

CONTINENTAL SEPARATION AND DEEP-WATER MINERAL RESOURCES IN THE EQUATORIAL ATLANTIC

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Investigations in the deep waters of the Equatorial Atlantic have revealed the presence of hydrocarbon-rich shales, phosphorites and ferromanganese accumulations whose formation was closely related to the history of continental separation and ocean circulation. The shales lie beneath the abyssal plains and continue under the adjacent continental rise and slope. Deposition occurred during early and mid-Cretaceous time when water movements near the Equator were restricted by closely spaced fracture zone ridges. Later sequences are confined to the shallow parts of the continental margins where vigorous upwelling extended into the Tertiary. Phosphorites form cappings on seamounts and other elevations, and can be detected using a towed scintillometer. These deposits are also associated with upwelling, which appears to have been intense during the Eocene. Ferromanganese encrustations, some having high levels of Co and other trace metals, occur in a variety of settings. It has been demonstrated that large volumes of phosphorites and Co-rich encrustations can be recovered in water depths up to 1000m using grabs operated from conventional research vessels. Further geophysical surveys, surface sampling and drilling are needed to assess the deep-water petroleum potential of the Equatorial Atlantic margins and the feasibility of large-scale extraction of non-petroleum minerals from seamounts and fracture zones.