

Evolution and intensification of the Indian monsoon  
contemporaneous with regional as well as global climate  
changes: Results from ODP Hole 758A

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The evolution and intensification of the Indian monsoon are linked with tectonically-driven forcing factors such as uplift of the Himalaya-Tibetan Plateau, closing of the Indonesian seaway and Northern Hemisphere Glaciations (NHG). Here, we present past 6 Million year data of stable oxygen and carbon isotope ratios of surface dwelling planktic foraminifera and abundance of planktic foraminiferal assemblages from Ocean Drilling Program (ODP) Hole 758A, eastern equatorial Indian Ocean. Contemplate the perspective of the evolution and intensification of the Indian monsoon, the closing of the Indonesian seaway played an important role along with the NHG during the latest Miocene-Pliocene. The regional climatic phase transition along with global climate change in the Indian Ocean region experienced a three-fold structure from the early Pliocene warm period to the late Pliocene cold period, to a relatively stable Pleistocene epoch. In the latest Miocene to the early Pliocene (6 to 3.8 Ma), the  $\delta^{18}\text{O}$  value was 0.1‰ lower and  $\delta^{13}\text{C}$  value was 0.5‰ higher than the middle Pliocene indicating a warm period with high productivity in the Indian Ocean region. We assume that, the northeast Indian monsoon enhanced from 3.5 to 3 Ma following the closing of the Indonesian seaway as surface water of the tropical Indian Ocean cooled and freshened, and intensified during the development of the NHG from 3 to 2.6 Ma. Southwest Indian monsoon intensified just after the NHG from 2.6 to 1.33 Ma as defined by the abundance of coastal upwelling species like *Globigerina bulloides*.

Keywords: Climate change, Indian monsoon, Indonesian seaway, Northern Hemisphere Glaciation.