HINDOO cruise deep-sea channel survey in the Bay of Bengal

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During Leg 4 of KH-00-5 (Hakuho-maru INDian Ocean Observation Cruise : HINDOO Cruise), we conducted swath bathymetry survey using the SeaBeam 2120 system (20 kHz) together with a 3.5 kHz sub-bottom profiler to map the bathymetric features of the submarine channels of the Bengal Fan (Emmel and Curray, 1985), and to calculate the inflow sediment volume from the Indian subcontinent since the Last Glacial Maximum (LGM). Piston and multiple cores were taken for various analyses to understand more on the history of Himalaya-Karakoram mountain ranges under continent–continent collision and its consequent climatic changes.

Swath bathymetric profiles are not distinct due to the smooth slopes, however it is useful to trace submarine channels. Two channel types, active and old channels, are identified both on swath bathymetry and sub-bottom profiles. Active channels are characterized by V-shaped deep and narrow structures inside the channel (Figs. 3, 5). High channel levees show parallel strong reflectors, and has slumping down channel walls with stepping features at some places. Differ from the active channels, old channels are characterized by U-shaped wide and shallow structures (Figs. 4, 6). Strong and transparent reflectors which are identified inside channel levees, might be overbank fine-grained sediments paralleling the subbottom (Damuth, 1980).

Figure 1. Location map of the study area with ship tracks. Contours are in meter scale below seafloor.

Figure 2. Swath bathymetry map with deep-sea channels.
Active channels

Figure 3. Enlarged image of an active deep-sea channel from northern part of the survey area (figure 2). Channel meanders are clearly seen all over and abandoned channel parts are in crescent shape at a few places.

Old channels

Figure 4. Enlarged image of an old deep-sea channel from southern part of the survey area (figure 2). Unlike the active channel, abandoned features characterize the channel.

Figure 5. 3.5 kHz sub-bottom profiler images of the active channel with V-shaped narrow and deep channel structures. Locations are shown in figure 3.

Figure 6. 3.5 kHz sub-bottom profiler images of old channels with U-shaped wide channel structures and meanders (bottom). Locations are shown in figure 4.

References
Damuth, J. E., 1980, Use of high frequency (3.5-12 kHz) echograms in the study of near-bottom sedimentation processes in the deep-sea : a review. Marine Geology, 38, 51-75.