


Red Sea Coastal Block Faults Assessment Unit 20710201



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-  Red Sea Basin Geologic Province 2071

USGS PROVINCE: Red Sea Basin (2071)

GEOLOGIST: S.J. Lindquist

TOTAL PETROLEUM SYSTEM: Maqna (207102)

ASSESSMENT UNIT: Red Sea Coastal Block Faults (20710201) (frontier)

DESCRIPTION: The Red Sea Basin originated as an Oligocene cratonic rift between the northeastern part of the African continent and the Saudi Arabian peninsula. It has been undergoing sea floor spreading for the last 5 m.y. This assessment unit includes all the Red Sea coastal block faulted areas of Egypt, Sudan, Eritrea, Saudi Arabia, and Yemen where trap types are mostly similar to those in the productive Gulf of Suez. It also extends into the southeastern one third of the Gulf of Suez, but it does not include any portion of the Gulf of Aqaba. The assessment unit is >100,000 km in area.

SOURCE ROCKS: Middle and Lower Miocene oil-and-gas-prone syn-rift and post-rift shales from a variety of laterally limited depositional settings ranging from marine to terrigenous. They typically average 1 to 2 wt. % TOC (maximum 14 wt. %), with thicknesses of as much as tens of meters.

MATURATION: Dominantly Late Miocene to Quaternary, 11 to 2 Ma. Locally high thermal gradients and the partly terrigenous character of the source rock result in both gas and oil presence and an oil window as shallow as 1,000 m.

MIGRATION: Migration paths range from simple, cross-fault juxtapositions of mature source and reservoir rock to more tortuous cross-fault migrations combined with upward movements through fault blocks to a seal.

RESERVOIR ROCKS: Miocene sandstones and carbonates from depositional environments ranging from deep marine to deltaic, coastal and subaerial. Arithmetic average of porosity is about 22 percent and of permeability about 1 D.

TRAPS AND SEALS: Traps are predominantly tilted fault blocks of Oligocene and Miocene age. The regional seal is extensive Upper Miocene salt, evaporite and shale hundreds of meters thick.

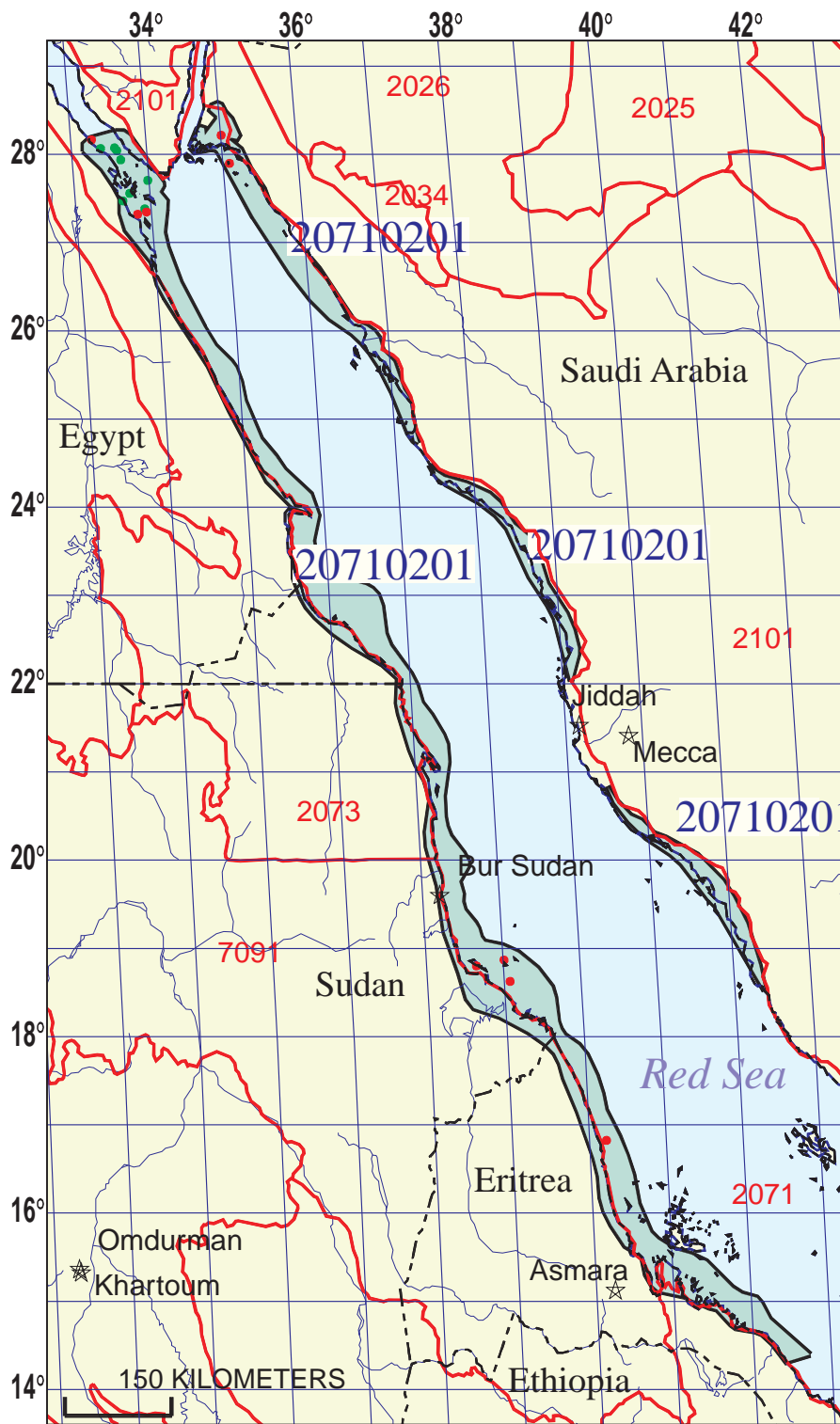
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Lindquist, S.J., 1998, The Red Sea basin province—Sudr-Nubia(!) and Maqna(!) petroleum systems: U.S. Geological Survey Open-File Report 99-50-A, 21 p., 11 figs., 2 tables.



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EXPLANATION

- Hydrography
- Shoreline
- 2071 Geologic province code and boundary
- - - Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 20710201 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:..... 11/20/98
 Assessment Geologist:..... T.S. Ahlbrandt
 Region:..... Middle East and North Africa Number: 2
 Province:..... Red Sea Basin Number: 2071
 Priority or Boutique..... Priority
 Total Petroleum System:..... Maqna Number: 207102
 Assessment Unit:..... Red Sea Coastal Block Faults Number: 20710201
 * Notes from Assessor Used MMS growth factor.

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?..... 1 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: 7 Gas: 6
 Established (>13 fields) Frontier (1-13 fields) X Hypothetical (no fields)

Median size (grown) of discovered oil fields (mmboe):
 1st 3rd 14.4 2nd 3rd 10 3rd 3rd
 Median size (grown) of discovered gas fields (bcfg):
 1st 3rd 1159 2nd 3rd 90 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)	10	median no.	125	max no.	250
Gas fields:.....min. no. (>0)	10	median no.	200	max no.	400

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	1	median size	8	max. size	400
Gas in gas fields (bcfg):.....	min. size	6	median size	50	max. size	10000

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

<u>Oil Fields:</u>	minimum	median	maximum
Gas/oil ratio (cfg/bo).....	<u>1350</u>	<u>2350</u>	<u>3350</u>
NGL/gas ratio (bnl/mmcf).....	<u>50</u>	<u>60</u>	<u>70</u>
<u>Gas fields:</u>	minimum	median	maximum
Liquids/gas ratio (bnl/mmcf).....	<u>40</u>	<u>60</u>	<u>80</u>
Oil/gas ratio (bo/mmcf).....	<u> </u>	<u> </u>	<u> </u>

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

<u>Oil Fields:</u>	minimum	median	maximum
API gravity (degrees).....	<u>20</u>	<u>41</u>	<u>55</u>
Sulfur content of oil (%).....	<u>0.5</u>	<u>0.8</u>	<u>1</u>
Drilling Depth (m)	<u>1000</u>	<u>2300</u>	<u>4500</u>
Depth (m) of water (if applicable).....	<u>0</u>	<u>20</u>	<u>300</u>
<u>Gas Fields:</u>	minimum	median	maximum
Inert gas content (%).....	<u> </u>	<u> </u>	<u> </u>
CO ₂ content (%).....	<u> </u>	<u> </u>	<u> </u>
Hydrogen-sulfide content (%).....	<u> </u>	<u> </u>	<u> </u>
Drilling Depth (m).....	<u>1000</u>	<u>2300</u>	<u>4500</u>
Depth (m) of water (if applicable).....	<u>0</u>	<u>20</u>	<u>300</u>

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

1. Egypt represents 22.2 areal % of the total assessment unit

<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>22.2</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>82.2</u>	_____
 <u>Gas in Gas Fields:</u>	 minimum	 median	 maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>22.2</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>82.2</u>	_____

2. Sudan represents 33.7 areal % of the total assessment unit

<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>33.7</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>74.3</u>	_____
 <u>Gas in Gas Fields:</u>	 minimum	 median	 maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>33.7</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>74.3</u>	_____

3. Eritrea represents 22.5 areal % of the total assessment unit

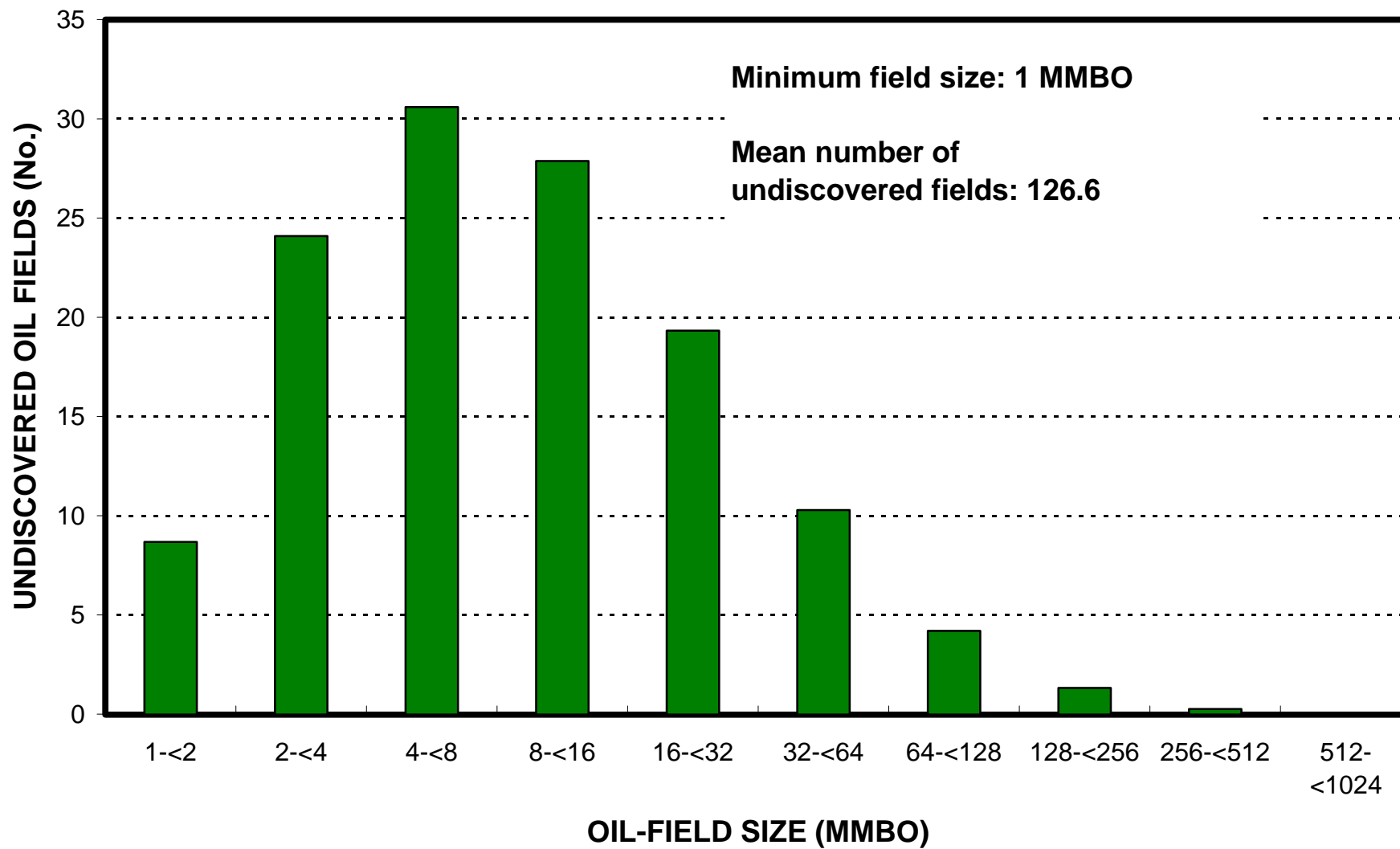
<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>22.5</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>76.2</u>	_____
 <u>Gas in Gas Fields:</u>	 minimum	 median	 maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>22.5</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>76.2</u>	_____

4. Saudi Arabia represents 21.6 areal % of the total assessment unit

<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>21.6</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>52.4</u>	_____
 <u>Gas in Gas Fields:</u>	 minimum	 median	 maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>21.6</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>52.4</u>	_____

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Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution

