The South China Sea History in Ocean Drilling Perspectives

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The last decade witnessed rapid development of marine geology in the South China Sea (SCS), largely driven by growing interest in hydrocarbons and the monsoon history. Numerous scientific expeditions have been organized to the SCS culminated with the Ocean Drilling Program Leg 184 in 1999 entitled "East Asian monsoon history as recorded in the SCS and its global climate impact". The sediment cores recovered by the Leg provide deep-water marine records of the East Asian monsoon and the SCS basin history over the last 30 Ma. The inception of the East Asian monsoon system can traced back to around 23-25 Ma, followed by a series of paleo-climate events especially at 8 Ma, 3.2 Ma, and 0.4 Ma. Its step-wise evolution is similar to that of the Indian monsoon, with an enhanced winter monsoon over East Asia being the major difference. A long-term cyclicity of 400-500 kyr was discovered in the carbon isotope records in the southern SCS which is found to be present in all oceans and represents a response of the global carbon reservoir to the long-eccentricity orbital forcing presumably through variations in monsoon circulation and marine phytoplankton. Evidence for the evolution of the SCS basin includes the deep water sediments during its early seafloor spreading stage ca 30 Myr ago when sedimentation rates were the highest in the history. About 23-25 Myr four major unconformities and remarkable diagenetic features indicate the strongest tectonic events in the region. The hemipelagic sediment sequences above the hiatuses have recorded the subsidence and closure of the basin, the differentiation in sedimentary environments between the southern and northern SCS, and the history of sea-level fluctuations during the glacial cycles. For example, the emerged shelves in the northern SCS was covered by grassland during low sea-level stand 20 kyr ago, while rain forest grew on the Sunda Shelf in the southern SCS at the same time. The N-S climate contrast is ascribed to the enhanced winter monsoon winds which brought moisture from the SCS to the Sunda shelf. The lecture will discuss the tectonic, sedimentary and climate history of the SCS on the basis of the ODP 184 and other deep-sea expeditions.