Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

APE031-23 Room:104 Time:May 26 10:00-10:15

Provenance of quartz in coarse silt fraction of sediments from Yangtze River drainage and its paleoclimatic application

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Whereas precipitation brought by East Asian summer monsoon [EASM] is essential to maintain lives of large population living in that area, precipitation by EASM and tropical cyclone [TC] may also cause floods and ruin those lives. Consequently, it is crucial to predict temporal and spatial variations of precipitation brought by EASM and TC. However, prediction of spatio-temporal variations of EASM and TC precipitation with ongoing global warming is difficult and known as examples of poor agreements among predictions by different climatic models. It is likely that the range of variability caused by global warming may exceed the range in the instrumental records and that some unknown non-linear response may exist. So, it is desirable to tune climatic models with paleoclimatic data characterized by wider range of variability. In this respect, paleoclimatic reconstruction of the EASM precipitation during the Holocene will provide valuable constraints for tuning climatic models.

Yangtze River drainage occupies the major part of South China ranging from 25 to 35 degree N. The position of EASM front, which is characterized by high precipitation, is considered as migrated from 35 to 20 degree N during the Holocene. On the other hand, tropical cyclones that are landed on South China frequently cause flood of Yangtze River, and their courses and frequencies varied with time and could be related to EASM intensity. Thus it is useful to reconstruct spatio-temporal variations of EASM precipitation and TC course and frequency during the Holocene. However, such attempt has never been carried out before with high resolution. Here we use electron spin resonance [ESR] signal intensity and crystallinity index of quartz in fine fraction of detrital materials in the Yangtze delta sediments to estimate source area of fine-grained detrital materials. First, we analyzed rivers sediments collected from various branches of Yangtze River to construct a database for provenance study. The result suggests that it is possible to differentiate detrital materials derived from the upper, middle, and lower reaches as well as southern and northern branches of Yangtze River. We then adopt this result to the core samples obtained from Yangtze delta. The result will be discussed in the session.

Keywords: Yangtze River, river sediments, provenance, East Asian SummerMonsoon, Tropical Cyclone, ESR