

Geologic architectures, physical-mechanical properties and geochemistry of the eastern Nankai prism along the Tenryu Canyon

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Since 1997, we have surveyed the eastern Nankai prism using the unmanned-submersibles ROV Kaiko and manned-submersible Shinkai6500. So far, we have used mainly two methods to understand geologic architectures; drilled cores and seismic images. Drilled cores revealed in detail vertical variation of micro-scale structures, seismic images gave us 2D-3D macro-scale architectures.

Our original concept of this new study is to observe directly 2D-3D meso-scopic geologic architectures exposed on sidewalls of the submarine canyons. There are mainly three merits in this study. First, we can observe deformational and sedimentary structures in detail in the outcrop scales. Second we can collect rock samples from outcrop directly. Particularly we can study in detail in the fault and/or fractured/damaged zones, where might be difficult to collect rock samples successively using drilling operation. Third, we can understand lateral variations of meso-scopic geologic architectures. Meso-scopic geologic architectures revealed on the basis of those survey results can directly compared with macro-scopic seismic images and micro-scopic drilled core images. We believe that this new attempt using submersibles is one of the strong survey methods as well as seismic survey and drill core study to understand geologic architectures below seafloor.

In this paper, we introduce geologic architectures in detail what we have observed during mainly three expeditions (YK05-08Leg2, YK06-02 and YK08-E04) by R/V Yokosuka-Shinkai6500. We dived totally 18 times in the Tenryu Canyon to see geologic architectures of the Nankai prism exposed on the sidewalls. We revealed meso-scopic geologic architectures throughout the prism from leading edge to out-of-sequence thrust. In these surveys, we found many submarine slides and normal faults associated with accretionary processes. We measured physical and mechanical properties of collected rock samples, and we showed lateral variation of those values throughout the prism. Furthermore, we showed geochemical data in calcite veins associated with thrust activities and geologic age using radiolarian microfossils. Based on those survey results, we will discuss accretionary prism formation processes related to gravitational collapses in the eastern Nankai prism.