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Detailed Surveys of Offshore Peru Margin

The complex and highly variable structure of the submarine continental margin of central Peru is revealed by geophysical surveys and geologic sampling completed in 1985. The surveys were conducted in preparation for deep scientific drilling to be undertaken by the Ocean Drilling Program in November-December 1986. More than 11,000 km^2 of sea floor were mapped using the SeaMARC II side-scan sonar and bathymetry system; 1,500 km of multichannel seismic reflection profiles and 4,000 km of single-channel seismic data were shot; and many coring, dredging, and heat-flow stations were obtained. The data permit construction of detailed three-dimensional geologic maps of the region. These maps show that the ancient metamorphic rocks of South America extend close to the trench axis and apparently have undergone a history of truncation and subsidence related to the subduction of the Nazca oceanic plate. Adjacent segments of the Peru forearc have dramatically different structure and appear to have had differing tectonic histories. The margin is disrupted by extensive (primarily tensional) faulting; the larger faults extend perpendicular to the strike of the trench and often serve as conduits for diapirs and mud volcanoes. Living chemosynthetic clams were dredged from 3,800-m depth along one of these fault trends, suggesting that active fluid venting occurs at depth on the continental wall of the Peru Trench.