Records of the East Asian Monsoon from Beibu Gulf since Last Deglaciation

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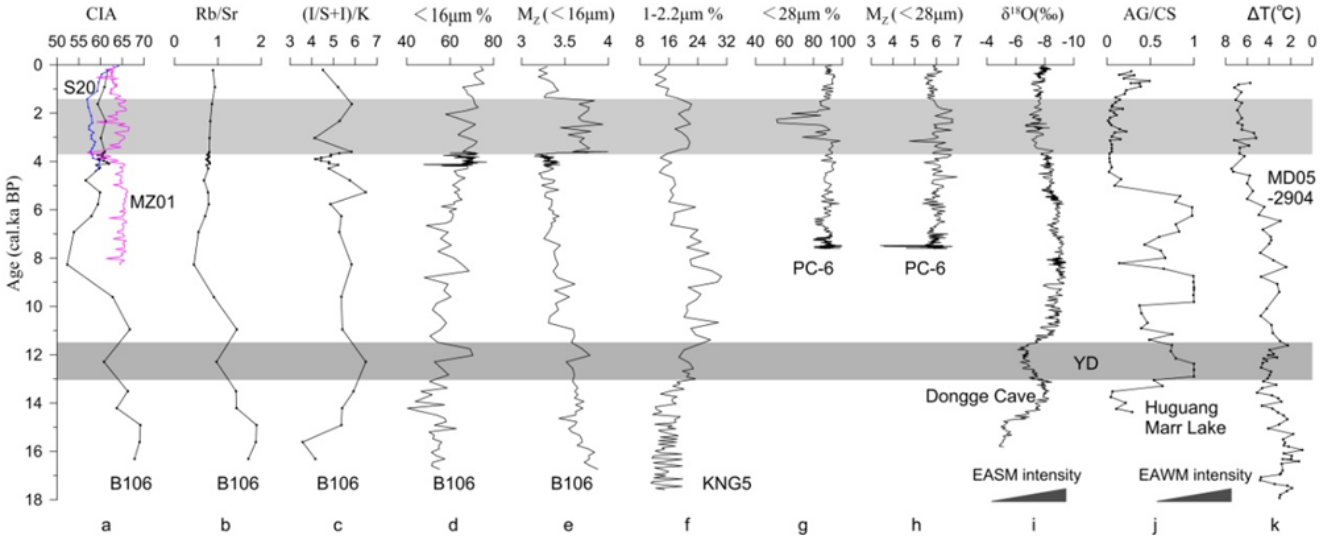
The East Asian Monsoon is one of the most active components in the global climate system. Many researchers have found that the intensity of East Asian Summer Monsoon (EASM) quickly increased in the early Holocene, characterized by strengthened precipitation and humid climate, while gradually decreased during the middle and late Holocene, characterized by decreased precipitation and dry climate. But due to the difficulty of constructing substitute indexes, the evolution of East Asian Winter Monsoon (EAWM) through Holocene was debatable.In this paper we studied the East Asian Monsoon records in core B106 recovered from the Beibu Gulf (the Gulf of Tonkin) in northwestern South China Sea.The 300cm long core was located in 108°36′02″E,19°54′04″N with a water depth of 62 m, and the grain size, chemical and clay mineral component,and AMS^{14}C age of this core was analyzed. The results show that before 13ka BP, the location of B106 was in continental sedimentation environment, with sedimentation source mainly from south China paleo-rivers, and the sediments was characterized by coarser grain size and high ΣHREE/(ΣLREE+ΣMREE), TiO_2/Al_2O_3 and C/N. From about 13 ka BP to 7ka BP, B106 located in marine environment with increasing water depth and fading influence of south China paleo-rivers. Since the formation of loop current in Beibu Gulf at about 7ka BP, the sediments of core B106 came from mixed sources but with little contribution of Red River or Pearl River.The fluctuation of CIA, Rb/Sr, (I/S+I)/K and the content and mean grain size of less than 16μm grain size population of core B106 were influenced by the evolution of East Asian monsoon.By synthesizing these indexes, the warm and humid climate in early Holocene was revealed, and also the cold event around 8.2, 5.4 and 4.8ka BP in middle Holocene, the drought climate during 3.6-1.6ka BP in late Holocene were revealed, reflecting a regional response to global climate change. But more attention should be paid in using CIA and mean grain size of fine environmental sensitive population as the substitution indexes of EAWM intensity, as they may be influenced by EASM too. In middle and late Holocene, the content of less than 16μm grain size population of core B106 can reflect the strength of EAWM to some extent, while the mean grain size of less than 16μm population was insensitive to EAWM and the increasing of which was closely linked with the weakening of EASM. When extracting grain size index to study the evolution of East Asian Monsoon, the restriction of sedimentation source and dynamics should be defined firstly.

Keywords: Beibu Gulf, East Asian Monsoon, Last Deglaciation



(a)CIA records of core B106(this study),S20 (Xu et al.,2010) and MZ01 (Liu et al.,2010a); (b)Rb/Sr of B106;(c)clay mineral proxy-(illite-smectite interstratified clay minerals + illite) vs.kaoline of B106 (Wu et al.,2011); content(d) and mean grian-size(e) of fine grain-size population(<16μm) of B106;(f)fine grain-size population(1-2.2μm) content of core KNG5 (Huang et al.,2011); content(g) and mean grain size(h) of fine grain-size population(<28μm) of core PC-6 (Xiao et al.,2006);(i)records of the stalagmite $\delta^{18}O$ from Dongge Cave,South China (Dykoski et al.,2005);(j)relative abundance ratio of two diatom species(*A.granulate* vs. *C.stelligera*) recorded in Huguang Marr Lake (Wang et al.,2012);(k) the temperature differences between sea surface (based on alkenone) and thermocline (based on thermocline-dwelling planktonic foraminifera *Pulleniatina obliquiloculata*) recorded by core MD05-2904 (Steinke et al.,2011).

