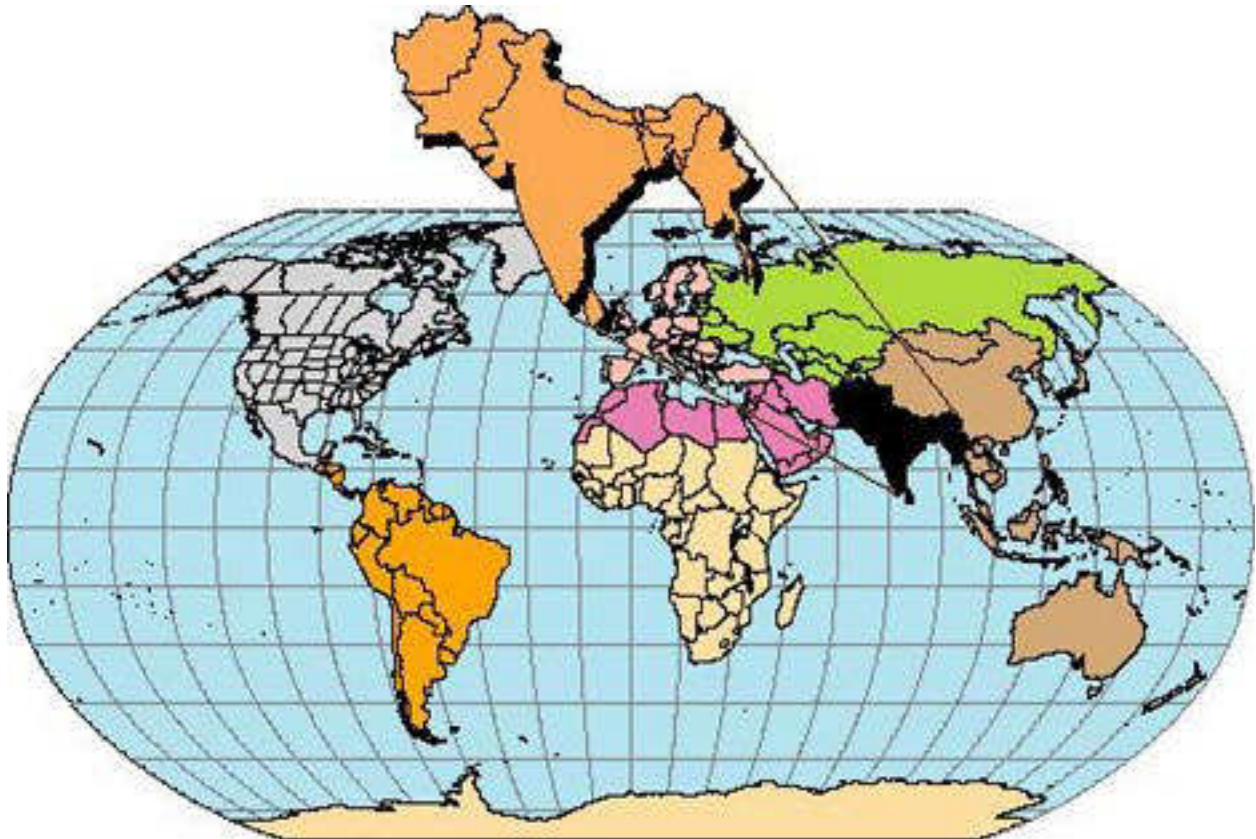


U. S. Department of the Interior  
Geological Survey

MAPS SHOWING GEOLOGY, OIL AND GAS FIELDS  
AND GEOLOGIC PROVINCES OF SOUTH ASIA

by

Craig J. Wandrey and Ben E. Law



Open-File Report 97-470C

This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the U. S. government.



# **U.S. Geological Survey Open File Report 97-470C**

## **MAPS SHOWING GEOLOGY, OIL AND GAS FIELDS AND GEOLOGIC PROVINCES OF SOUTH ASIA**

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### **INTRODUCTION**

This digitally compiled map includes petroleum geology, geologic provinces, and oil and gas fields of South Asia. The map is part of a worldwide series released by the U. S. Geological Survey World Energy Project. The goal of the project is to assess the undiscovered, technically recoverable oil and gas resources of the world and report these results by the year 2000. For data management purposes the world was divided into eight energy regions corresponding approximately to the economic regions of the world as defined by the U.S. Department of State. South Asia (Region 8) is represented on this CD-ROM (see Reference Map), and includes Afghanistan, Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan, and Sri Lanka.

Each region was then further divided into geologic provinces on the basis of natural geologic entities and may include a dominant structural element or a number of contiguous elements. Some provinces contain multiple genetically related basins. Geologic province boundaries for South Asia were delineated using data from UNESCO geologic maps, and other tectonic and geographic data (see Selected References). Offshore province boundaries were defined by the 2000 meter bathymetric contour from the UNESCO geologic maps (see References). Each province was assigned a unique number; the first digit is the region number. An attempt was made to number the provinces in geographical groups; onshore, offshore, and combined on and offshore. In South Asia, the numbering starts in the west. Oil and gas field data from Petroconsultants International Corporation worldwide oil and gas field database were allocated to these provinces. The geologic provinces are being further subdivided into petroleum systems and assessment units in order to appraise the undiscovered petroleum potential of selected provinces of the world. For a more in-depth discussion of the geologic provinces and their relative ranking in terms of total known petroleum volume, see Klett and others, 1997.

This map for South Asia was compiled and synthesized primarily from the UNESCO, 1976 and 1990, geologic maps of South and East Asia, 1:10,000,000 and 1:5,000,000 scales respectively. Specific details of the data sources are given in the metadata file on this CD-ROM. Geologic units were combined to simplify the map and to maintain consistency with other maps of the series. Precambrian rocks are undivided. Paleozoic, Mesozoic, and Cenozoic rocks have been combined in many cases (see Explanation). Oil and gas field markers represent field centerpoints published with permission from Petroconsultants International Data Corp., 1996 database.

This map was compiled using Environmental Systems Research Institute, Inc. (ESRI) ARC/INFO and ArcPlot softwares. Political boundaries and cartographic representations on this map were taken, with permission, from ESRI's ArcWorld 1:3 million digital coverage, have no political significance, and are displayed as general reference only.

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#### **REFERENCES**

Abu, M., Bakr, M. S., and Jackson, Roy O., 1964, Rawalpindi, Geological map of Pakistan: Geological Survey of Pakistan, scale: 1:2,000,000.

Alam, M., Khurshid, Hasan, A.K.M., Shahidul, Khan, Mujibur Rahman, and Whitney, John W., 1990, Geological map of Bangladesh: Geological Survey of Bangladesh, scale: 1:1,000,000.

Bender, F., 1981, Geology of Burma: Technische Fachhochschule Berlin, scale: 1:2,000,000.

\*Choubert, G. and Faure-Muret, A., 1976, Geological World Atlas, UNESCO, sheet 11, scale: 1:10,000,000.

Dasgupta, A. K., Ghose, A., and Chakraborty, K. K., 1993, Geological map of India: Hyderabad, Geological Survey of India, scale: 1:5,000,000.

Earth Sciences Research Division, 1977, Geological map of The Socialist Republic of the Union of Burma: Earth Sciences Research Division, Socialist Republic of the Union of Burma scale: 1:1,000,000.

Environmental Systems Research Institute Inc., 1992, ArcWorld 1:3M Environmental Systems Research Institute, Inc. (ESRI), Digital database, available from ESRI, Redlands, CA, scale: 1:3,000,000.

\*JEBSCO Seismic Ltd., compilers, 1984, Geological world atlas U.S.S.R. and surrounding areas: extract from the Geological World Atlas, sheets 10 through 13, Commission for the Geological Map of the World/UNESCO, scale: 1:10,000,000.

\*Ghose, A., Chatterjee, D., and Bannerjee, J., 1990, Geological map of South and East Asia: Commission for Geological Map of the World, Subcommission for South and East Asia, UNESCO, scale: 1,5,000,000.

Klett, T. R., Ahlbrandt, T. S., Schmoker, J. W., and Dolton, G. L., 1997 Ranking of the world's oil and gas provinces by known petroleum volumes: U.S. Geological Survey Open-File Report 97-463, one CD-ROM.

Petroconsultants International Data Corporation, 1988, World Sedimentary Basins: Petroconsultants International Data Corporation, Geneva, Switzerland, scale: 1:23,000,000.

Petroconsultants International Data Corporation, 1996, Petroconsultants Worldwide Oil and Gas Field database 1996: Petroconsultants International Data Corporation, Geneva, Switzerland.

Wirtz, D., Muhlfeld, R., Weippert, D., and Wittekindt, H., compilers, 1964, Geological map of Afghanistan Central and Southern Part: Hanover, Geological Survey of the Federal Republic of Germany, and Afghanistan Geological and Mineral Survey (Kabul), scale: 1:1,000,000.

Wittekindt, H., and Weippert, D., Compilers, 1973, Geological map of Central and Southern Afghanistan: Hanover, Geological Survey of the Federal Republic of Germany, scale: 1:500,000.

\* Used with the permission of UNESCO

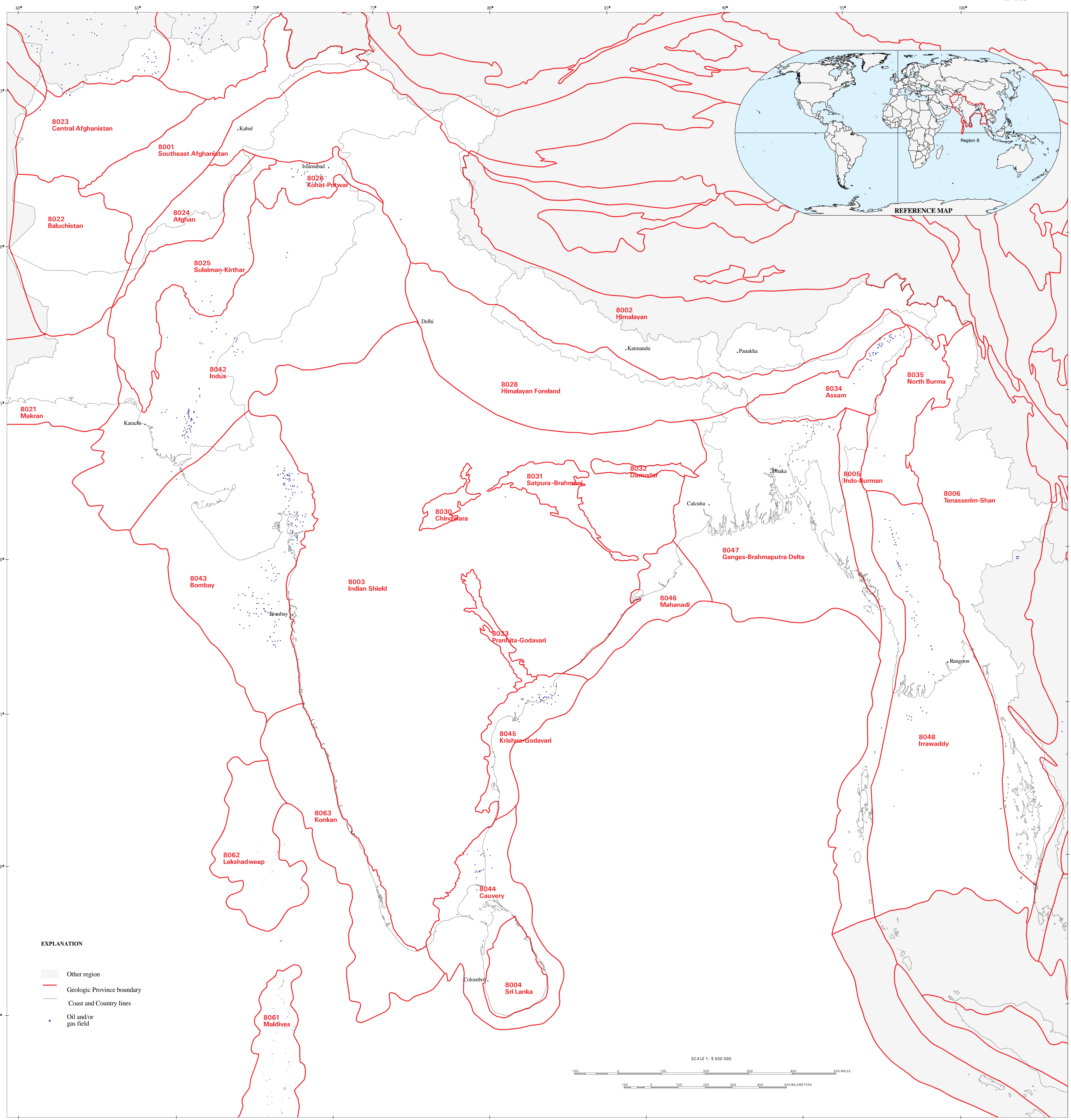
## **Geologic provinces in South Asia, sorted by province name**

<b>USGS Province Code</b>	<b>Province</b>
<b>8024</b>	<b>Afghan</b>
<b>8034</b>	<b>Assam</b>
<b>8022</b>	<b>Baluchistan</b>
<b>8043</b>	<b>Bombay</b>
<b>8044</b>	<b>Cauvery</b>
<b>8023</b>	<b>Central Afghanistan</b>
<b>8030</b>	<b>Chindwara</b>
<b>8032</b>	<b>Damodar</b>
<b>8047</b>	<b>Ganges-Brahmaputra</b>
<b>8002</b>	<b>Himalayan</b>
<b>8028</b>	<b>Himalayan Foreland</b>
<b>8003</b>	<b>Indian Shield</b>
<b>8005</b>	<b>Indo-Burman</b>
<b>8042</b>	<b>Indus</b>
<b>8048</b>	<b>Irrawaddy</b>
<b>8026</b>	<b>Kohat-Potwar</b>
<b>8063</b>	<b>Konkan</b>
<b>8045</b>	<b>Krishna-Godavari</b>
<b>8062</b>	<b>Lakshadweep</b>
<b>8046</b>	<b>Mahanadi</b>
<b>8021</b>	<b>Makran</b>
<b>8061</b>	<b>Maldives</b>
<b>8035</b>	<b>North Burma</b>
<b>8033</b>	<b>Pranhita-Godavari</b>
<b>8031</b>	<b>Satpura-Brahmani</b>
<b>8001</b>	<b>Southeast Afghanistan</b>
<b>8004</b>	<b>Sri Lanka</b>
<b>8025</b>	<b>Sulaiman-Kirthar</b>
<b>8006</b>	<b>Tenasserim-Shan</b>

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<b>8004</b>	<b>Sri Lanka</b>
<b>8005</b>	<b>Indo-Burman</b>
<b>8006</b>	<b>Tenasserim-Shan</b>
<b>8021</b>	<b>Makran</b>
<b>8022</b>	<b>Baluchistan</b>
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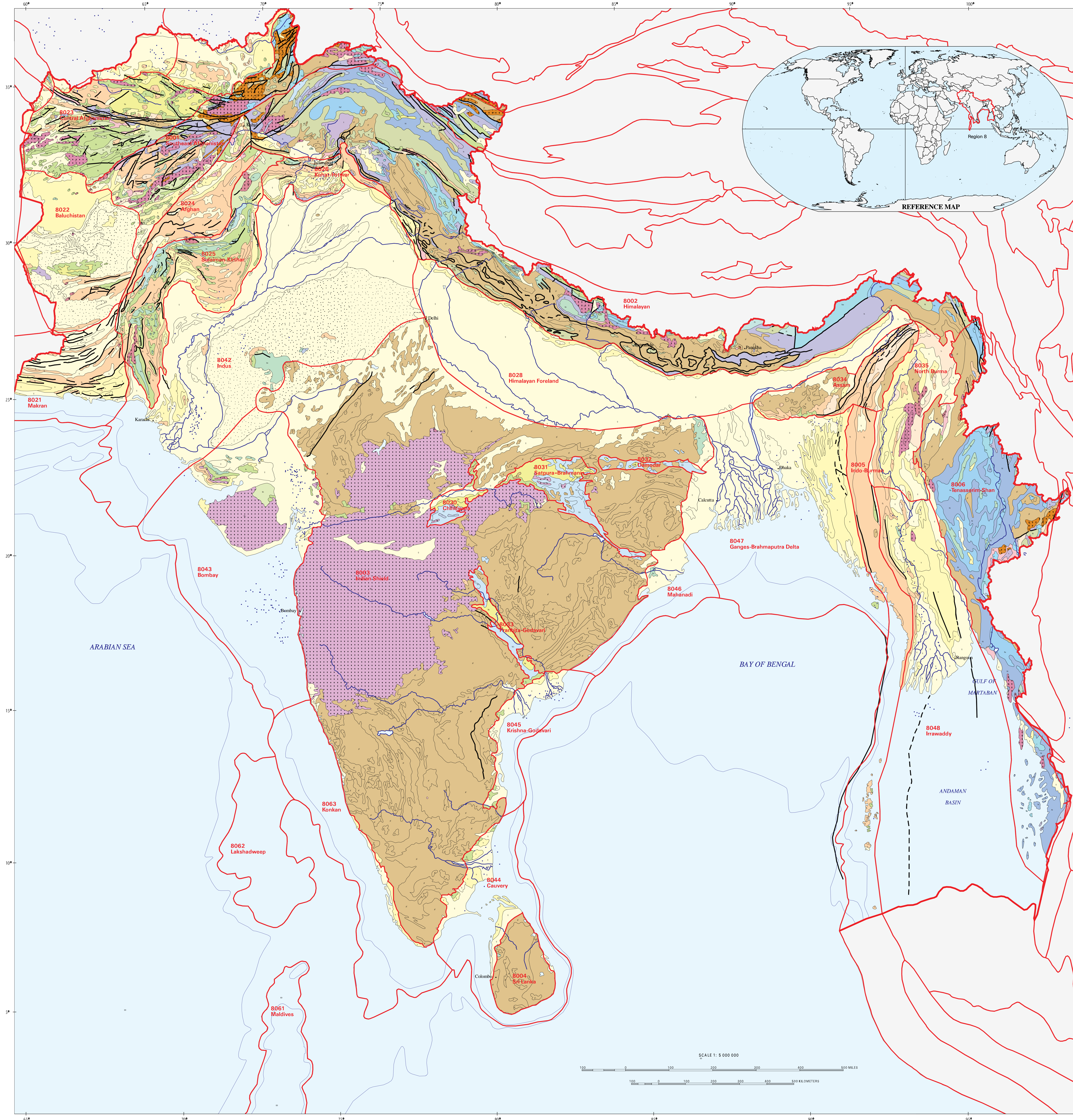
- EXPLANATION**
- Other region
  - Geologic Province boundary
  - Coast and Country lines
  - Oil and/or gas field

Projection: Albers Conic Equal Area  
 1st standard parallel: 10 degrees north latitude  
 2nd standard parallel: 40 degrees north latitude  
 central meridian: 80 degrees east longitude  
 latitude of origin: 20 degrees north latitude  
 false easting: 0  
 false northing: 0

**MAP SHOWING GEOLOGIC PROVINCES AND OIL AND GAS FIELDS OF SOUTH ASIA**

Compiled by Craig J. Wandrey and Ben E. Law  
 1998

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the International Stratigraphic Guide.



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**EXPLANATION**

Q Quaternary sediments	D undivided Devonian rocks
Qs Quaternary sand and dunes	S undivided Silurian rocks
N Neogene sedimentary rocks	SDc Silurian and Ordovician carbonate rocks
Pg Paleogene sedimentary rocks	Osm Ordovician sedimentary and metamorphic rocks
Ts Tertiary sedimentary rocks	Crmn Cambrian sedimentary and metamorphic rocks
Ti Tertiary igneous rocks	pC undivided Precambrian rocks
Tv Tertiary extrusive rocks	I undivided igneous rocks
TKs Tertiary and Cretaceous sedimentary rocks	H2O Water
TKim Tertiary and Cretaceous igneous and metamorphic rocks	Other region
TKv Paleocene Cretaceous extrusive rocks	Geologic Province boundary
Mzm Mesozoic intrusive and metamorphic rocks	Geologic Region boundary
Ks Cretaceous sedimentary rocks	— Fault
KJs Cretaceous and Jurassic sedimentary rocks	- - - Inferred Fault
KTs Lower Cretaceous to Middle Triassic sedimentary rocks	— River
Jms Jurassic metamorphic and sedimentary rocks	— Water depth contours
JTr Jurassic and Triassic rocks	• Oil and/or gas field
Tms Triassic metamorphic and sedimentary rocks	• Town or City
TrPr Triassic and Permian rocks	
TrCs Lower Triassic to Upper Carboniferous sedimentary rocks	
MzPzj Mesozoic and Paleozoic intrusive and metamorphic rocks	
Pz undivided Paleozoic rocks	
Pou Upper Paleozoic rocks	
Pjl Lower Paleozoic rocks	
Pzi Paleozoic igneous rocks	
Py undivided Permian rocks	
Cs Carboniferous sedimentary rocks	
CO undivided Carboniferous to Ordovician rocks	

**SELECTED REFERENCES**

Abu, M., Balz, M. S., and Jackson, Roy O., 1964, Geological map of Pakistan: Geological Survey of Pakistan, scale: 1:2,000,000.

Alam, M., Khurshid, Hasan, A.K.M., Shahid, Khan, Mujibur Rahman, and Whitney, John W., 1990, Geological map of Bangladesh: Geological Survey of Bangladesh, scale: 1:1,000,000.

Bender, F., 1981, Geology of Burma: Technische Fachhochschule Berlin, scale: 1:2,000,000.

\*Choubert, G. and Faure Muret, A., 1976, Geological World Atlas, UNESCO, sheet 11, scale: 1:10,000,000.

Dasgupta, A. K., Ghose, A., and Chakraborty, K. K., 1993, Geological map of India: Hyderabad, Geological Survey of India, scale: 1:5,000,000.

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Environmental Systems Research Institute Inc., 1992, ArcWorld 1:3M Environmental Systems Research Institute, Inc. (ESRI), Digital database, available from ESRI, Redlands, CA, scale: 1:3,000,000.

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Klett, T. R., Altherr, T. S., Schmor, J. W., and Dolan, G. L., 1997, Ranking of the world's oil and gas provinces by known petroleum volumes: U.S. Geological Survey Open File Report 97-463, one CD ROM.

Petroconsultants International Data Corporation, 1988 World Sedimentary Basins: Petroconsultants International Data Corporation, Geneva, Switzerland, scale: 1:25,000,000.

Petroconsultants International Data Corporation, 1996 Petroconsultants Worldwide Oil and Gas Field database 1996: Petroconsultants International Data Corporation, Geneva, Switzerland.

Wirtz, D., Mühlfeld, R., Weipert, D., and Wittekind, H., compilers, 1964, Geological map of Afghanistan Central and Southern Part: Hannover, Geological Survey of the Federal Republic of Germany, and Afghanistan Geological and Mineral Survey (Kabul), scale: 1:1,000,000.

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