
Polymetallic Sulfides of Ocean Floor— A New Mineral Resource of the Pacific?

Alexander Malahoff
National Ocean Survey
National Oceanic and Atmospheric Administration
Rockville, Maryland

A mineral body estimated to contain several million tons of polymetallic sulfides with up to 10% copper was recently discovered along the Galapagos Rift in a water depth of 8,500 ft (2,600 m). This body is the largest of several mapped along the marginal walls of the axial rift valley of the Galapagos Ridge at 85°50' west, 0°45' north. SASS multibeam data, provided by the U.S. Navy, was used to map the site, together with bottom photography, visual observations and bottom sampling with

the submersible *Alvin*. These deposits are the first known massive polymetallic sulfide deposits of the "Cyprus type" found on the ocean floor. The largest polymetallic sulfide field mapped extends for a distance of 3,300 ft (1,000 m) along the base of the northern boundary fault of the rift in the form of a metalliferous ridge, 115 ft (35 m) high and 492 ft (150 m) wide. The ridge consists of massive sulfides deposited within coalesced inactive "smokers" or chimneys, tens of meters high and several meters in diameter, formed during a period of intensive hydrothermal activity, lasting about 100 years. Preliminary chemical analyses suggest the sulfides to be largely iron, copper sulfides with considerable metallic components of silver, cadmium, manganese, lead, tin, and zinc. Massive deposits of the type mapped along the Galapagos Rift could mark a new source of renewable, commercially valuable metalliferous deposits on the ocean floor. Potential sites in the Pacific for these deposits include the East Pacific Rise, the Gorda and Juan de Fuca Ridges, and the active marginal basins of the western Pacific.
