Provenance variability associated with East Asian Summer Monsoon precipitation change recorded in the inner shelf deposit of the East China Sea during the middle and late Holocene

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Hydroclimate variations associated with the East Asian Summer Monsoon (EASM) precipitation exert significant impacts on lives of people inhabiting within the Yangtze River drainage and the coastal zone of South China. Seasonal shift of main precipitation area is attributable to the reposition of northern limit of summer monsoon, which would lead to provenance and composition changes of suspended materials transported by the Yangtze River. Consequently, the interannual- to millennial -scale variability in the position of rain belt mentioned above could be recorded in the long-term change in compositional variation of the sediment originated from the suspended materials from the Yangtze River. The inner shelf sediments of the East China Sea (ECS) is of primary importance to study provenance changes of terrestrial materials from the Yangtze River. Because of this expectation, we examined provenance changes in MD06-3040 core sediments recovered from the inner shelf of ECS in association with spatial variability of EASM precipitation.
Provenance of sediment particles were evaluated on the basis of the electron spin resonance (ESR) signal intensity and crystallinity index (CI) of quartz. Comparison the core sediments taken from core MD06-3040 with Yangtze Delta core and modern Yangtze River sediments suggests that the Yangtze River would be a predominant source of the mud belt on the inner shelf of ECS. The ESR value in fine silt fraction of core MD06-3040 samples showed larger values compared to the ESR value in coarse silt fraction during 6.5 to 6 cal kyr BP, 6 to 4 cal kyr BP, and 1.8 to 1 cal kyr BP. The ESR values in both fine silt fraction and coarse silt fraction of core MD06-3040 samples have similar results during 4 to 1.8 cal kyr BP and 1 to 0 cal kyr BP. Moreover, detailed examination of quartz provenance within the Yangtze River drainage using ESR and CI enable us to discriminate the sediment contributions from the upper-middle reaches (northern tributaries) versus lower reach (southern tributaries) of the Yangtze drainage. This observation suggested that variability of the main location of EASM precipitation (EASM front) on multi-centennial to millennial-scale has been detected from this result which showed heavier precipitation in the middle-upper reaches(NW part of the drainage) with contribution from southeastern side of lower reaches (Lakes Dongting and Poyang) and few local rivers during 6 to 4 cal kyr BP, and in the middle-upper reaches(NW part of the drainage) during 4 to 1.8 cal kyr BP, 1.8 to 1.0 cal kyr BP, and 1.0 to 0.6 cal kyr BP.
Modal grain size in fine silt of core MD06-3040 showed notable decrease at times of smaller contribution from EASM precipitation within the Yangtze drainage, such as 6 cal kyr BP, 5.3 cal kyr BP, 4.5 cal kyr BP, 3.7 to 3.3 cal kyr BP, 2.2 cal kyr BP, 1.4 to 1.3 cal kyr BP, which also coincide with the higher value of reconstructed SSS derived from paired measurement of Mg/Ca and $\delta^{18}O$ of foraminifera calcite in core MD06-3040. Such coincidence of low Yangtze discharge events and minima in grain size suggest that the Yangtze River discharge supplied by EASM precipitation should be a dominant control on the Yangtze River discharge, and accordingly influence deposition of Yangtze-derived sediment on the inner shelf of ECS and ECS salinity.High precipitation is correlated with higher contribution of material from the upper and middle reaches of the Yangtze drainage since 6 cal kyr BP.

Keywords: EASM precipitation, Yangtze discharge, East China Sea

