Impact of the East Asian monsoon rainfall changes on the erosion of Asian river and sediments transfer to the South China Sea

Christophe Colin

IDES – Laboratoire des Interactions et Dynamique des Environnements de Surface (UMR 8148) - Département des Sciences de la Terre Université Paris-Sud, 91405 Orsay, France.

I will present an overview of results obtained in the deep-sea sediments of the South China Sea (SCS) in order to show: what is the main sedimentary sources of the clay minerals to the SCS? ; What is the main factors that control the clay distributions in the SCS? 3/ What information can give to us variation trough time of the clay minerals in deep-sea cores collected close to Asian river mouths?

Clay mineralogy in surface sediments collected from both the SCS and its surrounding major fluvial drainage basins have been conducted to reveal sources of fine-grained detrital sediments (clay fraction) and their transportation in the SCS. The mineralogical composition of the clay fraction combined with illite crystallinity and chemistry index in the surrounding fluvial drainage basins permits to determine the main sources of clay minerals in the SCS. In the northern part of the SCS, clay minerals are highly mixed by both surface and bottom currents.

A coupled approach based on clay mineral assemblages and isotopic data (Rb, Sr, Nd) of the Ocean Drilling Program (ODP) Site 1145 and sites 1146 has been utilized in order to trace the sources of the sediment feeding the northern part of the South China Sea (SCS), and to investigate the evolution of the East Asian monsoon intensity over the last 450 kyr. $^{87}Sr/^{86}Sr$ and Nd isotopic data, combined with the smectite/(illite+chlorite) ratio, indicate that the Pearl River is the main contributor for detrital material to the northwestern margin of the SCS, with variable continental input of volcanic material derived from the erosion of the Luzon Arc. These inputs follow the low-latitude solar insolation with a 23 kyr periodicity, as recorded by a periodic change of the clay mineralogy. This imply a narrow control of the smectite/(illite+chlorite) by the South-East Asian summer monsoon intensity.

At shorter time scale, paleohydrological changes in the southern South China Sea (SCS) combined with clay mineralogy have been also investigated along core MD01-2393 recovered off the Mekong River mouth in order to assess the impact of sea level and East Asian monsoon rainfall intensity on erosion and weathering during the last 25 000 yr. SSTs and ^{18}O values determined on *Globigerinoides ruber* were used to estimate past changes of local seawater oxygen isotope ($^{18}O_w$). The close position of the studied core to the Mekong River mouth at sea level lowstand likely played a role in the $^{18}O_w$ fluctuations resulting from changes of the monsoon rainfall and runoff into the Mekong River basin. The smectite/(illite+chlorite) and kaolinite/(illite+chlorite) ratios combined with the illite chemistry index during the Holocene show higher chemical weathering of detrital material

originating mainly from the lower reach of the Mekong River. At shorter time scales, periods of strong monsoon rainfall are associated with an intensification of erosion of the Mekong River lowland favoured by the development of incised-valley systems inducing higher inputs of detrital material from the lower relative to the upper reach of the Mekong River. Our findings suggest a rapid response of erosion processes of the Mekong River basin to the monsoon rainfall intensity changes.