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Holocene development and sedimentological characteristics of the Andaman Sea inner shelf offshore Phang Nga Province (Thailand)

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The NW part of the Sunda Shelf offshore Phang Nga province (Thailand) is poorly investigated. Besides some information from tin mining activities [1] and the fate of matter discharged by the Ayeyarwady-Salween river system [2] this offshore area received some more attention after it was hit by the 2004 Indian Ocean Tsunami. However, most of the published results are limited to tsunami issues in shallow water mainly on the recognisability of the impact on sediments [3, 4]. The shelf development regarding a geological/sedimentological perspective was not considered.

During 3 cruises from 2007 – 2010 we undertook about 2000 nautical miles of hydroacoustic profiling with high resolution side-scan sonar to get information about the acoustic properties of the seafloor, with shallow reflection seismic to get insight into the shelf architecture and with a multibeam echosounder to collect bathymetrical data. About 1000 km² between 5 – 90 m water depth have been mapped. Based on these data, 156 grab samples and 60 sediment cores up to 2 m in length were retrieved from the seafloor. Measurements of ^{210}Pb activity were done to assess sediment accumulation rates. Age control of organic material in the sediment cores was done by ^{14}C-analyses. Chemical element composition to differentiate between terrigenous versus marine constituents was determined by an X-ray fluorescence (XRF) core scanner.

The inner wave dominated shelf is shallow, inclining with an angle of 0.8° down to 18 m, continuing offshore with only 0.1°; the 50 m isobaths is reached about 30 km offshore. Close to the coast palaeoreefs form a platform extending down to 10 – 12 m water depth, intersected by up to 2 m deep and 30 - 100 m wide channels. In water depth from 15 – 30 m elongated SW – NE striking asymmetric morphological ridges with a steep NW-flank have been mapped reaching a height of about 2 m and extending several kilometres offshore. The distance between these ridges varies from several hundreds of meters to kilometres. Over an annual cycle their position is stable.

Tin mining down to 50 m water depth has ceased out about 25 years ago, but the pits on the seafloor even in 20 – 25 m water depth are still existing showing holes with up to 100 m in diameter and up to 7 m depth. They have not been refilled until now, indicating little sediment mobility and small accumulation rates. These unfilled pits, elongated fields of stones and boulders at 30 – 35 m water depth which are disconnected from the subsurface and the outcropping granite basement at the inner/mid shelf transition in about 30 m water depth supports the idea of a sediment starving shelf.

In sediment cores taken from 55 m and 62 m water depth terrestrial deposits have been found. An abruptly change in the Ti/Ca ratio marks the transition from the terrestrial to the marine environment, which was dated to around 13 cal ka BP. This indicates the deglacial marine flooding, quite similar to the history of the marine flooding of the shelf of the South China Sea [5].

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