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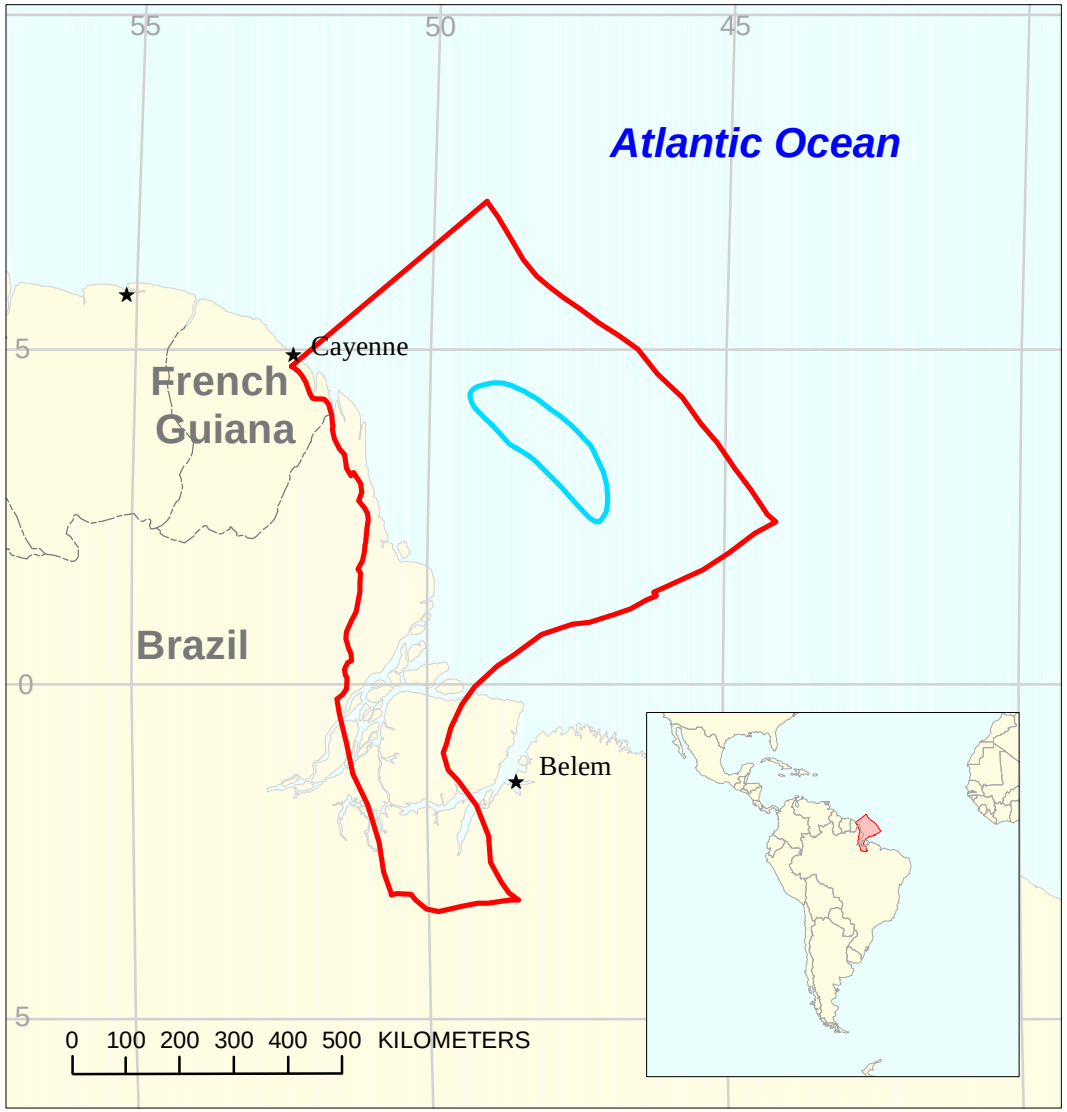
Offshore Gas Hydrates Assessment Unit 60220102



Offshore Gas Hydrates Assessment Unit 60220102

Foz do Amazonas Basin Geologic Province 6022

Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

This assessment unit was not assessed quantitatively.

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

TOTAL PETROLEUM SYSTEM: Neogene (609901)

ASSESSMENT UNIT: Offshore Gas Hydrates (60220102)

DESCRIPTION: This assessment unit encompasses the area underlain by gas hydrates in the offshore of the Foz do Amazonas Basin. The area is recognized by the presence of a strong Bottom-Simulating Reflector on seismic. The hydrate zone is estimated to be approximately 450 m thick.

SOURCE ROCKS: The main source rocks are postulated to mudstones of the Neogene delta-slope system that began to prograde in the Miocene following uplift of the Andes and flow reversal of the Amazon drainage. Biogenic generation of some of the hydrate is also a possibility.

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 interpreted to be vertical, suggesting that deep thermogenic gas is a significant source for the gas trapped in the shallow subsurface.

RESERVOIR ROCKS: Reservoir rocks are predominantly Pleistocene-Recent sandstones and siltstones that are within the stability zone for hydrates.

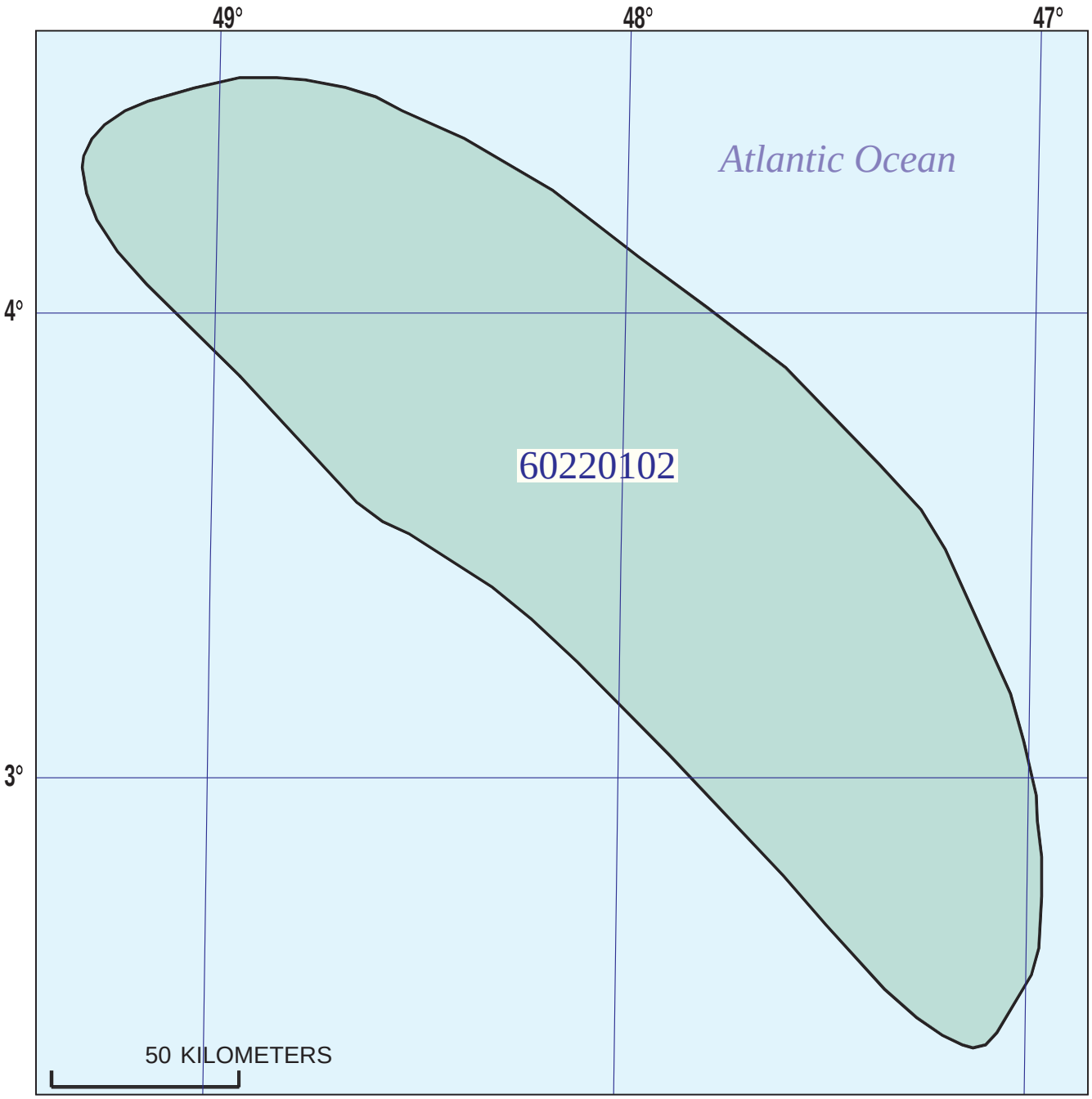
TRAPS AND SEALS: The vertically migrating gas entered the stability zone for hydrate and formed clathrate, leading to a trap for other gas.

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.

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

Sad, A.R.E., Silveira, D.P., Silva, S.R.P., Maciel, R.R., and Machado, M.A.P., 1998, Marine gas hydrates along the Brazilian margin, *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. 146-147.



Offshore Gas Hydrates
Assessment Unit - 60220102

EXPLANATION

- Hydrography
- Shoreline
- 6022 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60220102 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:…… Offshore Gas Hydrates Number: 60220102
* Notes from Assessor

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. _____ 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: _____ Gas: _____
Established (>13 fields) _____ Frontier (1-13 fields) _____ 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……	
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	
Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):……	
4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size……	

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) _____ median no. _____ max no. _____

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 _____ median size _____ max. size _____

Assessment Unit (name, no.)

_____

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)……			
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)……			
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)

_____

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

1. _____ represents _____ 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):…			
Portion of volume % that is offshore (0-100%)……			