

## **Geologic Setting of Polymetallic Sulfide Deposits on East Pacific Rise at 21°N and Juan de Fuca Ridge near 45°N**

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Massive sulfide deposits of zinc, copper, lead, and silver have been recovered from the East Pacific Rise (EPR) in the mouth of the Gulf of California and from the Juan de Fuca Ridge (JFR) west of Oregon. Both of these oceanic spreading centers have a separation rate of about 2.4 in./year (6 cm/year), and the metal composition of their deposits is nearly identical. In both areas, the bulk of the sulfide deposits occur on, or immediately adjacent to, the morphologic axis of spreading in a sediment-free zone underlain by fresh glassy basalt. The axial zone of the East Pacific Rise at 21° north is nearly 985 ft (300 m) deeper than that of the Juan de Fuca Ridge. An extensive international program at the East Pacific Rise has

photographed and sampled both hydrothermal fluids and mineral deposits. The existence of active hydrothermal vents at the Juan de Fuca Ridge is inferred from the form and the absence of weathering of samples recovered during a recent U.S. Geological Survey cruise.

The East Pacific Rise exhibits a moderate degree of morphologic symmetry, and the sulfide deposits are generally situated along a low axial pillow-basalt ridge that is flanked by slightly older crustal zones containing numerous fissures and faults. On the Juan de Fuca Ridge, the massive sulfides occur within a continuous(?) depression along the center of a flat axial-valley floor 0.6 mi (1 km) wide that is underlain by extensive fresh glassy lava sheet flows; overall morphologic symmetry is strikingly developed at the Juan de Fuca Ridge. Although the form and texture of the sulfide deposits are better known from the East Pacific Rise, it is clear that the deposits and associated faunal communities differ between the two sites. The overall commonality of these deposits and their regional settings suggest that polymetallic sulfide deposits may be fairly common along spreading-center ridges in the East Pacific. To date, sulfide deposits have been discovered at six different widely separated sites.