Objectives of the Shanghai Core Sites

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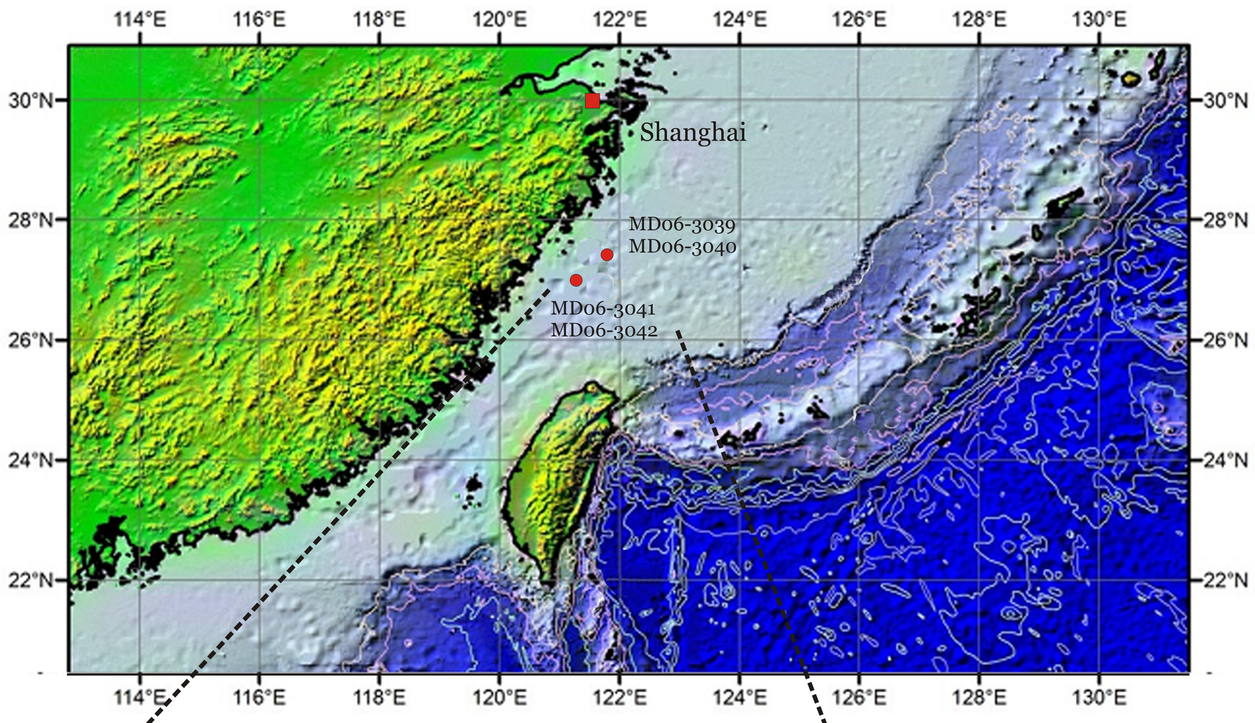

Figure 1 : Map of coring sites.

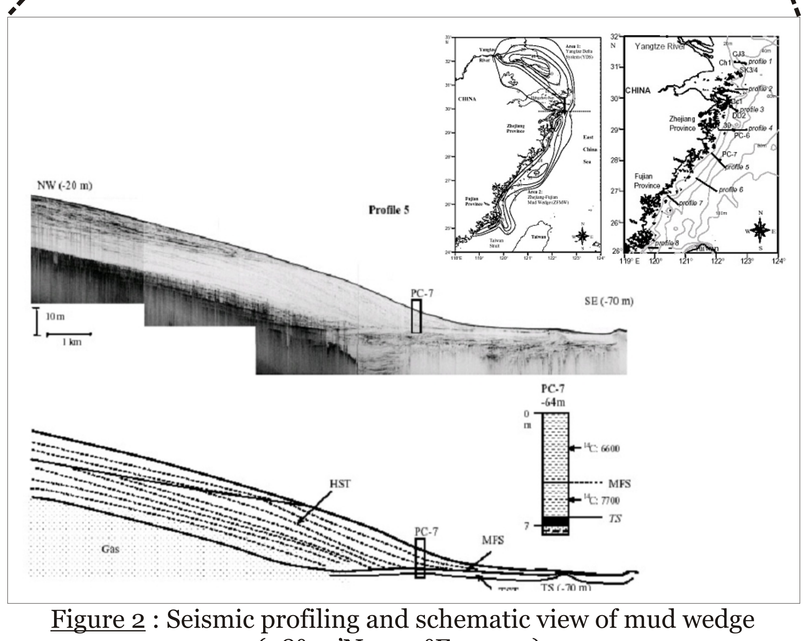

Figure 2 : Seismic profiling and schematic view of mud wedge (28°04'N ; 122°E ; 20 m).

This wedge presently has a maximum thickness of ~40 m close to the coast at water depths of 20-30 m and thins offshore reaching 1-2 m or less at 60-90 m water depth, corresponding to an across-shelf distance of less than 100 km.

Introduction

The objectives of the Marco Polo II cruise from Shanghai (China) to Jakarta (Indonesia) were the study of the Kuroshio current in the North, of the Indonesian Throughflow in the South and of changes of the hydrological regimes over the Asian continental areas. In addition, the objectives of the Shanghai core sites concerned the study of the Yangtze River sediments.

Yangtze River History

This river, open to the East China Sea, was formed after the topographic changes of the Cenozoic (outlined below).
China's drainage system was altered and rivers began flowing east.
Yangtze River mouth is the beginning of an elongated mud wedge.

Indeed sediments in the Yangtze outflow are trapped by the northward-flowing Taiwan Warm Current, the southward-flowing China Coastal Current and the Kurioshio Current. So there are high sedimentation rates near the mouth of the river, which permit high resolution reconstruction from coring sites.
Furthermore, since 2000 B.P, sediments rates increased because of the evolution of the Yangtze River under influence of human activities.

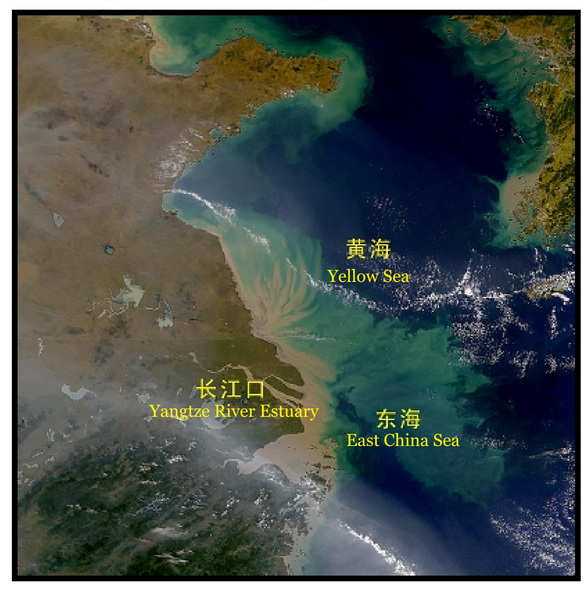

Figure 3 : Picture of Yangtze's discharge.

Reasons for each site

The objectives of Shanghai coring sites concerned the study of the Yangtze river sediments deposited as an elongated mud wedge along the coast from the Yangtze river mouth southward into the Taïwan strait during the Holocene period.
This mud wedge consists of sediments transported to the sea by the Yangtze river with some input presumably from smaller local rivers, and is thought to have formed during the past 7000 years, after postglacial sea level reached its mid-Holocene high stand, and after re-intensification of the Chinese alongshore current system.
The interaction between environmental changes and human activities has become a "hot" topic in the studies of global changes in recent years. The difficulty of obtaining a precise chronology for the land record often hampers a better understanding of the process. The mud wedge may provide a relatively continuous record, with high temporal resolution, of the erosion history in the Yangtze drainage with respect to climatic changes and human activities during the Holocene and pre-Holocene periods.

The first coring sites (MD06-3039 and MD06-3040) selected are located on an elongated mud wedges (~800 km in length), which extends from the Yangtze river mouth southward off the Zhejiang and Fujian coasts into the Taïwan strait.

Impact of topographic changes

The topographic reversal of China has significantly affected the evolution of the East Asian Monsoon, the paleoclimate of China and the sediment supply of Yangtze River. In the early Cenozoic, when the Tibet Plateau was still part of East Tethys Sea, the climate of East Asia was mainly dominated by the planetary wind system. The distribution of the arid belt was approximately parallel to the latitude, with the effect of monsoon merely limited in the coastal provinces. The uplift of the Tibet Plateau prevented the Indian Ocean moisture from getting into the inner of the continent. The continous uplift of the plateau altered the atmospheric circulation of East Asia, and caused the final arise of the East Asian Monsoon at about 22 Ma BP (Guo et al, 2002). With a decreased moisture supply and strengthed monsoon, the arid region of China retreated to Northwest China. The topographic reversal also has great effect on Yangtze River discharge. Due to the eastward gradient of the topography, a huge amount of sediment was transported to the East China Sea (ECS) from the inner continent. By coring the ESC shelf, a detailed history of Yangtze River evolution and high resolution paleoclimatic change of China can be reconstructed.

Topographic Changes During the Cenozoic : Tectonic

Over the course of the Cenozoic era, movement of the tectonic plates caused significant changes in the topography of Asia. An East-West transect of the continent taken in the early Cenozoic displays low altitude in the west and higher elevation in the east (see Figure 4 below). Around 50 million years ago, the subduction of the Indian Plate below the Asian Plate began to affect the continental margins of India and Asia. This collision resulted in significant uplift, forming the modern Tibetan plateau and the Himalayas. The subduction of India continues today, adding to the already colossal height of the world's highest point by a few centimeters each year. The uplift of the southwestern part of the Asian Plate and the subsequent weathering and erosion of the eastern regions of the plate yielded influential alterations in the continental topography. These changes are evident when a modern transect is compared to the early Cenozoic (see figures below).

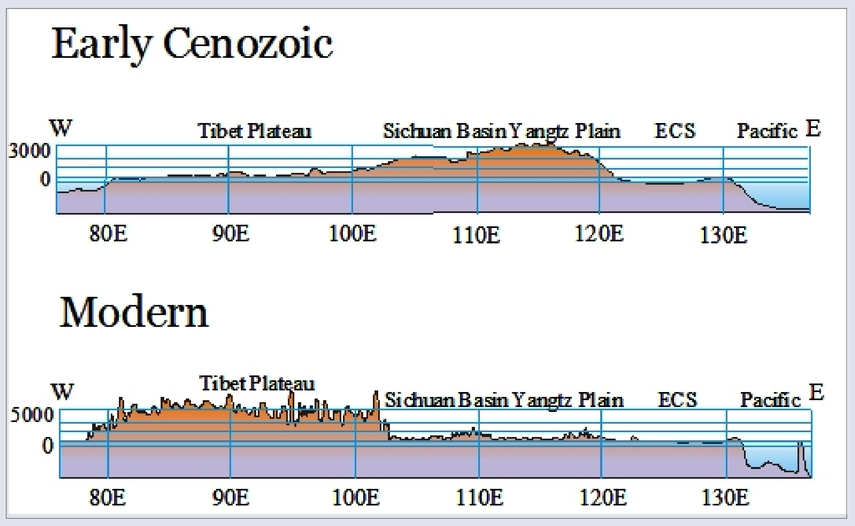

Figure 4 : E-W Transect of topography (Asian continent).

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