THE EFFECTS OF MASS WASTING ON THE DEVELOPMENT OF COBALT-RICH FERROMANGANESE CRUSTS ON CROSS SEAMOUNT, HAWAII

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INTRODUCTION

Cobalt-rich ferromanganese crusts cover the surfaces of many older Pacific seamounts. Previous work has focused on the distribution, thickness and geochemistry of the crusts (Hawkins, 1969; Commeau et al., 1984; Halbach and Puteanus, 1984b; Hein et al., 1985b; Hein et al., 1986; DeCarlo et al., 1987) and, to a lesser degree, on geomorphology and seamount sedimentation and erosional processes (Lonsdale et al., 1972; Normark and Spiess, 1976; Stanley and Taylor, 1977; Hollister et al., 1978; Taylor, 1980; Smoot, 1985).

Previous work within the Hawaiian Archipelago (Frank et al., 1976; Glasby and Andrews, 1977; Craig et al., 1982) has concentrated on the Hawaiian Ridge from Midway Island in the northwest to Hawaii in the southeast. Their studies have shown that ferromanganese crusts are most prevalent on discontinuous deep terraces which are recognized throughout the archipelago. Crusts cover exposed outcrops or occur as widespread pavements on the terraces. Jointing of the pavement is quite common, as are areas where detached blocks are recemented by ferromanganese oxides into a continuous pavement surface (Craig et al., 1982). Bottom photography has revealed that ferromanganese crusts are widely distributed and occur on various hard substrates (Frank et al., 1976; Glasby and Andrews, 1977; and Craig et al., 1982). Samples obtained from dredging indicate that the thickness and chemistry of the crusts vary widely on both regional and local scales (Frank et al., 1976; Craig et al., 1982). The combination of dredging, bottom photography, and siesmic reflection data suggest that sedimentary and structural processes control the exposure of substrate necessary for the development of thick ferromanganese crusts (Craig et al., 1982).