of Oruro, the lode deposits are related to small stocks and dikes of dacite and rhyolite of Pliocene age. The belt widens (100 km) and forms the famous polymetallic province, unique in the world because of the rare associations of tin, silver, and other minerals such as teallite, franckeite, aramayoite, andorite, argirodite, *etc.* (Chocaya).

Inexplicably the deposits are of shallow depth; in most cases their root zones are in the lower part of the hills and the vertical difference in elevation of the zones is not more than 1,000 m (Chorolque).

There is zonal arrangement from tin, wolframite, bismuth to lead, silver and zinc, to the outer zone of quartz and stibnite. In the southern province, the zonal arrangement is more local (Tasna).

There are approximately 750 tin mines, 2,000 lead mines, 250 antimony mines, and about 30 mines for bismuth, most of them are small and shallow. The wealth of some of these mines is extraordinary. The production of Llallagua (Catavi) is estimated as 600,000 tons of tin. There remains one million tons of proven and indicated reserves, 75 percent of which belongs to Corporacion Minera de Bolivia (COMIBOL).

The tin veins are exploited by selective underground methods despite high mining costs. The grade averages of the deposits have declined to limits which now can be considered marginal.

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AUSTRALIAN NORTHWEST CONTINENTAL SHELF: RESULTS OF 10 YEARS' EXPLORATION

Exploration during the past 10 years on the Northwest Shelf of Australia provides an excellent example of the use of modern technology to evaluate the hydrocarbon potential of a large offshore region.

The area under concession consists of about 140,000 sq mi and comprises the greater part of five separate sedimentary basins or subbasins. Water depths range from 20 mi to more than 1,500 m, and are greater than 175 m in over half the total concession area.

Exploration commenced in 1964 with seismic surveys which have continued every year to the present. The first drilling commenced in 1967, and to the end of 1973 a total of 36 exploration wells has been drilled. Of these, nine can be classed as hydrocarbon discoveries, with several being potentially commercial fields despite relatively deep water and long distances from shore. In addition, nine successful appraisal wells have been completed.

The utilization of both drilling and seismic data has enabled a meaningful geologic interpretation of this previously unexplored area.

The Paleozoic history of the offshore area is largely unknown. During the early Mesozoic, rifting on a continental scale resulted in the development of a typical pull-apart tectonic regime. Extensive Triassic to Middle Jurassic fluviodeltaic sedimentation was terminated in Late Jurassic time by major faulting followed by a widespread marine transgression. Upper Jurassic and Lower Cretaceous sedimentary rocks are mainly marine clastic, passing upward to predominantly carbonate sedimentation.

Tertiary sediments are thick and widespread, showing a transition from sands in the nearshore areas to carbonates farther out on the shelf.

The main hydrocarbon accumulations have been found in reservoirs ranging in age from Late Triassic to Late Cretaceous. These discoveries can be attributed largely to the successful application of geologic models produced as a result of close cooperation between geologists and geophysicists.

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PLATE TECTONICS AND MINERAL RESOURCES OF PACIFIC

Maps have been compiled of the geologic framework of the Pacific Ocean basin and surrounding continents including lithospheric plate boundaries, volcanic activity, geologic age provinces, geothermal sites and heat flow, gravity, and sediment thickness. On a common base also have been compiled maps of Pacific energy resources (oil, gas, coal, lignite, uranium, hydroelectric, geothermal) and material resources (iron and ferro-alloy metals, base metals, light metals, rare metals, precious metals, chemical and fertilizer minerals, metal-bearing mud, and manganese nodules and crusts).

Analysis reveals patterns of distribution of the different Pacific resources. Many of the patterns may be related to lithospheric-plate boundaries and associated processes.

ROTMAN, V. K.

MEIMECHITE OF KAMCHATKA AND KIMBERLITE PROBLEMS OF PACIFIC MOBILE BELT

No abstract available.

ROTMAN, V. K.

OUTLINE OF KURILE-KAMCHATKA ARC

No abstract available.

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METALLOGENIC PROVINCES IN MEXICO

The first Metallogenic Chart of Mexico has been prepared in compliance with the Metallogenic Chart of the World Project and in keeping with the North America Subcommittee commitments.

It portrays the location of mines and/or mineral districts, and through special symbols and colors from an ample and explicit legend, shows the type of ore deposits, their age, and depositional environment, *etc.*

Thus, on the basis of mineral-deposit environment, the author tentatively proposes to divide the Mexican territory into six metallogenic provinces. (These later may be subdivided into subprovinces and smaller units.)

1. The Baja California province, on the north, with an approximate surface area of 92,000 sq km, is made up of one or more very large granodioritic batholiths, vast areas of metamorphic rocks of undetermined age, and restricted volcanic-neck areas. The southern part shows extensive andesitic and ignimbrite flows as well as silicic and mafic intrusive rocks.

2. The Sierra Madre Occidental province is a 266,000-sq km area of volcanic rock intruded by granites and granodiorites and subordinate mafic rocks. Mineral deposits are present as veins in the intrusive