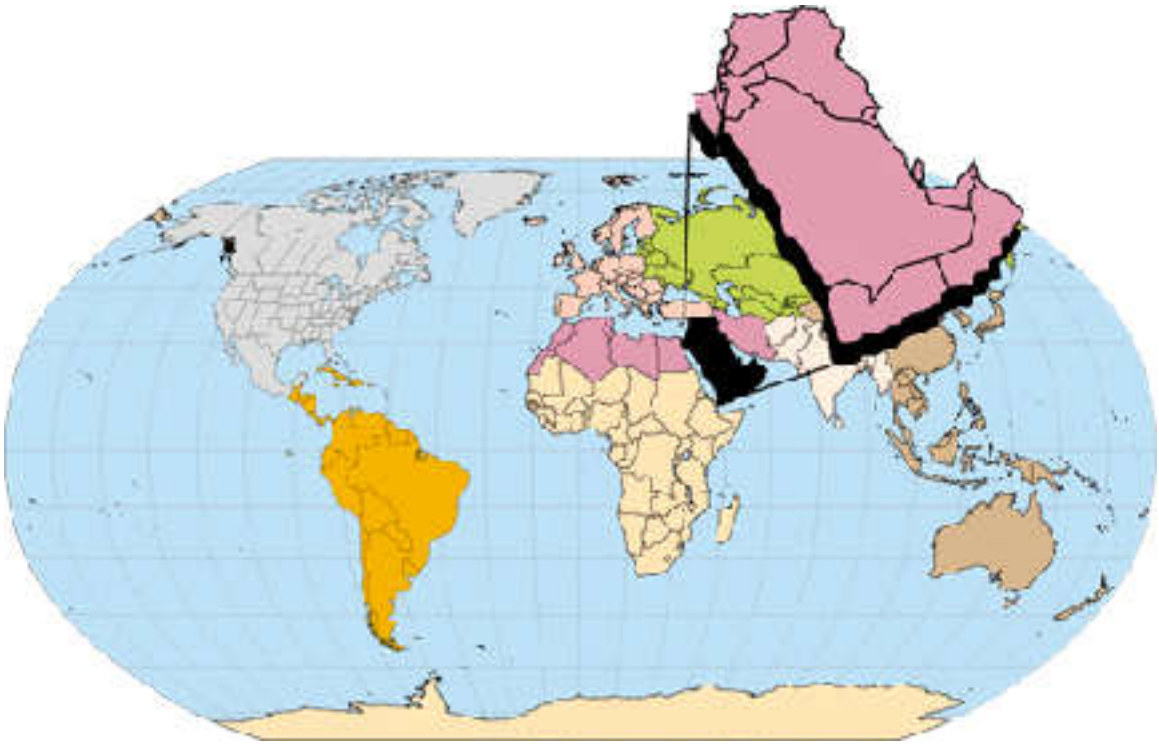
U. S. Department of the Interior
Geological Survey

MAPS SHOWING GEOLOGY, OIL AND GAS FIELDS AND GEOLOGIC PROVINCES OF THE ARABIAN PENINSULA

by

Richard M. Pollastro, Amy S. Karshbaum,
and Roland J. Viger



Open-File Report 97-470B

USGS
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U.S. Geological Survey Open File Report 97-470B

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Table of Contents

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1. INTRODUCTION

This digital map compilation, which includes geology, geologic provinces, and oil and gas fields of the Arabian Peninsula, is part of a map series of the world produced by the U.S. Geological Survey World Energy Project. The goal of the project is to produce a worldwide assessment of the undiscovered, technically recoverable oil and gas resources and report these results by the year 2000. To assess the world's petroleum, a sequence of steps is being undertaken proceeding from defining geologic provinces of the world at a comparable scale, allocating oil and gas fields to these provinces, defining petroleum systems within these provinces, and ultimately assessing the undiscovered petroleum potential of selected provinces of the world. A more in-depth discussion of the geologic provinces and their relative ranking in terms of total known petroleum volume is given in USGS Open File Report 97-463 (see Klett and others, 1997).

For the World Energy assessment, the world was divided into eight energy regions which correspond approximately with the economic regions of the world as defined by the U.S. Department of State. The Arabian Peninsula portion of Region 2 is represented on this CD-ROM (see insert Reference Map on geologic map). The geology map of the Arabian Peninsula was compiled and synthesized primarily from the U.S. Geological Survey--Arabian American Oil Company, 1963, 1:2,000,000 scale Geologic map of the Arabian Peninsula. Additional geology in the northern portion of this map for parts of Iraq, Jordan, Syria, Israel, and Lebanon was derived with permission from the 1:5,000,000 scale, 1971 version of the Geologic Map of Europe, Eastern sheet, published by UNESCO (see Selected References no.4). Specific details of the data sources are given in the metadata file on this CD-ROM. Map units were combined to simplify the map when projected at a larger scale and to maintain consistency with other region maps. Precambrian rocks are undivided and consist of sedimentary,

metamorphic, and igneous types. The boundary for Region 2 (Middle East/North Africa) is shown as an inset on the map. Oil and gas field markers represent field centerpoints published with permission from Petroconsultants International Data Corp., 1996 database.

Each region was divided into geologic provinces. Geologic province boundaries for the Arabian Peninsula were delineated onshore using data from the U.S. Geological Survey--Arabian American Oil Company, and UNESCO geologic maps (see Selected References), and other tectonic and geographical data from the publications listed in the Selected References section. Offshore geologic province boundaries are defined by the 2000 meter bathymetric contour from the U.S. Geologic Survey--Arabian American Oil Company 1963 geologic map (see Selected References). Provinces may contain one dominant element or a number of contiguous elements or basins that are genetically related. Each geologic province was assigned a unique number; the first digit is the region number. An attempt was made to number the provinces in geographical order. In the Arabian Peninsula the numbering starts in the southernmost portion of the peninsula, generally increasing to the east and north.

This map was compiled and displayed using Environmental Systems Research Institute, Inc. (ESRI) Arc/Info, ARCVIEW, and ArcPlot softwares. Political boundaries and their cartographic representation on this map were taken with permission from ESRI's ArcWorld 1:3,000,000 Arc/Info digital coverage, have no political significance, and are displayed as general reference only. Refer to the ESRI licensing agreement in the ESRI license folder on the CD-ROM.

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Geological provinces in the Arabian Peninsula, sorted by province name

USGS Province Code	Province
2089	Anah Graben
2101	Arabian Shield
2078	Beirut
2015	Central Oman Platform
2012	East Flank Oman Sub-basin
2075	Euphrates/Mardin
2016	Fahud Salt Basin
2014	Ghaba Salt Basin
2010	Ghudun-Khasfeh Flank Province
2021	Greater Ghawar Uplift
2018	Gulf of Oman Basin
2025	Hail-Ga'Ara Arch
2076	Haleb
2003	Hays Structural Belt
2013	Huqf-Haushi Uplift
2020	Interior Homocline-Central Arch
2026	Jafr-Tabuk Basin
2074	Khleisha Uplift
2032	Levantine Basin
2004	Ma'Rib-Al Jawf Basin
2009	Masila-Jeza Basin
2008	Masirah Trough
2024	Mesopotamian Foredeep Basin
2102	Mirbat Precambrian Basement
2005	Mukalla Rift Basin
2027	North Harrah Volcanics
2017	Oman Mountains
2077	Palmyra Zone

Geological provinces in the Arabian Peninsula, sorted by province name

USGS Province Code	Province
2022	Qatar Arch
2071	Red Sea Basin
2019	Rub Al Khali Basin
2028	Rutbah Uplift
2006	Shabwah Basin
2007	Sharmah Rift Basin
2033	Sinai Basin
2034	South Harrah Volcanics
2011	South Oman Salt Basin
2029	Wadi-Surhan Basin
2023	Widyan Basin-Interior Platform
2001	Yemen Volcanic Basin (North)
2002	Yemen Volcanic Basin (South)
2030	Zagros Fold Belt
2031	Zagros Thrust Zone

Geological provinces in the Arabian Peninsula, sorted by province code

USGS Province Code	Province
2001	Yemen Volcanic Basin (North)
2002	Yemen Volcanic Basin (South)
2003	Hays Structural Belt
2004	Ma'Rib-Al Jawf Basin
2005	Mukalla Rift Basin
2006	Shabwah Basin
2007	Sharmah Rift Basin
2008	Masirah Trough
2009	Masila-Jeza Basin
2010	Ghudun-Khasfeh Flank Province
2011	South Oman Salt Basin
2012	East Flank Oman Sub-basin
2013	Huqf-Haushi Uplift
2014	Ghaba Salt Basin
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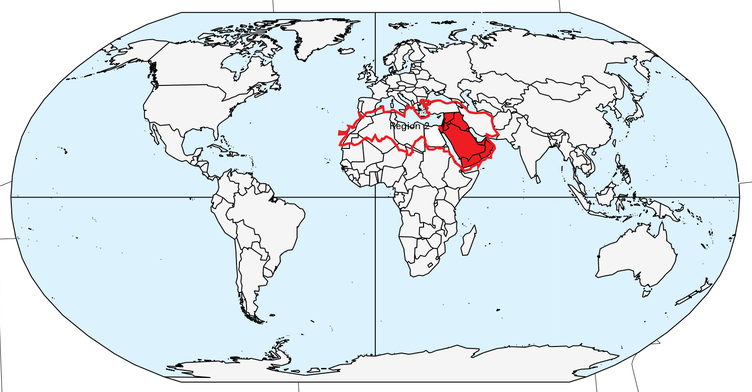
2031	Zagros Thrust Zone
2032	Levantine Basin
2033	Sinai Basin
2034	South Harrah Volcanics
2071	Red Sea Basin
2074	Khleisha Uplift
2075	Euphrates/Mardin
2076	Haleb
2077	Palmyra Zone
2078	Beirut
2089	Anah Graben
2101	Arabian Shield
2102	Mirbat Precambrian Basement



REFERENCE MAP

MEDITERRANEAN SEA
RED SEA
ARABIAN-PERSIAN GULF
GULF OF OMAN
ARABIAN SEA
GULF OF ADEN

2076 Haleb
2075 Euphrates/Mardin
2074 Khleisha Uplift
2078 Beirut
2077 Palmyra Zone
2085 Anah Graben
2029 Wadi-Surhan Basin
2032 Levantine Basin
2027 North Harrah Volcanics
2028 Rutbah Uplift
2033 Sinai Basin
2023 Widyan Basin-Interior Platform
2031 Zagros Thrust Zone
2026 Jafr-Tabuk Basin
2101 Arabian Shield
2025 Hail-Ga'Ara Arch
2034 South Harrah Volcanics
2024 Mesopotamian Foredeep Basin
2030 Zagros Fold Belt
2022 Qatar Arch
2021 Greater Ghawar Uplift
2018 Gulf of Oman Basin
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2016 Fahud Salt Basin
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EXPLANATION

2000 Province number

USGS Province Boundary

International boundary

Oil and Gas Fields

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Petroleum field location centerpoints used with permission from Petroconsultants International Data Corporation 1996 database.

Country boundaries ARCWORLD 1:3M Digital Map of the World.

Source of Geologic Province boundaries is USGS World Energy Project.

SCALE 1: 4 500 000

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100 0 100 200 300 400 500 KILOMETERS

Lambert Conformal Conical Projection
Units: Meters, Standard Parallels: 17 00 00, 33 00 00
Meridian: 47 00 00, Latitude of Origin: 22 00 00
False Easting: 0, False Northing: 0

Original data accurate at scale of 1:2,000,000.
Map produced at the Central Region, Energy Resource Team GIS Laboratory, Denver, Co.

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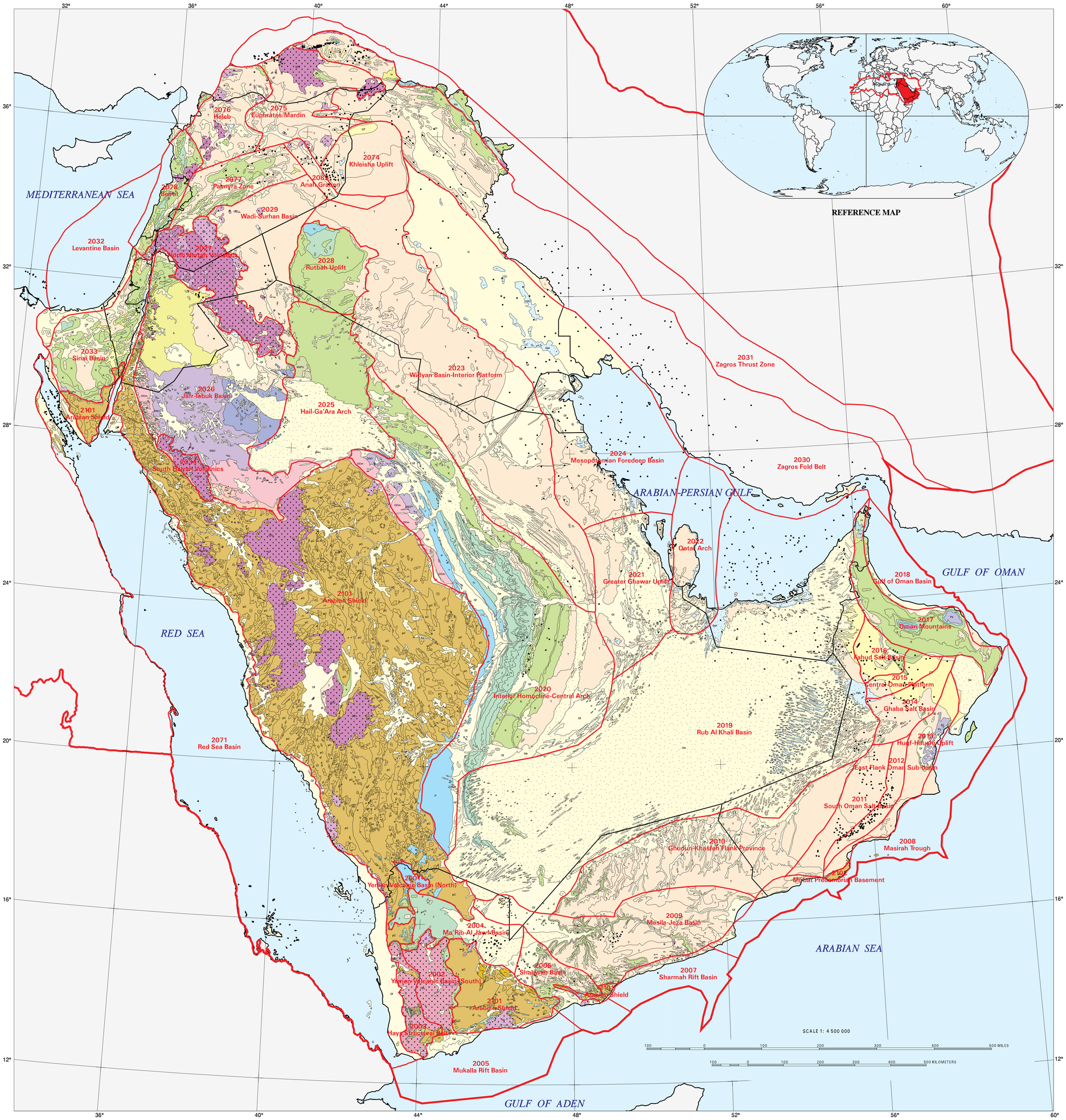
1998



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EXPLANATION

Geologic Units

- Q — Quaternary
- Qf — Quaternary, fluvial
- Qe — Quaternary, eolian
- Qsk — Quaternary, sabkha
- QT — Quaternary Tertiary
- T — Tertiary
- TK — Tertiary Cretaceous
- K — Cretaceous
- KJ — Cretaceous Jurassic
- J — Jurassic
- JTr — Jurassic Triassic
- Tr — Triassic
- TrP — Triassic Permian
- P — Permian
- C — Carboniferous
- D — Devonian
- DSO — Devonian Silurian Ordovician
- OCm — Ordovician Cambrian
- Cm — Cambrian
- Mz — Mesozoic
- MzPz — Mesozoic Paleozoic
- Pz — Paleozoic
- PzpC — Paleozoic Precambrian
- pC — Precambrian undifferentiated

Volcanics and Intrusives

- Kv — Cretaceous volcanics
- TKv — Tertiary Cretaceous volcanics
- TKi — Tertiary Cretaceous intrusives
- Qv — Quaternary volcanics
- QTv — Quaternary Tertiary volcanics
- Czi — Cenozoic intrusives
- MzCzi — Mesozoic Cenozoic intrusives
- MzCzv — Mesozoic Cenozoic volcanics
- Pzi — Paleozoic intrusives

- 2000 — Province Number
- Zagros — Province Name
- Geologic Province Boundary
- USGS Region 2 Boundary
- Political Boundary
- Geologic Contact
- Oil and Gas Fields
- Water
- Land areas not included in this study

SELECTED REFERENCES

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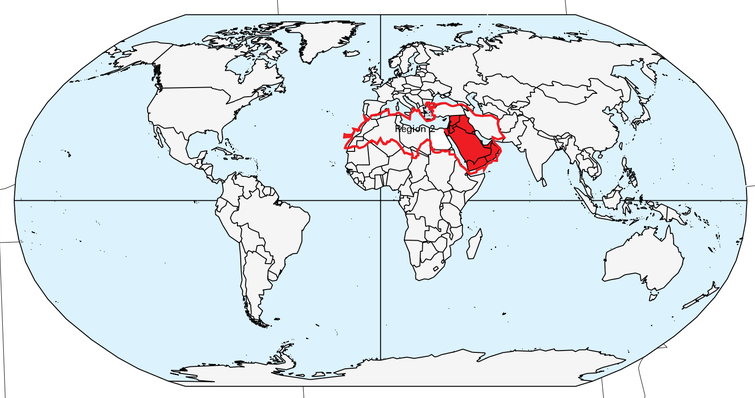

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2000 Province number

USGS Province Boundary

International boundary

Oil and Gas Fields

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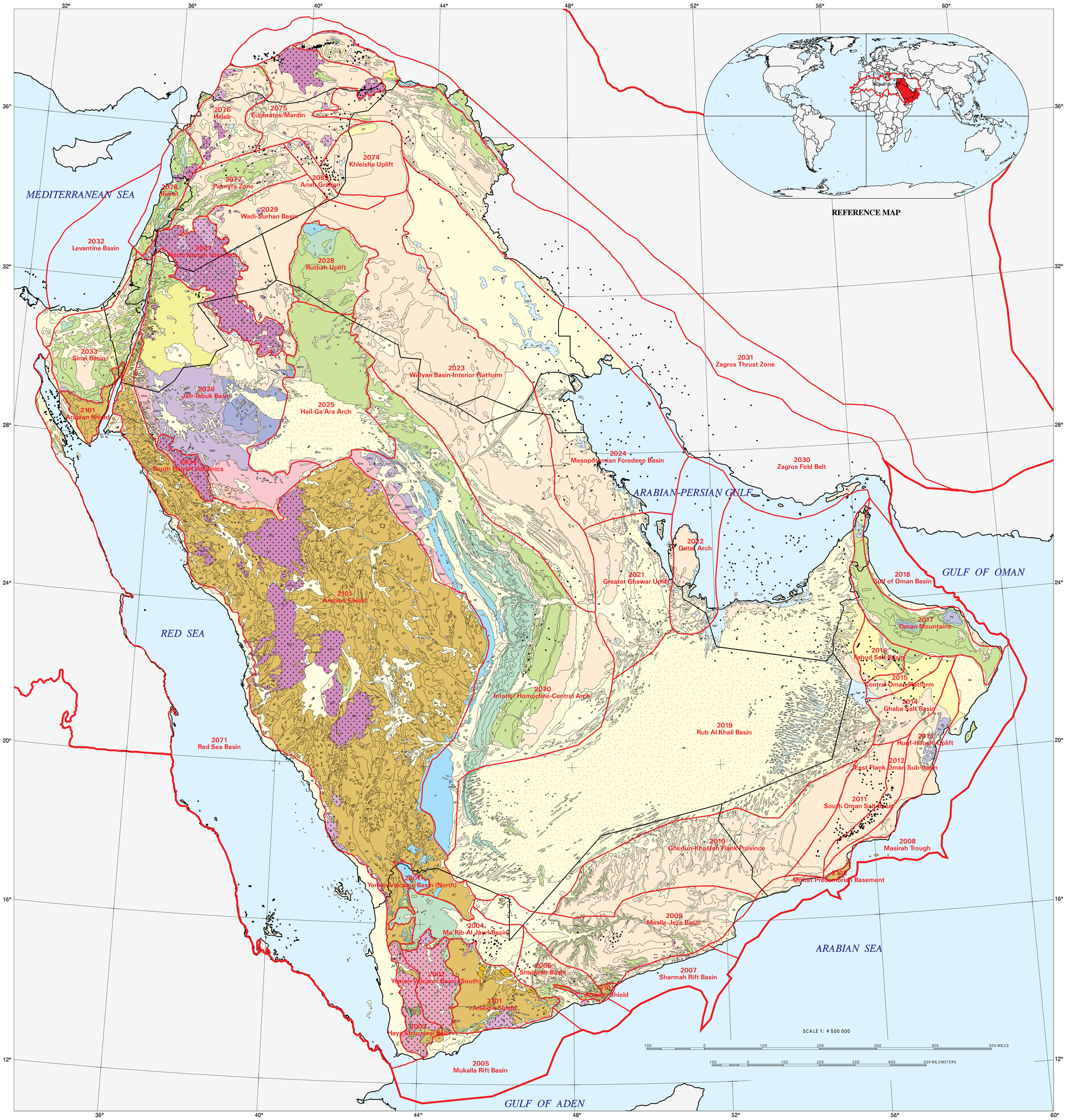

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INTRODUCTION

This digital map compilation, which includes geology, geologic provinces, and oil and gas fields of the Arabian Peninsula, is part of a map series of the world produced by the U.S. Geological Survey World Energy Project. The goal of the project is to produce a worldwide assessment of the undiscovered, technically recoverable oil and gas resources and report these results by the year 2000.
To assess the world's petroleum, a sequence of steps is being undertaken proceeding from defining geologic provinces of the world at a comparable scale, allocating oil and gas fields to these provinces, defining petroleum systems within these provinces, and ultimately assessing the undiscovered petroleum potential of selected provinces of the world. A more in depth discussion of the geologic provinces and their relative ranking in terms of total known petroleum volume is given in USGS Open File Report 97 463 (see Klett and others, 1997).

For the World Energy assessment, the world was divided into eight energy regions which correspond approximately with the economic regions of the world as defined by the U.S. Department of State. The Arabian Peninsula portion of Region 2 is represented on this CD ROM (see insert Reference Map on geologic map). The geology map for the Arabian Peninsula was compiled and synthesized primarily from the U.S. Geological Survey Arabian American Oil Company, 1963, 1:2,000,000 scale Geologic map of the Arabian Peninsula. Additional geology in the northern portion of this map for parts of Iraq, Jordan, Syria, Israel, and Lebanon was derived with permission from the 1:5,000,000 scale, 1971 version of the Geologic Map of Europe, Eastern sheet, published by UNESCO (see Selected References no.4). Specific details of the data sources are given in the metadata files on this CD ROM. Map units were combined to simplify the map when projected at a larger scale and to maintain consistency with other region maps. Precambrian rocks are undivided and consist of sedimentary, metamorphic, and igneous types. The boundary for Region 2 (Middle East/North Africa) is shown as an inset on this map. Oil and gas field markers represent field centerpoints published with permission from Petroconsultants Inter national Data Corp., 1996 database.

Each region was divided into geologic provinces. Geologic province boundaries for the Arabian Peninsula were delineated onshore using data from the U.S. Geological Survey Arabian American Oil Company, and UNESCO geologic maps (see Selected References), and other tectonic and geographical data from the publications listed in the Selected References section. Offshore geologic province boundaries are defined by the 2000 meter bathymetric contour from the U.S. Geological Survey Arabian American Oil Company 1963 geologic map (see Selected References). Provinces may contain one dominant element or a number of contiguous elements or basins that are generically related. Each geologic province was assigned a unique number; the first digit is the region number. An attempt was made to number the provinces in geographical order. In the Arabian Peninsula the numbering starts in the southernmost portion of the peninsula, generally increasing to the east and north.

This map was compiled and displayed using Environmental Systems Research Institute, Inc. (ESRI) Arc/Info, ARCVIEW, and ArcPlot softwares. Political boundaries and their cartographic representation on this map were taken with permission from ESRI's ArcWorld 1:3,000,000 Arc/Info digital coverage, have no political significance, and are displayed as general reference only. Refer to the ESRI licensing agreement in the ESRI license folder on the CD ROM.

EXPLANATION

Geologic Units

- Q — Quaternary
- Qf — Quaternary, fluvial
- Qe — Quaternary, eolian
- Qsk — Quaternary, sabkha
- QT — Quaternary Tertiary
- T — Tertiary
- TK — Tertiary Cretaceous
- K — Cretaceous
- KJ — Cretaceous Jurassic
- J — Jurassic
- JTr — Jurassic Triassic
- Tr — Triassic
- TrP — Triassic Permian
- P — Permian
- C — Carboniferous
- D — Devonian
- DSO — Devonian Silurian Ordovician
- OCm — Ordovician Cambrian
- Cm — Cambrian
- Mz — Mesozoic
- MzPz — Mesozoic Paleozoic
- Pz — Paleozoic
- PzpC — Paleozoic Precambrian
- pC — Precambrian undifferentiated

Volcanics and Intrusives

- Kv — Cretaceous volcanics
- TKv — Tertiary Cretaceous volcanics
- TKi — Tertiary Cretaceous intrusives
- Qv — Quaternary volcanics
- QTv — Quaternary Tertiary volcanics
- Czi — Cenozoic intrusives
- MzCzi — Mesozoic Cenozoic intrusives
- MzCzv — Mesozoic Cenozoic volcanics
- Pzi — Paleozoic intrusives

- 2000 — Province Number
- Zagros — Province Name
- Geologic Province Boundary
- USGS Region 2 Boundary
- Political Boundary
- Geologic Contact
- Oil and Gas Fields
- Water
- Land areas not included in this study

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