



## **Sediment transport process and East Asian monsoon evolution during the last 410 kyr in the northern South China Sea: a multi-proxy approach**

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Terrigenous detrital materials buried at sea is a book documenting their whole life, including the continental environment where they originated from and the transport process they experienced. In order to reconstruct the East Asian monsoon evolution in late Quaternary, we need to read this book correctly. The key problem is to well understand the proxies and pick the right ones, because most of them are affected by several factors.

In this study, clay and magnetic mineralogical measurements and geochemical XRF analyses were conducted on Core MD12-3432 taken from the northern South China Sea at 2125 m water depth during the CIRCEA cruise organized within Franco-Chinese LIA-MONOCL framework on board the R.V. Marion Dufresne.

The age model is derived from both carbonate and magnetic stratigraphy. The clearly identified Laschamp and Iceland Basin geomagnetic excursions are used as tie points. Coupled earth magnetic field paleointensity and carbonate content record calibrated from XRF core scanned calcium intensity, we established a robust age model, indicating that Core MD12-3432 covers the last 410 kyr with an average sedimentation rate of 12.4 cm/kyr.

The calibrated XRF-scan data provide high-resolution Ti/Ca, Al/Si and K/Al ratios. Ti/Ca and Al/Si ratios vary in phase, indicating strong clastic flux and short transport distances during glacials. Variations in K/Al ratio show an independent pattern, suggesting that temperature-driven chemical weathering is not the main control factor. Special attention needs therefore to be paid to the transport process.

For that purpose, anisotropy of magnetic susceptibility was measured on discrete samples at 50 cm intervals. Orientations of the principal anisotropy axes could be reconstructed, using the NRM declination to orient the core in the horizontal plane. The maximum axis is relatively well oriented in the stratigraphic plane of the sedimentary magnetic fabric. A 90° shift is observed at the MIS 5-6 boundary, suggesting a change either in the direction or in the intensity of the bottom current.

The clay mineral assemblage is dominated by smectite (23-59%) and illite (22-43%), with minor contribution of chlorite (13-27%) and kaolinite (4-13%). The provenance analysis suggests three end-member sources: smectite derives from Luzon, kaolinite originates from the Pearl River, and illite and chlorite are coming from both the Pearl River and Taiwan. Using the linear separation method of illite crystallinity, a time series of the clay mineral contribution from the three major provenances to the northern South China Sea was reconstructed.

By synthesizing all these proxies, we find that the clay minerals and element ratios contain information about provenance supply and transport process. The provenance supply could be a proxy to reconstruct the East Asian Monsoon evolution. To achieve detailed provenance supply information, the terrigenous flux and the analyses of magnetic minerals and grain-size will be also presented.