

Neogene Carbonate Platforms in the South China Sea and Indonesian Backarc Region as Recorders of the Evolving East Asian Monsoon

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Miocene to Recent carbonate platforms from southern parts of the South China Sea and Indonesian backarc region have variable internal growth patterns that likely reflect the gradual strengthening of the East Asian Monsoon, an annual seasonal cycle where precipitation and wind directions change dramatically across Southeast Asia. Extensive high-quality seismic-reflection data and published data were examined across the study area and showed that Neogene isolated carbonate platforms commonly have asymmetrical facies distributions and internal stratal patterns that reflect prevailing paleowind directions during growth. Early to middle Miocene platforms throughout the study area show consistent windward-leeward asymmetry, which suggests that prevailing winds were fairly constant over long time scales. Starting at about 11 Ma, however, growth patterns became much more variable in many platforms, especially those from the East Natuna Basin and offshore Vietnam. These complex growth patterns continue until the present day. In the Indonesian backarc region, middle to late Miocene isolated platforms show strongly asymmetrical but consistent growth patterns that also reflect strengthening of the East Asian Monsoon at this time because prevailing winds during the winter monsoon are out of the west and stronger than the weaker, easterly winds of the summer monsoon. The gradual change to modern monsoonal wind patterns across the South China Sea and Indonesian backarc region began at about 11 Ma, which is consistent with other proxy records for the timing of major uplift in the Tibetan Plateau and associated strengthening of the East Asian Monsoon.