CHRONOSTRATIGRAPHY OF FERROMANGANESE CRUSTS FROM THE PACIFIC OCEAN

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Fe-Mn crusts precipitate from cold ambient seawater onto hard-rock substrates and represent condensed stratigraphic sequences that range up to 25 cm thick. Characteristic sequences of stratigraphic layers in these hydrogenetic Fe-Mn crusts from different areas of the central Pacific Ocean can be correlated based on textures, compositions, and paleontological characteristics. These well-defined sequences serve as the basis for spatial correlations and allow for the development of crust chronostratigraphy.Six layers have been defined based on textures and composition. Consecutive change of calcareous nannofossil assemblages in crust sections date those six layers as Late Cretaceous, Late Paleocene-Early Eocene, Middle-Late Eocene, Late Oligocene-Early Miocene, Middle-Late Miocene, and Pliocene-Pleistocene. Hiatuses in crust growth are dated as Early Paleocene and Early-Middle Oligocene.The following compositional changes with decreasing age of crust layers have been determined. The Mn oxide composing Late Cretaceous layers is asbolane, whereas the predominant Mn oxide in overlying layers is vernadite, except in Late Paleocene-Early Eocene layers, where the two minerals occur together. Late Cretaceous and Eocene layers are phosphatized and are characterized by relatively low major metal contents and by high Mn/Fe ratios. Miocene-Pleistocene layers contain much very fine-grained detritus, relatively high Fe and Co contents, low Mn/Fe ratios, an increase in silica, and no phosphates. The delineation of these regionally consistent sequences of crust layers will greatly aid in the use of crusts for general geologic and paleoceanographic reconstruction.