U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

CIRCUM-PACIFIC MAP SERIES
MAP CP-50
*Explanatory pamphlet accompanies map*

CIRCUM-PACIFIC COUNCIL FOR ENERGY AND MINERAL RESOURCES

**CIRCUM-PACIFIC COUNCIL FOR ENERGY AND MINERAL RESOURCES**
**Michel T. Halbouty, Founder**

**CIRCUM-PACIFIC MAP PROJECT**
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# ENERGY-RESOURCES MAP OF THE CIRCUM-PACIFIC REGION

## PACIFIC BASIN SHEET

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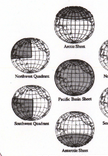



**INDEX TO MAP SHEETS**

## ENERGY RESOURCES

**PETROLEUM**

- Oil fields
- Gas fields
- Oil sand
- Oil shale

**COAL**–Map shows extent of coal deposits, parts of which may be too deep in the center or too thin on the edges of coal basins to be of present commercial value

- Anthracite
- Bituminous
- Subbituminous
- Lignite
- Rank unidentified

**GEOTHERMAL**–Geothermal convection system (estimated mean reservoir temperature)

| System | Developed | Development in progress | Identified |
|---|---|---|---|
| >150° C Vapor-dominated system | ▲ | | △ |
| >150° C Hot-water hydrothermal convection system | ● | ○ | ○ |
| 90-150° C Hot-water hydrothermal convection system | ● | ○ | ○ |

**Hot spring**–Surface temperature >50° C (not evaluated for reservoir temperature)

## GEOLOGIC BACKGROUND

**DESCRIPTION OF MAP UNITS**

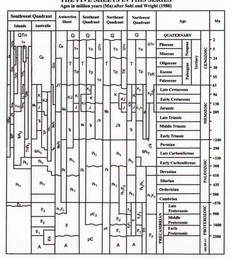
- **Major sedimentary basins, platform deposits, and surficial deposits (Phanerozoic)** Undeformed to folded and faulted
- **Volcanic rocks (Cenozoic to Paleozoic)** Essentially undeformed, principally subaerial; a, felsic; b, felsic to intermediate; c, intermediate; d, intermediate to mafic; e, mafic; f, undifferentiated
- **Intrusive igneous rocks (Phanerozoic) a**, felsic; b, intermediate; c, intermediate to mafic; d, mafic; e, alkaline; f, undifferentiated
- **Metamorphic complexes (Phanerozoic)**
- **Continental-margin rocks (Late Proterozoic and Phanerozoic)** Unmetamorphosed to slightly metamorphosed, mobile zones and deformed continental margin deposits
- **Crystalline basement rocks (Early and Middle Proterozoic and Archean)** Plutonic, volcanic, and metasedimentary
- **Ultramafic rocks**

**SYMBOLS**

- **Contact**
- **Fault**–Dashed where approximate or concealed
- **Ice front or edge of ice shelf**
- **Ice shelf**
- **Bathymetric contour**–Depth of water in meters; contour intervals 200 m and 1000 m. Intermediate contours dashed
- **City of 1,000,000 or more people**
- **City of less than 1,000,000 people**
- **Heights in meters**
- **Sedimentary basin**–Number refers to stratigraphic column of basin in explanatory notes
- **Active plate boundaries**
  - **Spreading axis**
  - **Transform fault**
  - **Subduction zone**–Sawteeth on upper plate

## CORRELATION DIAGRAM FOR MAP LEGEND OF THE FIVE SHEETS IN THIS SERIES

Ages in million years (Ma) after Sadd and Wright (1988)




**THICKNESS OF SEDIMENTARY ROCKS**–The thickness of unmetamorphosed sedimentary strata is indicated by isopachs, or indirectly, by structure form line; on land and in nearshore basins the contours are in kilometers, starting generally from 1 km; in oceanic areas thicknesses are shown in tenths of a kilometer or in seconds of two-way time (contours in seconds). Color indicates age of oldest sediment overlying basement. Dashed where approximate.

- **Neogene**
- **Paleogene**
- **Cretaceous**
- **Cretaceous-Jurassic**
- **Jurassic-Triassic**
- **Triassic**
- **Mesozoic and/or Cenozoic**
- **Upper Paleozoic**
- **Lower Paleozoic**
- **Paleozoic to Mesozoic**
- **Proterozoic**
- **Upper Precambrian**
- **Proterozoic to Paleozoic**
- **Unknown**

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*Affiliations are at time of compilation

**Map Production by U.S. Geological Survey**
**Compilation Coordinated by George Gryc**
**Cartography by Fran R. Mills, Connie Hoong, Theresa R. Swint-Iki, and Douglas S. Aitken**

SCALE 1:17 000 000

0 500 1000 1500 2000 KILOMETERS
0 500 1000 MILES
0 250 500 MILES

Lambert Azimuthal Equal-Area Projection
(Map center point: Equator , 160°W.)

**2000**

## CIRCUM-PACIFIC MAPS

This map is one in a series of maps covering the Pacific, Antarctic, and Arctic regions. The maps have been compiled as part of the Circum-Pacific Map Project, a cooperative international effort to show the relations of petroleum and energy resources to such phenomena as geology, tectonics, and crustal dynamics. The project is one of the activities of the Circum-Pacific Council for Energy and Mineral Resources.

The Map Project is made up of Earth scientists from countries in the Pacific region who contribute to maps of the Northwest, Northeast, Southwest, and Southeast Quadrants, and the Antarctica and Arctic areas. Eight series of maps are already published or are being prepared for future publication: Geographic, Base, Plate-Tectonic, Geologic, Tectonic, Geodynamic, Mineral-Resources, and Energy-Resources.

The nine accompanying maps cover the Pacific Basin at a scale of 1:10 million, and a seventh map covers the entire region at a scale of 1:17 million. All are plotted on the the Lambert azimuthal equal-area projection. The index map shows the boundaries of the quadrant map and of the Antarctic and Arctic area maps in the Pacific Ocean.

Geographic names are as recommended by the U.S. Board on Geographic Names, taking into account the recommendations of the Circum-Pacific Map Project panels. Names and boundaries on the maps do not necessarily reflect recognition of the political status of an area by those involved in the preparation and publication of these maps.

## ENERGY-RESOURCES MAP SERIES

Maps of the Energy-Resources Series show generalized geologic background, sedimentary isopachs, oil and gas fields, oil sand and oil shale, coal deposits, geothermal energy sites, and thickness of sedimentary rocks. Bathymetric contours and geographic names are also shown.

## SOURCES OF DATA

Full lists of references cited as sources of data for the map elements shown on this sheet are listed in the accompanying explanatory notes booklet and on the 1:10 million scale quadrant maps of the Energy-Resources Map series of the Circum-Pacific Map Project.

### ENERGY RESOURCES

W. David Palfreyman, Australian Geological Survey Organisation, compiled data for Australia, New Zealand, and the South Pacific Islands, and the Northwest Quadrant overlap is compiled by Tomoaki Sumii, Geological Survey of Japan. Geothermal resources data are compiled by W. David Palfreyman for the Southeast Quadrant region.

The principal sources of petroleum and coal data for the Northwest Quadrant region for Far East Soviet is Ermensko and others (1978), for China and Southeast Asia, United Nations ESCAP (1985); for the United States, Drummond (1986).

The principal sources of petroleum and coal data for the Southeast Quadrant region for South America were especially prepared by M.R. Yrigoyen (Argentina), R. Solis Iriarte (Bolivia), E. Gonzalez Pacheco (Chile), Empresa Colombiana de Petroleos (ECOPETROL) and Instituto Geologico Minero (Colombia), Ecuador (Ecuador), D. del Solar, V.R. Dyagilev, and V.R. Sanz (Peru), and N. Ponzoni and R. Bellizia (Venezuela). Geothermal resource data are from Stone (1985), and Waring (1965), and updated with assistance of individuals cited in the Explanatory Notes.

The principal sources of petroleum and coal data for the Northeast Quadrant region for the United States, Caswell and Schell (1977), Curtil (1972), Duncan and Swanson (1965), Moen (1978), Van Wert (1972), Hamilton and Danner (1973), and Bray (1975); Geological Survey of Canada (1981); for Mexico, Acevedo and Daunt (1980), and Salas and Cortes (1978); and for South America, Yrigoyen and others (1991). Geothermal resource data for the United States is from Muffler (1979) and Berry and others (1980). Computer plots of the geothermal data were provided by Ronald H. Smith, National Oceanic and Atmospheric Administration. The principal sources of geothermal data for South America, Central America, and Canada are Stone (1985), and Waring (1965).

### GEOLOGIC BACKGROUND

Land geology for the Southwest Quadrant is generalized from Deutch (1988). Active plate boundaries are generalized from Moore (1981).

Land geology for the Northwest Quadrant region is generalized from Inoue (1988). Active plate boundaries are generalized from Nishiwaki (1981, 1991).

Land geology for the Southeast Quadrant region is simplified and generalized from Corvalan (1985). Active plate boundaries are generalized from Moore (1982), modified in 1991.

Land geology for the Northeast Quadrant region is generalized from Drummond (1983). Active plate boundaries are generalized from Moore (1981).

### SEDIMENTARY BASINS

The sediment-thickness data for the Southwest Quadrant was compiled by W. David Palfreyman and Erwin Scheibner, of the Australian Geological Survey Organisation. Principal source of data for Australia is from Bureau of Mineral Resources (1981).

The sediment-thickness data for the Northwest Quadrant region was compiled by Tomoki Sumii, Geological Survey of Japan. The principal data are from Ermensko and others (1978), Khain (1985), Chinese Academy of Geological Science, Institute of Geomechanics (1984), Ludwig and Houtz (1979), United Nations ESCAP (1985), and Drummond (1986).

The principal sources of sediment-thickness data for the Southeast Quadrant region for marine areas are Case and Holcombe (1980), Ludwig and Houtz (1979), Martin (1980), and Westbrook and others (1984). Land isopachs were compiled by M. R. Yrigoyen with the assistance of individuals cited in the accompanying Explanatory Notes.

The principal sources of isopach data for the Northeast Quadrant region are Case and Holcombe (1980), Conrad and others, (1984), Frezon and others (1983), Grantz and May (1982), Ludwig and Houtz (1979), Martin (1980), and Westbrook and others, (1984). Salmon Bloch assisted in compiling sediment-thickness data.

Representative columnar sections for selected sedimentary basins are shown in the accompanying explanatory notes booklet.

Base by U.S. Geological Survey, 1989

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—2000

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225

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