MORPHOLOGY AND STRUCTURE OF THE SEAFLOOR IN THE NORTHERN PART OF THE NORTH FIJI BASIN

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ABSTRACT

A geophysical survey of the north central North Fiji Basin provides a high density data base for accurately charting seafloor morphology and defining major structural trends. The resulting bathymetric chart is believed to reliably portray the tectonic fabric of the basin and provide insight into the formation of the seafloor and development of associated structural features. The South Pandora Ridge (Hazel Holme Fracture Zone) appears to be a young or recently formed spreading ridge that bifurcates at its eastern end into the ENE-trending Rotuma Ridge and ESE-trending Tripartite Ridge. Southwest of South Pandora Ridge lies Pentecost Basin, interpreted to be originally formed along the western limb of the extinct central North Fiji Basin (CNFB) triple junction and now inundated, at its southwestern end, by sediment of the New Hebrides archipelagic apron. Southeast of the ridge lies Balmoral Basin, interpreted to be originally formed along the eastern limb of the old CNFB triple junction. Between the two basins lies a wedge of sediment-free ridge and trough terrain believed to be formed by a propagating rift. To the east, in the southern part of Balmoral Basin, Balmoral Ridge is interpreted to be the upraised leading edge of an overthrust block of North Fiji Basin crust, to the south of which lies the eastern end of the Fiji Fracture Zone, a presently active transform fault.

INTRODUCTION

The profusion of marginal basins in the Southwest Pacific appears as a puzzling array to most readers. The North Fiji Basin (Figure 1) is, perhaps, the most enigmatic basin in the region. The first bathymetric chart of the North Fiji Basin (Pandora Basin) was included in a bathymetric map of the Melanesian Borderland (Melanesian Border Plateau) produced by Fairbridge and Stewart (1960); the generalized description (which accompanied that map) of the various submarine features within and around the basin provides the basis for nomenclature in the region (see Table 1). Fairbridge and Stewart remark that “the name Melanesian Border Plateau was proposed to designate the partially raised ‘rim’ of the Melanesian region. It forms the northern limit of the Pandora Basin (or the ‘North Fiji Basin’ of Wiseman and Ovey, 1955) and is separated from the Fiji Plateau (of Sir John Murray, 1895)” (or ‘Fiji Platform’ of Coulson et al., 1975) “by the Balmoral Ridge and the Yasawa Trough.”

The first detailed bathymetric chart of the North Fiji Basin (Fiji Plateau [sic]) was published by Chase (1971) after an unpublished Scripps Institution of Oceanography chart. Shortly thereafter, more detailed bathymetric charts were published by Green and Cullen (1973) and Cullen (1974), who identified additional major seafloor features while renaming others (Table 1).
Figure 1. Regional framework of the North Fiji Basin (bathymetry after Kroenke et al., 1983).