

COMPARATIVE GROWTH HISTORY OF MARINE FE-MN CRUSTS FROM THE CENTRAL AND WESTERN PACIFIC OCEAN

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Fine-scale variations in the composition of ferromanganese (Fe-Mn) crusts from several locations in the central and western Pacific Ocean were investigated to elucidate and compare their genesis. Major, minor, and trace elements were determined in a series of sub-samples collected at approximately two millimeter intervals throughout the growth sequence of each crust. A strong relationship between element distribution coefficients and the mean residence time of elements in seawater provides evidence for a strong link between the chemistry of seawater and Fe-Mn crusts. Factor analysis reveals that elemental associations in crusts generally fall into four groups with some elements overlapping between several groups. The statistical associations of elements are inferred to represent hydrogenetic, biogenic, detrital, and carbonate fluorapatite groups. Similar elemental associations in individual crusts collected in different locations within the Pacific Ocean are consistent with the notion that similar processes control the growth of these deposits throughout the world oceans, whereas differences between them allow us to infer the regional oceanic conditions extant during the period in which the various strata of the crusts accreted. Temporal changes in the depositional environments of each crust are inferred from factor analysis of compositional data obtained as a function of depth within crusts.