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

CIRCUM-PACIFIC MAP SERIES
MAP CP-49
Explanatory pamphlet accompanies the 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
John A. Reinemund, Director
George Gryc, General Chair

GEOLOGIC MAP OF THE CIRCUM-PACIFIC REGION

PACIFIC BASIN SHEET

KENNETH J. DRUMMOND, Chairman, Northeast Quadrant Panel
JOSE CORVALAN D., Chairman, Southeast Quadrant Panel
TOMOYUKI MORITANI, Chairman, Northwest Quadrant Panel
R. W. JOHNSON, Chairman, Southwest Quadrant Panel
GEORGE W. MOORE, Chairman, Arctic Region Panel
IAN W. D. DALZIEL, Chairman, Antarctic Region Panel

COMPILERS AND PRINCIPAL CONTRIBUTORS*

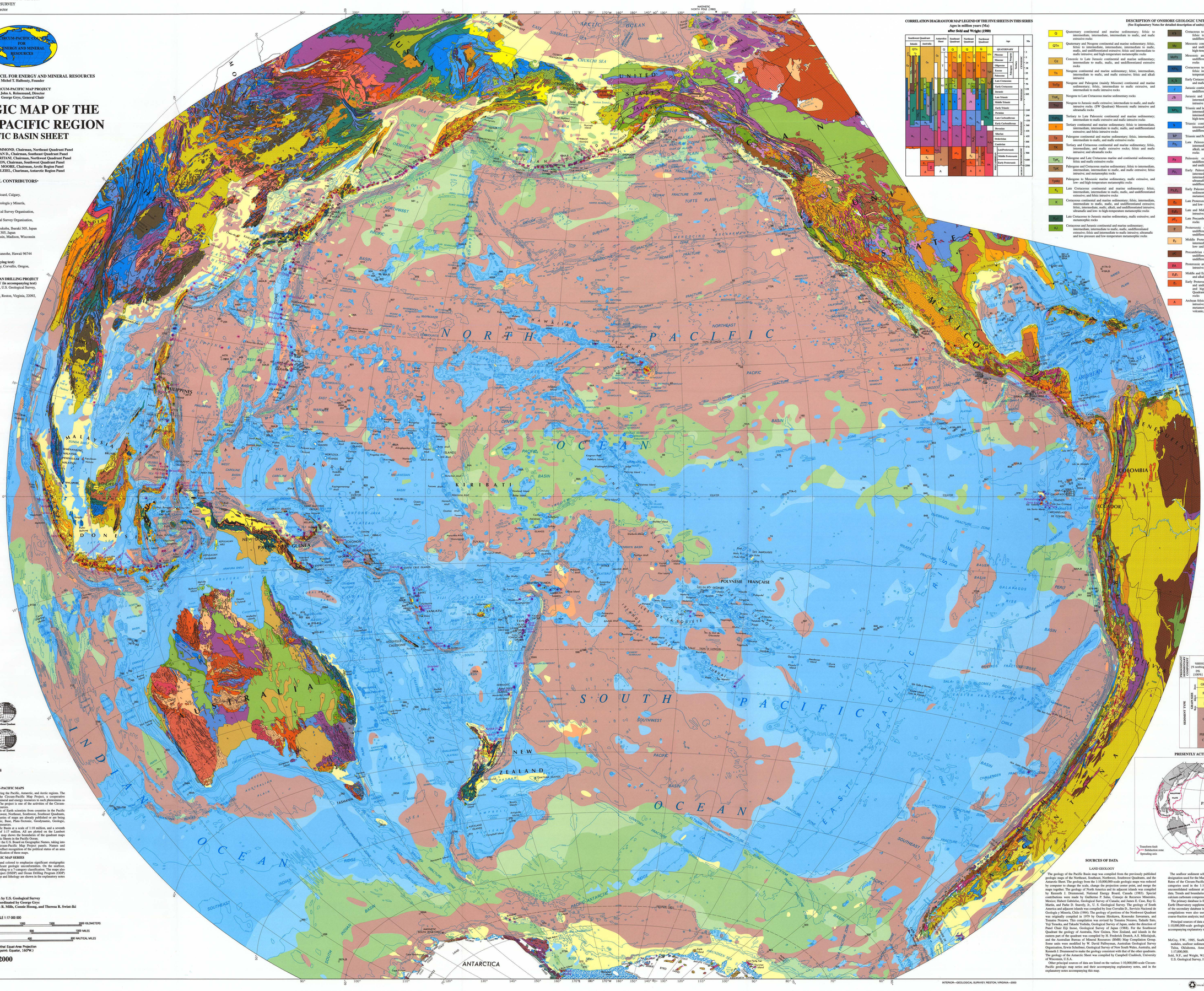
LAND GEOLOGY
Kenneth J. Drummond, National Energy Board, Calgary, Alberta,T2P3H2 Canada
José Corvalán D., Servicio Nacional de Geología y Minería, Santiago, Chile
W. David Palfreyman, Australian Geological Survey Organisation, Canberra, A.C.T., 2601, Australia
H. Frederick Doutch, Australian Geological Survey Organisation, Canberra, A.C.T., 2601, Australia
Eiji Inoue, Geological Survey of Japan, Tsukuba, Ibaraki 305, Japan
Tadashi Sato, Tsukuba University, Ibaraki 305, Japan
Campbell Craddock, University of Wisconsin, Madison, Wisconsin 53706, U.S.A.

SEAFLOOR SEDIMENT
Floyd W. McCoy, University of Hawaii, Kaneohe, Hawaii 96744

OFFSHORE GEOLOGY (in accompanying text)
George W. Moore, Oregon State University, Corvallis, Oregon, 97331, U.S.A.

DEEP SEA DRILLING PROJECT/OCEAN DRILLING PROJECT COLUMNAR SECTION LITHOLOGY (in accompanying text)
Theresa R. Swint-Iki and Anne L. Gartner, U.S. Geological Survey, Menlo Park, California, 94025, U.S.A.
Paul W. Richards, U.S. Geological Survey, Reston, Virginia, 22092, U.S.A.

*Affiliations at time of compilation



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

Ages in million years (Ma)
after Sohl and Wright (1980)

Southwest Quadrant: Islands | Australia
Antarctica Sheet
Southeast Quadrant
Northeast Quadrant
Northwest Quadrant
Age
Ma

CENOZOIC: QUATERNARY (Holocene, Pleistocene); TERTIARY (Pliocene, Miocene, Oligocene, Eocene, Paleocene)
MESOZOIC: Cretaceous (Late Cretaceous, Early Cretaceous); Jurassic (Late Jurassic, Middle Jurassic, Early Jurassic); Triassic (Late Triassic, Middle Triassic, Early Triassic)
PALEOZOIC: Permian; Carboniferous (Late Carboniferous, Early Carboniferous); Devonian; Silurian; Ordovician; Cambrian
PROTEROZOIC: Late Proterozoic; Middle Proterozoic; Early Proterozoic
ARCHEAN

DESCRIPTION OF ONSHORE GEOLOGIC UNITS

(See Explanatory Notes for detailed description of units)

- **Q** — Quaternary continental and marine sedimentary; felsic to intermediate, intermediate, intermediate to mafic, and mafic extrusive rocks
- **QTn** — Quaternary and Neogene continental and marine sedimentary; felsic; felsic to intermediate, intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; felsic and intermediate to mafic intrusive; and high-temperature metamorphic rocks
- **Cz** — Cenozoic to Late Jurassic continental and marine sedimentary; intermediate to mafic, mafic, and undifferentiated extrusive rocks
- **Tn** — Neogene continental and marine sedimentary; felsic, intermediate, intermediate to mafic, and mafic extrusive; felsic and alkali intrusive
- **TsTp** — Neogene and Paleogene (mainly Miocene) continental and marine sedimentary; felsic, intermediate to mafic extrusive, and intermediate to mafic intrusive rocks
- **TmKs** — Neogene to Late Cretaceous marine sedimentary rocks
- **TRJ** — Neogene to Jurassic mafic extrusive; intermediate to mafic, and mafic intrusive rocks. (SW Quadrant) Mesozoic mafic intrusive and ultramafic rocks
- **TRPz** — Tertiary to Late Paleozoic continental and marine sedimentary; intermediate to mafic extrusive and mafic intrusive rocks
- **T** — Tertiary continental and marine sedimentary; felsic to intermediate, intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; and felsic and alkali intrusive rocks
- **Tp** — Paleogene continental and marine sedimentary; felsic, intermediate, intermediate to mafic, and mafic extrusive rocks
- **TK** — Tertiary and Cretaceous continental and marine sedimentary; felsic, intermediate, and mafic extrusive rocks; felsic and mafic intrusive; and ultramafic rocks
- **TpKz** — Paleogene and Late Cretaceous marine and continental sedimentary; felsic and mafic extrusive rocks
- **TpJs** — Paleogene and Cretaceous marine sedimentary; felsic to intermediate, intermediate, intermediate to mafic, and mafic extrusive; felsic intrusive; and metamorphic rocks
- **TpMz** — Paleogene to Mesozoic marine sedimentary, mafic extrusive, and low- and high-temperature metamorphic rocks
- **Ks** — Late Cretaceous continental and marine sedimentary; felsic, intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; and felsic intrusive rocks
- **Kc** — Cretaceous continental and marine sedimentary; felsic, intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; felsic, intermediate, mafic, alkali, and undifferentiated intrusive; ultramafic and low- to high-temperature metamorphic rocks
- **KJs** — Late Cretaceous to Jurassic marine sedimentary, mafic extrusive; and metamorphic rocks
- **KJ** — Cretaceous and Jurassic continental and marine sedimentary; intermediate, intermediate to mafic, mafic, undifferentiated extrusive; felsic and intermediate to mafic intrusive; ultramafic and low-pressure and low-temperature metamorphic rocks
- **TRs** — Cretaceous to Triassic continental and marine sedimentary; felsic, felsic to intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; felsic and intermediate intrusive rocks
- **MZ** — Mesozoic continental and marine sedimentary; intermediate, mafic, and undifferentiated extrusive; felsic intrusive; ultramafic and high-temperature and high-pressure metamorphic rocks
- **MzPz** — Mesozoic and Paleozoic continental and marine sedimentary undifferentiated volcanic, and undifferentiated metamorphic rocks
- **PzTR** — Cretaceous to late Paleozoic continental and marine sedimentary; felsic intrusive, mafic extrusive, ultramafic, low- and high-temperature, and high-pressure metamorphic rocks
- **Ks,Js** — Early Cretaceous to Triassic continental and marine sedimentary; felsic and mafic extrusive; felsic and alkali intrusive rocks
- **J** — Jurassic continental and marine sedimentary; intermediate, mafic, and undifferentiated extrusive; felsic and mafic intrusive rocks
- **Js** — Jurassic and Triassic continental and marine sedimentary; felsic, intermediate, and mafic extrusive; felsic, mafic, and alkali intrusive rocks
- **TrPz** — Triassic and late Paleozoic continental and marine sedimentary; felsic, intermediate to mafic, and mafic extrusive; felsic, intermediate, intermediate to mafic, mafic, and alkali intrusive; and low- and high-temperature metamorphic rocks
- **Tr** — Triassic continental and marine sedimentary; felsic, felsic to intermediate, intermediate, intermediate to mafic, mafic, and undifferentiated extrusive; and felsic and alkali intrusive rocks
- **MP** — Triassic and Permian continental and marine sedimentary rocks
- **PzIg** — Late Paleozoic continental and marine sedimentary; felsic, intermediate, mafic, and undifferentiated extrusive; felsic, mafic, alkali, and undifferentiated intrusive; high-pressure metamorphic rocks
- **Pz** — Paleozoic continental and marine sedimentary; felsic and undifferentiated intrusive, and high-temperature, high-pressure, and undifferentiated metamorphic rocks
- **PzIs** — Early Paleozoic continental and marine sedimentary; felsic, intermediate, and mafic extrusive; felsic, intermediate, intermediate to mafic, alkali, and undifferentiated intrusive; ultramafic; and low- and high-temperature, high-pressure, and undifferentiated metamorphic rocks
- **PzJzRs** — Early Paleozoic and Proterozoic continental, marine, and undivided sedimentary; undifferentiated extrusive; felsic intrusive; and metamorphic rocks
- **Ep** — Late Proterozoic continental and marine sedimentary; felsic intrusive; and low- and high-temperature metamorphic rocks
- **EpEc** — Late and Middle Proterozoic marine sedimentary; felsic and alkali intrusive; and metamorphic rocks
- **EC** — Late Precambrian felsic intrusive; and undifferentiated metamorphic rocks
- **E** — Proterozoic continental and marine sedimentary; felsic and undifferentiated extrusive; felsic and mafic intrusive; and undifferentiated metamorphic rocks
- **Ec** — Middle Proterozoic continental and marine sedimentary; felsic, intermediate, and mafic extrusive; felsic and mafic intrusive; and low- and high-temperature metamorphic rocks
- Precambrian undivided volcanic, intrusive, and metamorphic; and undifferentiated metamorphic rocks (Northeast Quadrant region); undifferentiated metamorphic rocks (Southeast Quadrant region)
- Proterozoic and Archean marine sedimentary; felsic extrusive; felsic intrusive; and low- and high-temperature metamorphic rocks
- **EA** — Middle and Early Proterozoic felsic and intermediate extrusive; felsic and alkali intrusive; and metamorphic rocks
- **EzPz** — Early Proterozoic continental and marine sedimentary; felsic, mafic, and undifferentiated extrusive; felsic and mafic intrusive; low- and high-temperature metamorphic rocks; and (Northeast Quadrant region) undivided volcanic, intrusive, and metamorphic rocks
- **A** — Archean felsic, mafic, and undifferentiated extrusive; felsic and mafic intrusive; and low- and high-temperature and undifferentiated metamorphic rocks (Northeast Quadrant region); undivided volcanic, intrusive, and metamorphic rocks

ONSHORE ROCK TYPE

SEDIMENTARY ROCKS
- Mostly marine
- Mostly nonmarine

IGNEOUS ROCKS (Extrusive / Intrusive)
- Felsic
- Felsic to intermediate
- Intermediate
- Intermediate to mafic
- Mafic
- Undifferentiated
- Alkali
- Ultramafic

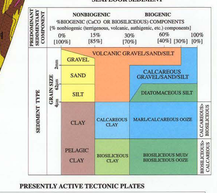
METAMORPHIC ROCKS (Trend lines of foliation) (Trend lines not available)
- *Low pressure and temperature
- *High temperature
- *High pressure
- Undifferentiated

*Applicable only to island arc areas

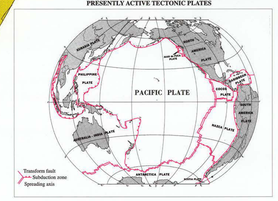
SYMBOLS

- Contact
- Normal or strike-slip fault
- **Historically active volcano**–Generally during past 1,000 yr and documented during or soon after eruption; volcano named in color if active from 1964 to 1998
- **Holocene volcano**–Active during past 10,000 yr; not documented historically
- **Holocene thermal activity**–Includes solfataras and volcano related thermal springs; no direct evidence for Holocene volcanic eruption
- 207 — **DSDP or ODP borehole**–Labeled with site number
- **Ice**
- **Ice front or edge of ice shelf**
- **Ice shelf**
- **Bathymetric contours**–Depth of water in meters shown by 200m contour and at 1000m intervals from 1000m depth. Intermediate contours dashed
- **Cities 1,000,000 or more**
- **City less than 1,000,000 people**
- 4100× — **Topographic prominence**–Height in meters
- **International boundary**

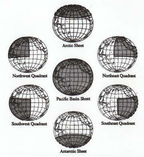
SEAFLOOR SEDIMENT



PRESENTLY ACTIVE TECTONIC PLATES



INDEX TO MAP SHEETS



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 relation of mineral 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 six panels of Earth scientists from countries in the Pacific region who contribute to maps of the Northwest, Northeast, Southwest, Southeast Quadrants, and the Arctic and Antarctic areas. Eight series of maps are already published or are being prepared for future publication: Geographic, Base, Plate-Tectonic, Geodynamic, Geologic, Tectonic, Mineral-Resources, and Energy-Resources.

The Pacific Basin Sheet is printed on a Mercator projection 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 Lambert azimuthal equal-area projection. The index map shows the boundaries of the quadrant maps and the boundaries of the Arctic and Antarctic Sheets 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.

GEOLOGIC MAP SERIES

The Geologic Maps show units selected and colored to emphasize significant stratigraphic similarities between continents and significant geologic unconformities. On the seafloor, surface-sediment distribution is shown according to a 7-category classification. The maps also show the location of Deep Sea Drilling Project (DSDP) and Ocean Drilling Program (ODP) sites. Selected stratigraphic columns with age and lithology are shown in the explanatory notes pamphlet accompanying the maps.

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

SCALE 1:17 000 000

500 0 500 1000 1500 2000 KILOMETERS
500 0 500 1000 MILES
400 200 0 400 800 NAUTICAL MILES

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

2000

SOURCES OF DATA

LAND GEOLOGY

The geology of the Pacific Basin map was compiled from the previously published geologic maps of the Northeast, Southeast, Northwest, Southwest Quadrants, and the Antarctic Sheet. The geology from the 1:10,000,000-scale geologic maps was reduced by computer to change the scale, change the projection center point, and merge the maps together. The geology of North America and its adjacent islands was compiled by Kenneth J. Drummond, National Energy Board, Canada (1983). Special contributions were made by Guillermo P. Salas, Consejo de Recursos Minerales, Mexico; Hubert Gabrielse, Geological Survey of Canada; and James E. Case, Ray G. Martin, and Parke D. Snavely, Jr., U. S. Geological Survey. The geology of South America and adjacent islands was compiled by Jose Corvalán D., Servicio Nacional de Geología y Minería, Chile (1984). The geology of portions of the Northwest Quadrant was originally compiled in 1979 by Osamu Hirokawa, Kosuneide Sawamura, and Tomatsu Nozawa. This compilation was revised by Tomatsu Nozawa, Tadashi Sato, Yoji Teraoka, and Takashi Yoshida, Geological Survey of Japan, under the direction of Peterl Chiar Eiji Inoue, Geological Survey of Japan (1988). For the Southwest Quadrant the geology of Australia, New Guinea, New Zealand, and islands in the eastern part of the quadrant was compiled by H. Frederick Doutch, A.S. Mikolajczak, and the Australian Bureau of Mineral Resources (BMR) Map Compilation Group. Some units were modified by W. David Palfreyman, Australian Geological Survey Organisation, Erwin Scheibner, Geological Survey of New South Wales, Australia, and Kenneth J. Drummond to make the geology consistent with that of the other quadrants. The geology of the Antarctic Sheet was compiled by Campbell Craddock, University of Wisconsin, U.S.A.

Other principal sources of data are listed on the various 1:10,000,000-scale Circum-Pacific geologic map series and their accompanying explanatory notes, and in the explanatory notes accompanying this map.

SEAFLOOR SEDIMENT

The seafloor sediment scheme used for the Pacific Basin map is the seven-color designation used for the Manganese Nodules, Seafloor Sediment, and Sedimentation Rates of the Circum-Pacific Region (McCoy, 1985), generalized from the thirteen categories used in the 1:10,000,000 geologic quadrant maps. The units depict unconsolidated sediment at the sediment-water interface based primarily on core data. Trends and boundaries of sediment types were controlled by bathymetry and calcium carbonate compensation depth levels.

The primary database is from smear-slide analysis of cores from Lamont-Doherty Earth Observatory supplemented by cores from other institutions. About two-thirds of the secondary database is from the World Data Bank, literature and existing map compilations were also used. These data generally are from field descriptions or coarse-fraction analysis; technique used is described in the accompanying pamphlet.

Principal sources of data are listed on the maps and in the explanatory notes of the 1:10,000,000-scale geologic maps of the Circum-Pacific Map Series and in the accompanying explanatory notes.

REFERENCES CITED

McCoy, F.W., 1985, Seafloor sediment, in Piper, D.Z, and others, Manganese nodules, seafloor sediment, and sedimentation rates of the circum-Pacific region: Tulsa, Oklahoma, American Association of Petroleum Geologists, scale 1:17,000,000.

Sohl, N.F., and Wright, W.B. 1980, Changes in stratigraphic nomenclature by the U.S. Geological Survey, 1979: U.S. Geological Survey Bulletin 1502-A, p. A1-A2.

Base by U.S. Geological Survey, 1989

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—2000

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225