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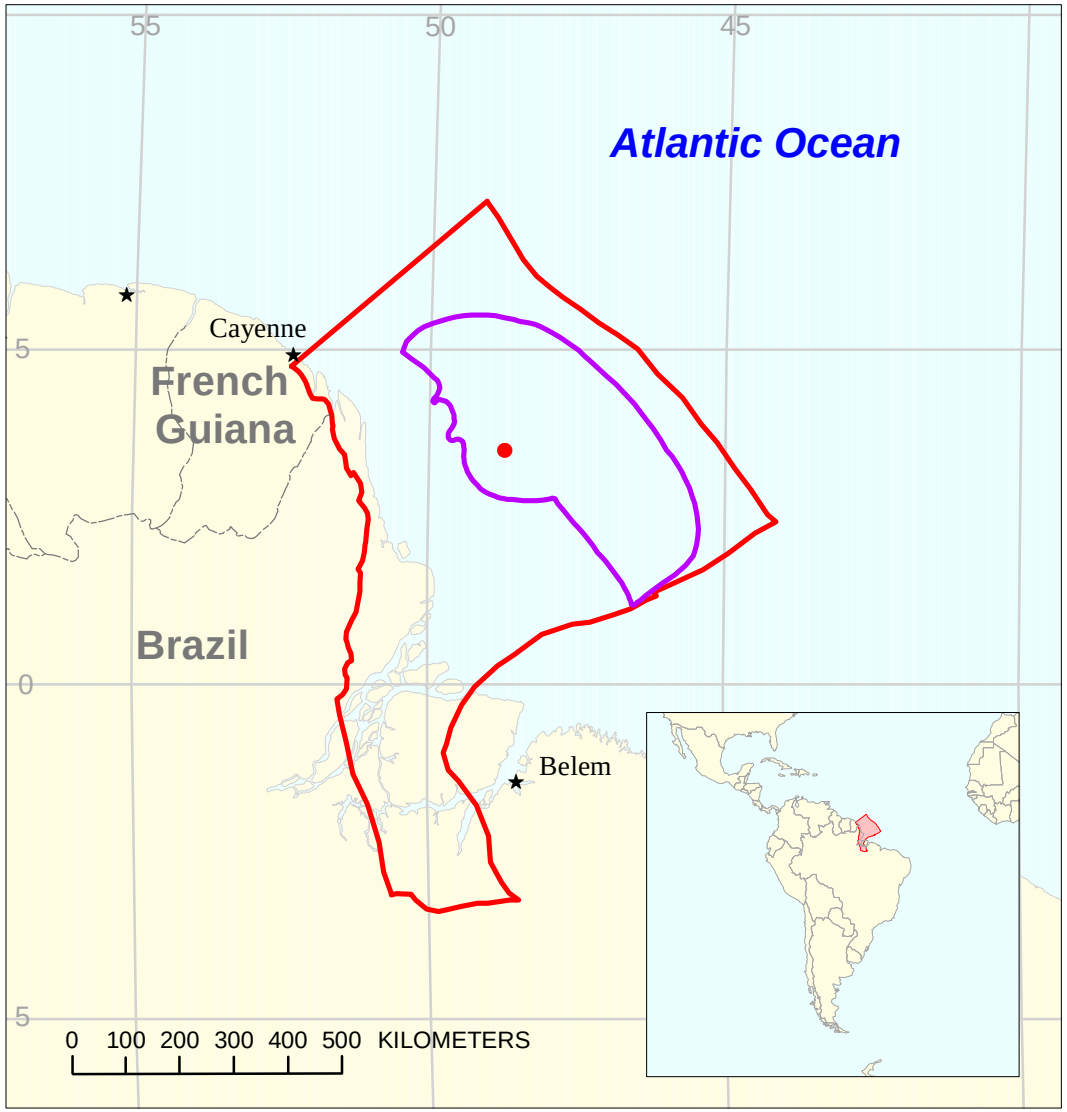
Amazon Delta and Submarine Fan Assessment Unit 60220101



Amazon Delta and Submarine Fan Assessment Unit 60220101

Foz do Amazonas Basin Geologic Province 6022

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: Foz do Amazonas (6022) **GEOLOGIST:** C.J. Schenk

TOTAL PETROLEUM SYSTEM: Neogene (602201)

ASSESSMENT UNIT: Amazon Delta and Submarine Fan (60220101)

DESCRIPTION: This assessment unit encompasses the Neogene Amazon Cone from the carbonate shelf edge to approximately the 4000 m isobath, where the sediments thin to approximately 4 km.

SOURCE ROCKS: Source rocks are postulated to be Neogene delta-slope mudstones of the Amazon system, with a dominance of Type III organic material, similar to deltas worldwide. The one existing gas field in this assessment unit may have a source that in part may be biogenic.

MATURATION: Given the maximum thickness of the proximal Amazon Cone (10 km), thermogenic maturation is estimated to have begun in the Plio-Pleistocene and continues today.

MIGRATION: Migration is considered to be mainly vertical along the numerous growth faults in the section, with the presence of a thick zone of hydrate further evidence of migration.

RESERVOIR ROCKS: Reservoir rocks are mainly slope channel, levee, and suprafan turbidite sandstone lobes of the Amazon Cone.

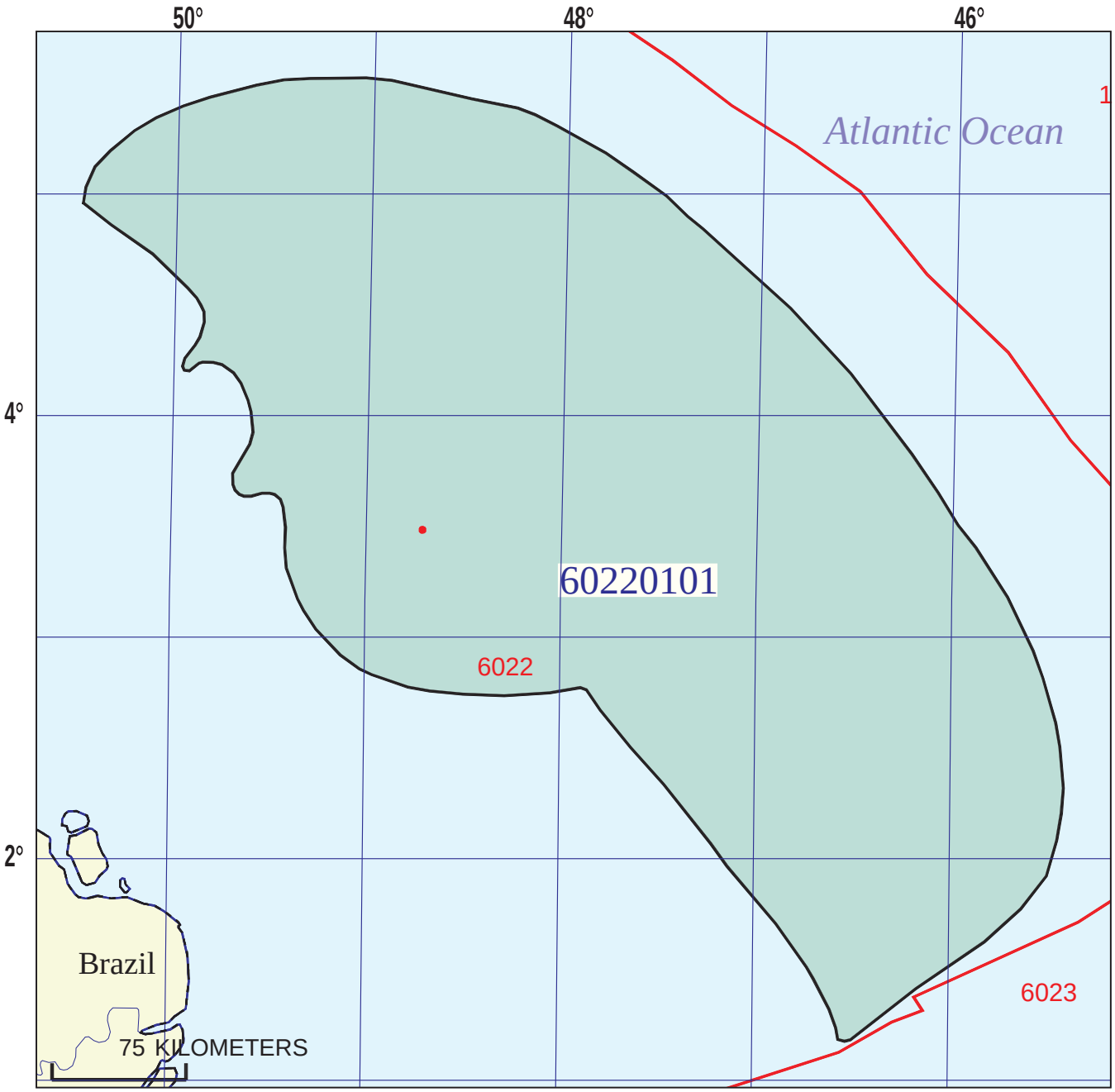
TRAPS AND SEALS: Traps are mainly associated with listric faults, and traps are formed by numerous channel margins and possibly by the margins of the mud diapirs.

REFERENCES:

Advocate, D.M., Young, S.W., Ross, A.H., Buerkert, T.P., Neal, J.E., and Mahon, K.L., 1998, Post-rift hydrocarbon systems, Greater Amazon Mouth, Brazil–transition from shelf to basin to source distribution controls, *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. 602-603.

Kingston, J., 1994, Undiscovered petroleum of southern South America: U.S. Geological Survey Open-File Report 94-559, 443p.

Milliman, J.D., 1979, Morphology and structure of Amazon upper continental margin: American Association of Petroleum Geologists Bulletin, v. 63, p. 934-950.



Amazon Delta and Submarine Fan Assessment Unit - 60220101

EXPLANATION

- Hydrography
- Shoreline
- 6022 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60220101 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	12/9/99		
Assessment Geologist:……..	C.J. Schenk		
Region:……..	Central and South America	Number:	6
Province:……..	Foz do Amazonas Basin	Number:	6022
Priority or Boutique……	Boutique		
Total Petroleum System:……	Neogene	Number:	602201
Assessment Unit:……..	Amazon Delta and Submarine Fan	Number:	60220101
* Notes from Assessor	Nile Cone as partial analog.		

CHARACTERISTICS OF ASSESSMENT UNIT

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

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: 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)		median no.		max no.	
Gas fields:……min. no. (>0)	1	median no.	80	max no.	200

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		median size		max. size	
Gas in gas fields (bcfg):……min. size	60	median size	180	max. size	8000

Assessment Unit (name, no.)
Amazon Delta and Submarine Fan, 60220101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……			
NGL/gas ratio (bngl/mmcfg)……			

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	5	10	15
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)……			
Sulfur content of oil (%)……			
Drilling Depth (m) ……			
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	1000	3500	7600
Depth (m) of water (if applicable)……	200	1000	3600

Assessment Unit (name, no.)
Amazon Delta and Submarine Fan, 60220101

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):…			
Portion of volume % that is offshore (0-100%)……			

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	

Amazon Delta and Submarine Fan, AU 60220101
Undiscovered Field-Size Distribution