

37. DATA REPORT: BATHYMETRY OF THE PIGAFETTA AND EAST MARIANA BASINS¹

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Several bathymetric charts of the western Pacific Ocean have been prepared from shipboard echo-soundings over the last two decades (Chase et al., 1970; Iwabuchi, 1984; Mammerickx and Smith, 1985). This map (Fig. 1, backpocket foldout), which incorporates more recent echo-soundings as well as data from satellite altimetry, was compiled and contoured over a period of several months before Leg 129 in order to provide a base map and tectono-geomorphic reference frame for Leg 129 drilling investigations and results. After the drilling leg, the map was revised to include bathymetric soundings collected aboard the *JOIDES Resolution* as well as those from several subsequent cruises in the area carried out by the University of Hawaii. In general, the track coverage is more plentiful in the western part of the map than the eastern, and, to a lesser extent, in the southern part than the northern. Both of these trends reflect the relative proximity of these more densely covered regions to accessible ports (such as Guam) and the correspondingly larger amount of ship traffic in these areas. The total track coverage of bathymetric soundings is shown in blue in Figure 1 (backpocket foldout). All institutions responsible for the cruises that constitute the bathymetric data base are listed in Table 1.

The computer-contoured gravity field, as derived from a combination of SEASAT and GEOSAT satellite investigations plus shipboard gravimetric data, is shown in Figure 2 (backpocket foldout). The methodology of preparation and presentation is that of Haxby and Hayes (1991). Satellite tracks are shown in blue. Gravity data were used to verify (or, in some cases, infer) the existence of seamounts and guyots with little or no bathymetric coverage. While the practice of assuming topographic expression of all gravity anomalies is not always scientifically indicated, it is quite reasonable in an environment such as this—a deep ocean basin dotted with discreet and unpredictably located seamounts and guyots. Estimates of size and summit depth for features defined solely by gravity data were based primarily on the observed relationship between bathymetry and gravity for those features with good bathymetric control. The age and probable subsidence history of the features in question were also taken into account. Summit depths were difficult to estimate with precision, because anomaly intensity is more a function of total feature mass than summit depth alone. Also, because the accuracy of gravity anomalies calculated from satellite data is highly dependent on data density, the reader is encouraged to examine the satellite track chart shown in blue on Figure 2 (backpocket foldout). All bathymetric contours in Figure 1 (backpocket foldout) derived from gravity data alone are shown with dashed lines.

The East Mariana and Pigafetta basins both trend northwest-southeast. The East Mariana Basin is bounded to the west by the Mariana Trench, to the south by the Caroline Seamounts (sometimes called the "Caroline Ridge"), and to the north and east by the Magellan Seamounts. The Pigafetta Basin is located immediately north and east of the Magellan Seamounts and is bounded to the northeast by the

Marcus-Wake seamount chain. Both the East Mariana and Pigafetta basins are characterized by broad abyssal plains about 5500–6000 m deep (though the northern part of the East Mariana Basin is slightly deeper than 6000 m) and an assortment of seamounts and guyots of varying depths. The Magellan Seamounts, which divide the two basins, correspond tectonically to the Ogasawara Fracture Zone. The detailed tectonics of the region are discussed elsewhere in this volume.

The lithologies of Ocean Drilling Program Sites 800 and 801 (drilled in the Pigafetta Basin) and 802 (drilled in the East Mariana Basin) are shown in Figure 3 (backpocket foldout).

Table 1. Sources for bathymetric soundings used in the compilation of Figure 1.

Bureau of Mineral Resources, Canberra, Australia
IFREMER, Centre de Brest, France
Institute for Geophysics, University of Texas at Austin, Austin, TX
Japanese Geological Survey, Kawasaki-shi, Japan
Lamont-Doherty Geological Observatory, Palisades, NY
National Oceanographic and Atmospheric Administration, Boulder, CO
Ocean Drilling Program, Texas A&M University, College Station, TX
Ocean Research Institute, Tokyo, Japan
Scripps Institution of Oceanography, La Jolla, CA
University of Hawaii, Honolulu, HI
U.S. Geological Survey, Menlo Park, CA
U.S.S.R. Academy of Sciences, Moscow, U.S.S.R.
Woods Hole Oceanographic Institution, Woods Hole, MA

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