Mekong Delta and the Tonle Sap

Seismic profiles extending from the mouths of the Mekong across the Sunda Shelf show large-scale prograding foresets that are indicative of presence of an active delta system from at least 8 – 10 Ma (Lee, et al., 2001), which is approximately coeval with the elevation of the Central Highlands of Viet Nam. Marine shelf conditions probably persisted from this time until the onset of the northern hemisphere glaciations at the beginning of the Pleistocene (2.58 Ma). During the succession of glacial and interglacial periods, sea levels fluctuated from present levels (during interglacial periods) to -120 m (during glacial maxima).

Last glacial maxima

Falling sea levels during the glacial periods exposed the Sunda Shelf and allowed an extended river network to develop across the shelf, which linked many of the large rivers that now flow into the Gulf of Thailand and the South China Sea (Molengraaff & Weber, 1920; Voris, 2000; Steinke, et al., 2003). It is not clear whether the Mekong was part of this system or whether the river continued to discharge directly into the South China Sea.
The last glacial period (Wurm glaciation) began around 80 ka (See figure below), and sea levels fell to their lowest at about 20 ka, at which time they were around 126 m below current levels (Hanebuth et al., 2009). A sea level fall of this magnitude must have had major implications on the hydrology and geomorphology of the Mekong river system as the drop is equivalent to half the height of the fall of the river from the Chinese border to the Delta, and must surely have rejuvenated the river.

Evidence for rejuvenation of the river system is seen in the Mekong Delta and on the adjacent continental shelf. Incised valleys are observed on shallow seismic profiles recorded close to the edge of the present day continental shelf, and these appear to be vestiges of the ancient drainage system of the Mekong River during the last glacial maxima (Schimanski & Sattegger, 2005). Similar incised channels are also observed on shallow seismic profiles recorded on the onshore part of the Mekong Delta (Ta et al., 2002), and cores drilled close to these profiles have penetrated incised valleys beneath the current delta-plain that are greater than 65 m deep (Ta et al., 2002). These valleys have cut through the recent delta-plain sediments, which average only 25 m (Ta et al., 2002), and into older deltaic sequences (i.e. those deposited during earlier interglacial periods), or even pre-deltaic strata.