

INFLUENCE OF OCEAN CURRENTS ON MIOCENE CARBONATE PLATFORM DROWNING

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ABSTRACT

Carbonate platform drowning is a common phenomenon that is explained by various theories regarding the drowning mechanism. In recent years, the close relationship between platform drowning and intensification of ocean currents have been proposed for the demise of the Miocene platforms in the Indopacific region. New lithologic and stratigraphic data from cores drilled on top and adjacent to the drowned Kardiva Platform in the Maldives during IODP Expedition 359 indicate that the drowning of this platform is related to the onset of strong ocean currents in conjunction with the strengthening of the Indian Ocean monsoon winds. Evidence that ocean currents played a major role in the drowning of the Kardiva Platform include; (1) drift deposition on top of the drowned Kardiva Platform, (2) concomitant onset of drift deposition and platform drowning, and (3) algal-rich carbonate production before drowning occurs.

Coring holes in 8 sites using the research vessel JOIDES Resolution along two transects in the Kardiva Channel in the Inner Sea of the Maldives retrieved the material to achieve the expedition objectives. Seismic data of the drowned Kardiva Platform reveals a 450m thick drift body in the deep basin overlaying the slope deposits. The youngest drift deposits are about 50m thick covering the Kardiva Platform itself. The top 80m of the Kardiva Platform consists of dolomitic boundstone and floatstone with red algae encrusted corals, red algae nodules and rhodoliths that are up to 4cm in length. Presence of red algae is an indicator of nutrient abundance due to upwelling brought by ocean currents. Based on seismic stratigraphy the platform drowning coincides with the onset of the drift deposition in the basin. Platform drowning seems to occur when a during a sea level rise strong ocean currents sweep the platform and prevent the re-establishment of shallow-water ecosystem on the previously exposed platform. This mechanism of current sweeping during a sea level rise is also observed at other drowned platforms. For example the drowning of platforms on the Marion Plateau is related to the onset of a current system that is only slightly younger than the onset of the current in the Maldives. Likewise mid-Miocene platform drowning in the Luconia Province is has been postulate to coincide with current strengthening.