Metallic mineralization, South Shetland Islands, Gerlache Strait, and Palmer Station

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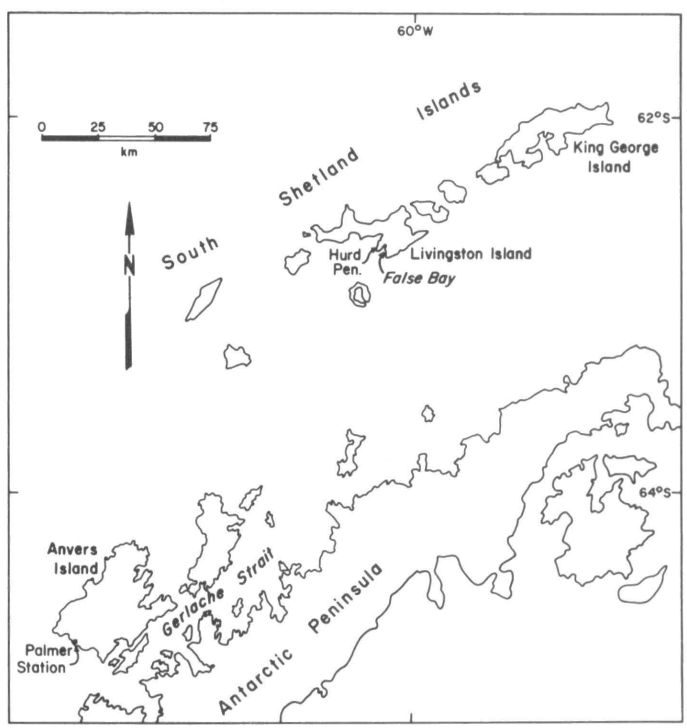
Cruise 81–3 of R/V *Hero* was devoted largely to investigations of metallic mineralization presumably related to Andean intrusive activity in the northern Antarctic Peninsula. The objectives were (1) to examine in detail areas identified as of interest during cruises 80–1 and 80–2 of R/V *Hero* (Cox, Ciocanelea, and Pride 1980), and (2) to study reported mineral occurrences in the South Shetland Islands (del Valle, Morelli, and Rinaldi 1974) and in the Gerlache Strait area (Alarcón et al. 1976). The overriding concern is whether large-scale porphyry-type and related mineralization is present in rocks of the northern Antarctic Peninsula.

Field studies were undertaken in mid-to-late March 1981 on Livingston Island (South Shetland Islands), at several localities within the Gerlache Strait area, and in the vicinity of Palmer Station, southern Anvers Island (figure). The geology was examined with respect to rock type, structure, and the presence of wall rock and/or pervasive hydrothermal alteration and mineralization. Hand specimens were collected for thin-section and polished-surface studies, and composite rock-chip samples were collected for trace element analyses.

Investigations by del Valle and others (1974) in the Johnson's Dock area, Hurd Peninsula, Livingston Island, identified several sulfide phases within veins in the Miers Bluff Formation; and Cox and others (1980) noted quartz veins bearing sphalerite, galena, chalcopyrite, and pyrite in the same area. Studies during cruise 81–3 indicate that the area probably does not contain large-scale metallic mineralization.

According to del Valle and associates (1974) the mineralization near Johnson's Dock is related to a tonalite intrusion located in False Bay. In addition, J. E. Curl (personal communication) described molybdenite veining in a granodiorite boulder from the east False Bay area. Several igneous phases were found within glacial debris along the northeast shore of the bay. Except for epidote, the rocks generally are unaltered, although they contain veinlets bearing pyrite, molybdenite, chalcopyrite, sphalerite, and quartz. The complex igneous geology and the heterogeneous mineralization suggest that the area should be studied in detail, particularly "up glacier" to the east-northeast.

Mineralization characterized as "polymetallic base-metal" and "porphyry copper" has been described for the Gerlache Strait region (Alarcón et al. 1976). Six localities from the strait, plus one point in the Melchior Islands and Point Thompson on northeastern Anvers Island, were reexamined during cruise 81–3. Where examined, the mineralization is fracture-controlled and weak. It consists of pyrite occasionally accompanied by chalcopyrite, galena, and sphalerite. Malachite staining sometimes accompanies iron-oxide coloration of the rocks. Wall rock alteration generally is not strong and where present consists largely of quartz, plus epidote and chlorite. The rocks



Location map for the northern Antarctic Peninsula.

exposed on southwestern Pelseneer Island are an exception in that they are strongly silicified and iron-stained at one locality.

Significant sulfide veining was found in float boulders along the shore north of Recess Cove (64°30′S 61°30′W), eastern Gerlache Strait. Iron-stained boulders up to 0.5 meters in diameter contain massive veins of pyrite, galena, sphalerite, and chalcopyrite(?). The veins generally are less than 1 centimeter thick, but one vein 10 centimeters thick was noted.

Several igneous phases were studied and sampled in the vicinity of Palmer Station, southern Anvers Island (figure). Igneous units of interest are trondhjemite and tonalite, as mapped by Hooper (1962). The mineralization of greatest interest is in the immediate vicinity of the station. A system of 20–25 veins was examined and sampled. Individual veins range to 12–15 centimeters thick, but the thickness varies considerably along strike. The mineralization includes pyrite, molybdenite, chalcopyrite, galena, sphalerite, and arsenopyrite, all within a quartz matrix. Wall rock alteration selvages are as much as 7 centimeters thick, and secondary minerals include epidote, quartz, and pyrite, plus perhaps clay minerals. The highest temperature mineralization in the Palmer vicinity seems to be in the area encompassing the station buildings. The center of mineralization may lie to the east-northeast, beneath the ice.

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