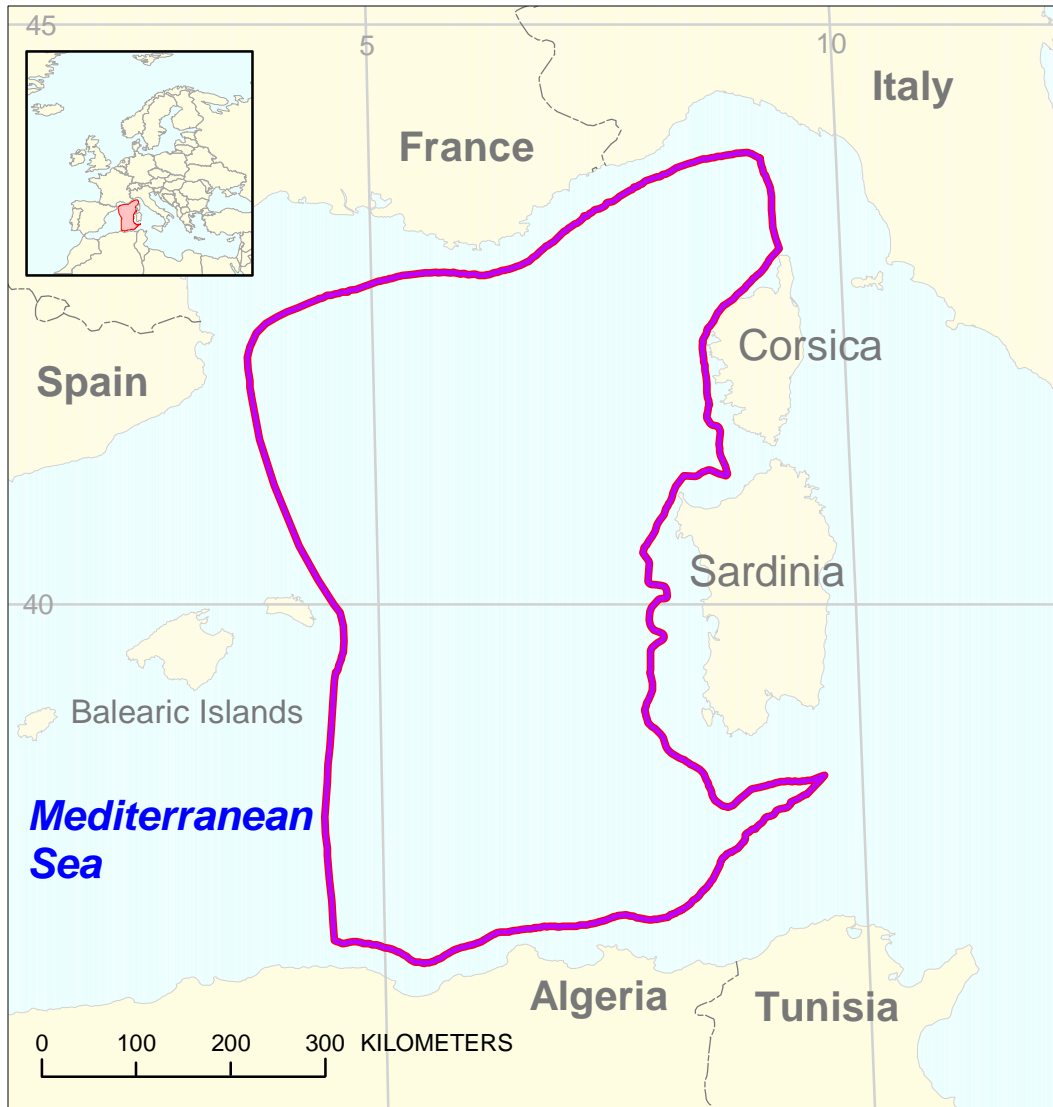




Subsalt Assessment Unit 40680101



-  Subsalt Assessment Unit 40680101
-  Provence Basin Geologic Province 4068

USGS PROVINCE: Provence Basin (4068).

GEOLOGIST: M.J. Pawlewicz

TOTAL PETROLEUM SYSTEM: Pre-Messinian (406801).

ASSESSMENT UNIT: Subsalt (40680101).

DESCRIPTION: This assessment unit is defined by the sediments beyond the continental shelf and below the Messinian (Uppermost Miocene) evaporites in the deep western Mediterranean between Spain, France, Corsica and Sardinia, Algeria, and the Balearic Islands.

SOURCE ROCKS: Essentially unknown; thought to be as much as 4 km of sediments in this basin; comprised of Upper Cretaceous through Oligocene and Miocene shales from turbidites and pelagic sedimentation.

MATURATION: Due to attenuation in the crust underlying the region and the resultant higher heat flow, the Mesozoic or early Tertiary shales are thought to be in the range of highly mature to overmature with reference to the oil window.

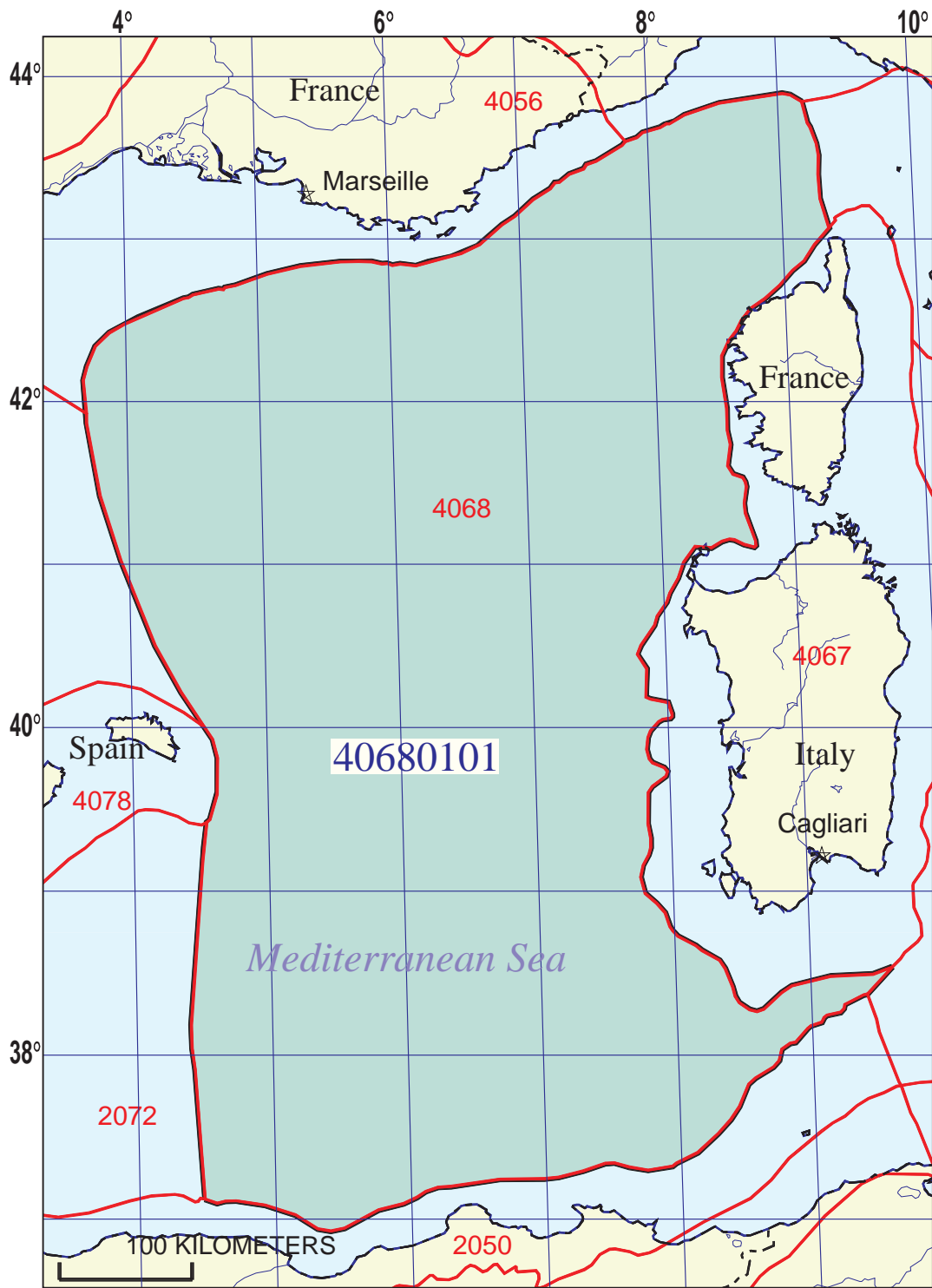
MIGRATION: Migration probably less than 3 km, vertically into domes created by salt diapirism. Possibility of structural traps associated with grabens formed in the basement during crustal stretching and attenuation.

RESERVOIR ROCKS: Miocene and Oligocene sandstone and turbidites; Cretaceous carbonates, and possibly deltaic sandstones.

TRAPS AND SEALS: Traps are stratigraphic in turbidite sandstones, and structural in basement fault blocks. The ultimate seal for the pre-Miocene sediments is the 1 to 2 km thick Messinian age evaporites.

REFERENCES:

- Peterson, J.A., 1994, Regional geology and hydrocarbon resource potential, the Mediterranean Sea region: US Geological Survey Open-File Report, 65 p.
- Burollet, P.F., 1984, Deep Mediterranean basins and their oil potential, *in* Halbouty, M.L., ed., Future Petroleum Provinces of the World: American Association of Petroleum Geologists Memoir 40, p. 545-557.
- Burrus, J., 1984, Contribution to a geodynamic synthesis of the Provençal Basin (North-Western Mediterranean): *Marine Geology*, v. 55, p. 247-269.



**Subsalt
Assessment Unit - 40680101**

EXPLANATION

- Hydrography
- Shoreline
- 4068 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 40680101 — 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:..... M.J. Pawlewicz
 Region:..... Europe Number: 4
 Province:..... Provence Basin Number: 4068
 Priority or Boutique:..... Boutique
 Total Petroleum System:..... Pre-Messinian Number: 406801
 Assessment Unit:..... Subsalt Number: 40680101
 * Notes from Assessor

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?..... 20 mmmboe 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:

| <u>Attribute</u> | <u>Probability of occurrence (0-1.0)</u> |
|--|--|
| 1. CHARGE: Adequate petroleum charge for an undiscovered field ≥ minimum size..... | <u>0.6</u> |
| 2. ROCKS: Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size..... | <u>1.0</u> |
| 3. TIMING OF GEOLOGIC EVENTS: Favorable timing for an undiscovered field ≥ minimum size | <u>1.0</u> |

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):..... 0.6

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) | <u>1</u> | median no. | <u>6</u> | max no. | <u>15</u> |
| Gas fields:.....min. no. (>0) | <u>1</u> | median no. | <u>60</u> | max no. | <u>140</u> |

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 | <u>20</u> | median size | <u>50</u> | max. size | <u>2500</u> |
| Gas in gas fields (bcfg):.....min. size | <u>120</u> | median size | <u>600</u> | max. size | <u>36000</u> |

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)..... | 1100 | 2200 | 3300 |
| NGL/gas ratio (bnl/mmcf)..... | 30 | 60 | 90 |
| <u>Gas fields:</u> | minimum | median | maximum |
| Liquids/gas ratio (bnl/mmcf)..... | 22 | 44 | 66 |
| Oil/gas ratio (bo/mmcf)..... | | | |

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

| <u>Oil Fields:</u> | minimum | median | maximum |
|---|---------|--------|---------|
| API gravity (degrees)..... | | | |
| Sulfur content of oil (%)..... | | | |
| Drilling Depth (m) | 4500 | 5000 | 8000 |
| Depth (m) of water (if applicable)..... | 2000 | 2500 | 2800 |
| <u>Gas Fields:</u> | minimum | median | maximum |
| Inert gas content (%)..... | | | |
| CO ₂ content (%)..... | | | |
| Hydrogen-sulfide content (%)..... | | | |
| Drilling Depth (m)..... | 4500 | 6000 | 8000 |
| Depth (m) of water (if applicable)..... | 2000 | 2500 | 2800 |

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

1. France represents 25 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):... | _____ | 80 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |
| | | | |
| <u>Gas in Gas Fields:</u> | minimum | median | maximum |
| Richness factor (unitless multiplier):..... | _____ | _____ | _____ |
| Volume % in parcel (areal % x richness factor):... | _____ | 40 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |

2. Spain represents 25 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):... | _____ | 20 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |
| | | | |
| <u>Gas in Gas Fields:</u> | minimum | median | maximum |
| Richness factor (unitless multiplier):..... | _____ | _____ | _____ |
| Volume % in parcel (areal % x richness factor):... | _____ | 35 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |

3. Algeria represents 20 areal % of the total assessment unit

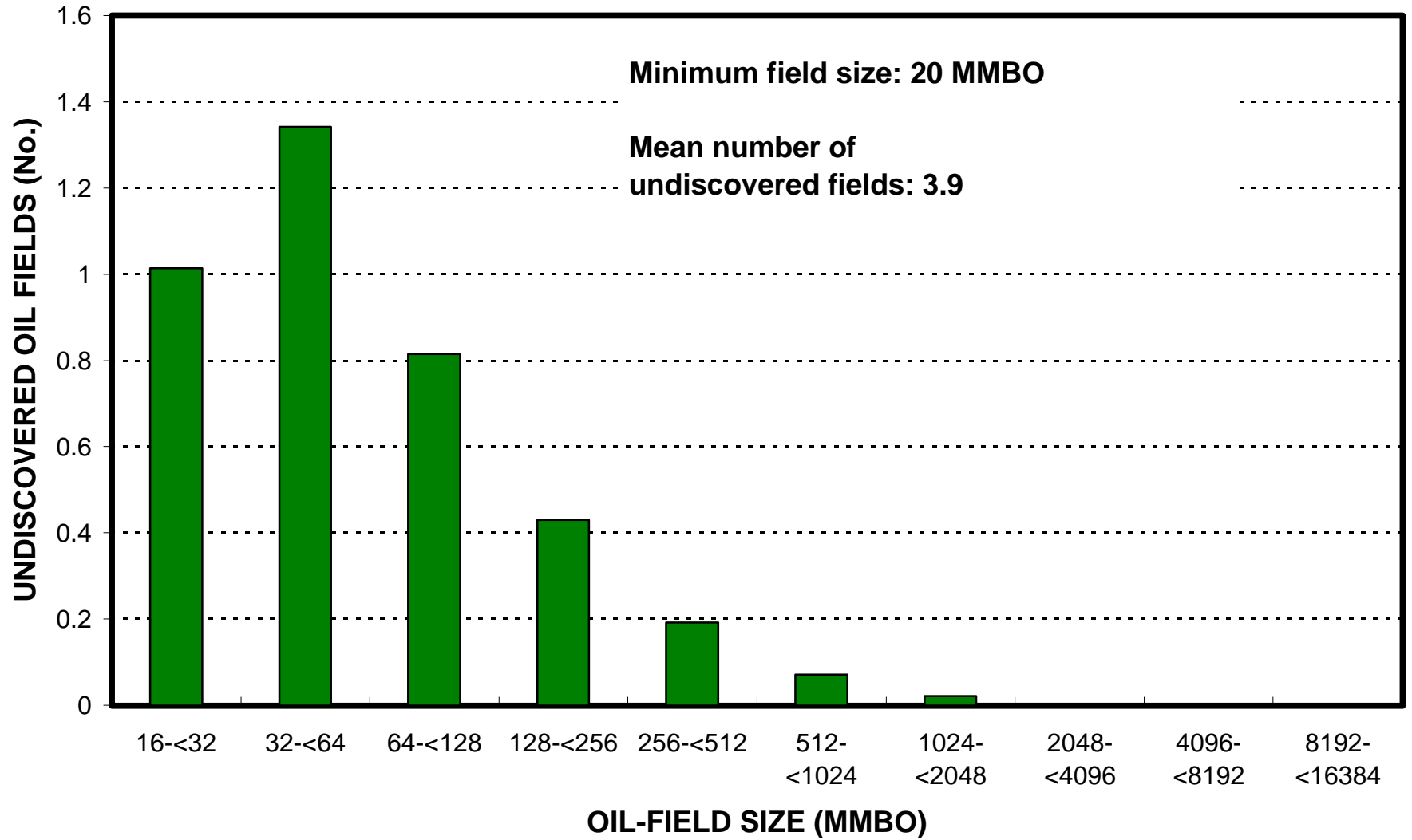
| <u>Oil in Oil Fields:</u> | minimum | median | maximum |
|---|---------|--------|---------|
| Richness factor (unitless multiplier):..... | _____ | _____ | _____ |
| Volume % in parcel (areal % x richness factor):... | _____ | 0 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |
| | | | |
| <u>Gas in Gas Fields:</u> | minimum | median | maximum |
| Richness factor (unitless multiplier):..... | _____ | _____ | _____ |
| Volume % in parcel (areal % x richness factor):... | _____ | 5 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |

4. Italy represents 30 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):... | _____ | 0 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |
| | | | |
| <u>Gas in Gas Fields:</u> | minimum | median | maximum |
| Richness factor (unitless multiplier):..... | _____ | _____ | _____ |
| Volume % in parcel (areal % x richness factor):... | _____ | 20 | _____ |
| Portion of volume % that is offshore (0-100%):..... | _____ | 100 | _____ |

Subsalt, AU 40680101

Undiscovered Field-Size Distribution



Subsalt, AU 40680101

Undiscovered Field-Size Distribution

