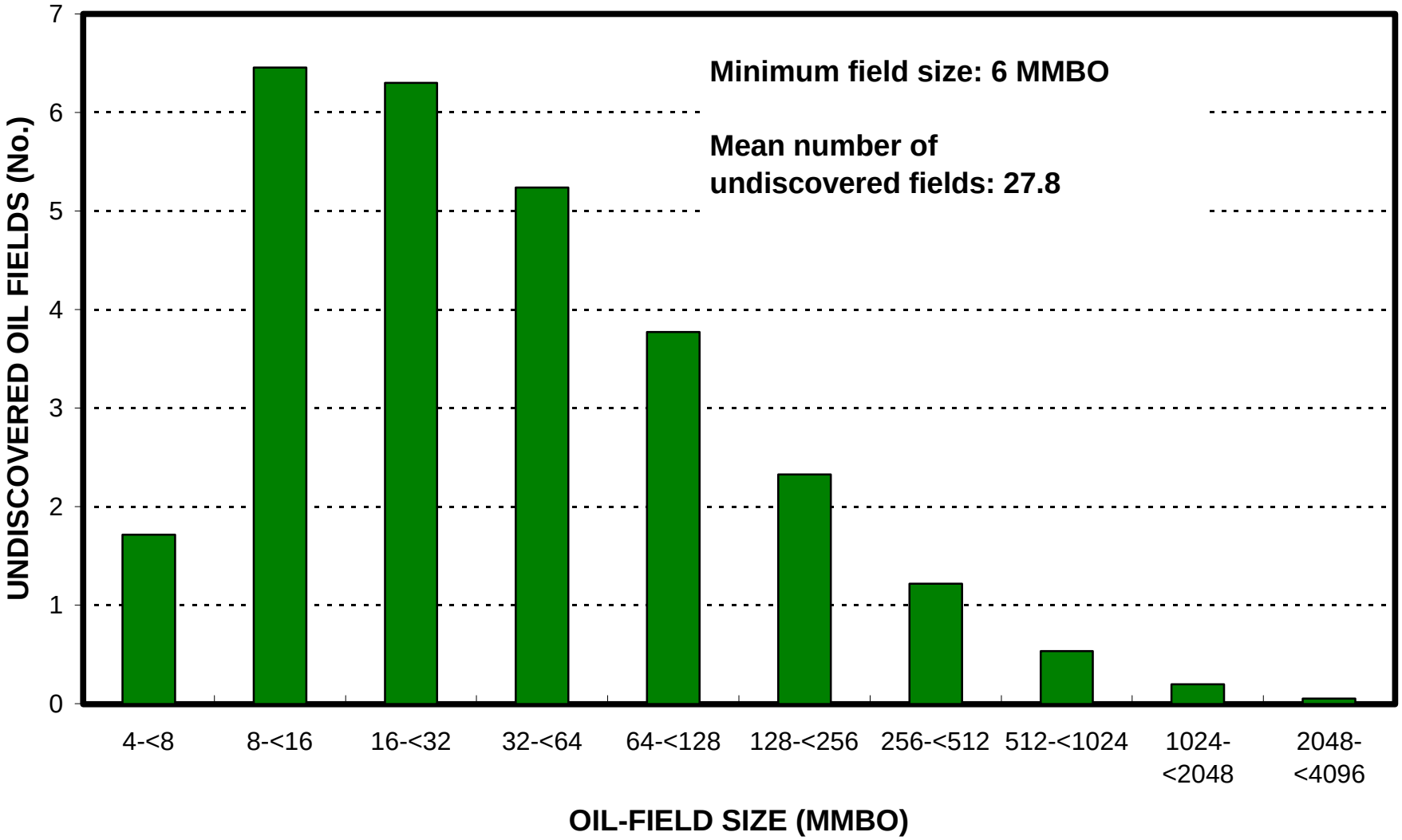
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

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	

Late Cretaceous-Tertiary Slide Blocks and Turbidites, AU 60340102
Undiscovered Field-Size Distribution



Late Cretaceous-Tertiary Slide Blocks and Turbidites, AU 60340102
Undiscovered Field-Size Distribution