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COMPARISON OF TERTIARY BASIN ARCHITECTURE BETWEEN PACIFIC AND JAPAN SEASIDES, NORTHERN HONSHU, JAPAN

No abstract available.

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GLOBAL METALLOGENIC SYSTEMS OF PACIFIC

No abstract available.

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METALLOGENIC PROVINCES OF NORTHEAST PACIFIC

Metal provinces of contrasting sizes and shapes in western North America include deposits of various ages and appear to be largely unrelated to recognized major elements of crustal tectonics, as pointed out by J. A. Noble. When considered in terms of respective structural and petrologic associations, apparent ages, and implied genesis, however, the known deposits can be assigned to metallogenic provinces with a geologically systematic pattern. Five principal kinds of metal concentrations are especially useful in this connection: (1) relatively massive sulfide deposits associated with thick sections of subaqueous volcanic rocks; (2) stratiform deposits in marine sedimentary rocks; (3) stratiform deposits in terrestrial sedimentary rocks; (4) deposits in host rocks of continental orogens; and (5) deposits associated with major volcanic accumulations of continental affinities.

The volcanogenic sulfide concentrations, which provide a long-term clue to crustal concentration processes, include Fe-Cu-Zn-Au-Ag deposits of Precambrian age that may well reflect contributions from a primitive mantle, Fe-Cu-Pb-Zn-Ag deposits of younger Precambrian and Mesozoic ages in less mafic volcanic rocks and associated eugeosynclinal strata, and post-Paleozoic Fe-Cu-Au deposits of the ophiolitic type that evidently represent mantle exhalations along zones of sea-floor spreading. Such exhalations also appear to have been responsible for accumulation of Fe, Cu, Mn, and other metals in pelagic sediments of deep ocean basins during Cenozoic time.

In marked contrast are other deposits that bespeak early separation into the earth's sialic crust of metals such as Mo, W, Sn, U, and V, and continuing differentiation in this direction for Pb, Ag, and Zn. Unlike those of more direct mantle derivation, these deposits evidently have required recycling of metals through various combinations of sedimentation, crustal melting, vapor transport, and new mantle contributions to explain their levels of concentration. Thus current models of metallization along zones of continental rifting, sea-floor spreading, and subduction of oceanic crust can account directly for the development of some important deposits, but they must include at least partly related processes of concentration and reconcentration within the continental crust to explain all of the recognized metallogenic provinces. The copper province of Arizona is perhaps the best example of such complicated interplay over a very long period of geologic time.

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EXPLORATION AND DEVELOPMENT OF NEW HYDROCARBON RESOURCES IN PACIFIC BASINS OF ECUADOR

The Pacific basins of Ecuador have excellent geologic characteristics for the accumulation of hydrocarbons. Geologic, seismic, gravity, and magnetic surveys provided a basis for exploratory drilling in the provinces of Esmeraldas, Manabi, and Guayas. Drilling has produced evidence of petroleum and gas especially in Manabi and Guayas.

Stratigraphically the Pacific basins of Ecuador contain a sedimentary pile which, in the Guayas depression, is up to 30,000 ft thick. Of these sediments approximately 10,000 ft is of Late Cretaceous age, ranging from the Cenomanian to the Maestrichtian. The remaining part of the sequence is Tertiary ranging in age from Paleocene to Pliocene. The lower Tertiary sediments from the Paleocene to middle Eocene offer the greatest interest in the search for hydrocarbons because euxinic facies are present as source rocks and some strata are suitable as reservoirs. Regionally the sedimentary conditions improve toward the south and with them the possibilities of hydrocarbons.

Structurally the area comprises a block-faulted platform which subsided quickly along high-angle normal faults. This permitted the thick column of sediments to accumulate and rapid facies changes are common. Accumulation and entrapment appear to be associated principally with areas affected by faults rather than with true anticlinal folds.

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DEVELOPMENT OF AUSTRALIA'S GROUNDWATER RESOURCES

Most of Australia has no perennial streams hence groundwater has been important in meeting the demand for water. Groundwater was used chiefly for stock and domestic supplies until about 1950 when extraction was greatly increased for irrigation. Groundwater also has been significant in urban water supply in Australia. Usage of groundwater in Australia in 1971 was about 2.5 x 10^9 cu m and, although some aquifer systems already are fully or overdeveloped, total groundwater resources are well in excess of usage.

Half of the groundwater used in Australia comes from aquifers in the larger sedimentary basins. Most of the remainder is drawn from alluvium and other unconsolidated aquifers. Fractured and weathered zones in hard rocks are important locally.

Groundwater in Australia is used by both the public and private sectors within the overall control, planning, and coordination of the Australian Water Resources Council. Several cases illustrate the interplay of hydrogeologic setting, economics, technologic change, and social attitudes in the pattern of groundwater use.

Few records are available on the use of groundwater prior to the discovery of the Great Artesian basin in 1878. Rapid exploration and development of groundwater with consequent declining yields and inefficient water use resulted in increased investiga-