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Variability of the East Asian monsoon during mid-Holocene - A case study from the Pearl River estuary, southern China

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This study aims to reconstruct a high-resolution record of the EAM variability during mid-Holocene from sedimentary sequences obtained from the mouth of the Pearl River estuary, southern China. A sediment core was analysed for organic carbon isotopes and major/trace elements at 2 cm intervals. The chronology of the core was established by four radiocarbon dates, and results show the 10 m long core covers a period from 6500 to 2300 cal. years BP, yielding a sampling resolution of c. 8 years. This study is based on the assumption that variations in monsoon-driven freshwater discharge lead to a change in geochemical signature in the estuarine sediment. For instance, the higher discharge may result in lower organic carbon isotope ratios, and vice versa.

Results from the core reveal variability at three different time scales. Firstly, the organic carbon isotopes indicate a progressive weakening of monsoon-driven freshwater discharge during mid-Holocene. Same trend was reflected by changes in concentrations of elements, e.g. K, Na. This weakening trend seems to be related to the decline in insolation in Northern Hemisphere, and is comparable with the stalagmite records from southern China. Secondly, the geochemical signatures show three and a half clear cycles of change, each lasts about 1000 years (i.e. from 6500 to 5400 cal. years BP, from 5400 to 4400 cal. years BP and from 4400 to 3200 cal. years BP). The driving

mechanisms for these cycles are related to changes in solar radiation (e.g. Bond et al., 2001; Wang et al., 2005; Clemens, 2005). The early half of the last period from 3200 to 2300 cal. years BP follows a similar pattern revealed in the three previous cycles. The latter half of the last period shows a dramatic increase in organic carbon isotope ratios, possibly due to an increase in human-induced sediment input. Finally, on the above long-term trends, there are many spikes in the organic carbon isotopic curve. These spikes may represent changes in decadal time scale, possibly influenced by ENSO variability.

This is an on-going study. Further analyses and dating will be carried out in 2008.