Submarine and on land comparison between Nankai Trough and Miura-Boso prisms: Results of submersible study

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We have conducted a series of submersible (SHINKAI 6500) and ROV (KAIKO 10K) studies in several selected areas of the present Nankai accretionary prism, chiefly around the Tenryu and Shionomisaki canyons. We attained a definite conclusion that the surface of the Nankai prism displays quite similar structures to those of the Miura-Boso fold-belts, ranging from a general large-scale thrust-and-fold-belt to small and minor structures, folds and faults, duplex and recumbent structures, web and vein structures etc. (Kawamura et al., 1999 JAMSTEC Deep Sea Res.; Kawamura et al., 2009 GSAB; Anma et al., 2010 JGSJ: Michiguchi, 2009 JGSJ: Michiguchi & Ogawa, 2011a b GSASP: Kawamura et al., 2011 SP; Anma et al., 2011 SP, etc.). Some formed on the oceanic side (subducting plate), others on the landward side (within the prism) under high pore-fluid pressure, shaking, tectonic and/or gravitational effects. In general, the Nankai Trough landward slope is said to be underlain by a simple accretionary prism (due to the results of DSDP-ODP and IODP-NanTro SEIZE), but in detail the structures vary from place to place, and all of the characteristics of the deformation are rather similar to those recognized along the coasts of the Miura-Boso fold belts.

The Tenryu area is characterized by large scale gravitationally collapsed bodies, induced by various stages of (paleo-) Zenizu ridge subduction-collision processes (Kawamura et al., 2011 SP). The stability and instability, and subsequent development of a thrust- and fold-belt might produce a very complicated mode of deformation, especially in the shallowly- buried smectite-bearing mudstones. The eroded walls of the canyon display various types of major and minor structures similar to those of Miura-Boso. The seaward- and landward-verging layer-subparallel thrusts with many layer-parallel faults, web structures, and vein structures are developed as well as earliest stage gravitational slide products in the oceanic realm, very similar to those of the Miura Group in the Nishikawana area (Michiguchi, 2009; Michiguchi & Ogawa, 2011a,b), Misaki area (Yamamoto et al., 2009 IA), and the Chikura Group in the Southernmost Boso area (Aung, 2009 Univ. Tsukuba: Muraoka & Ogawa, 2011 GSASP). Some minor structures also resemble those of the Emi (Hota) Group in the Emi area (Ogawa & Ishimaru, 1991 J. Geogr., Tokyo Geogr. Soc.). The Shionomisaki part of the Nankai prism also has similar characteristics, but much simpler, akin to the surface expression, and probably can be compared to the drilling results of the NanTroSEIZE area. The Omine ridge and its western extension represent wide boundary zone between the forearc basin and the present prism with a mixture of the former prism and subhorizontal forearc basin strata, associated with both normal and reverse faults (Anma et al., 2010, 2011).

Such comparisons between the submarine areas of the Nankai Trough and on land area of Miura-Boso suggest that the present Miura-Boso areas, formed early-middle Miocene to Pliocene thrust-and-fold belts (Emi, Miura and Chikura accretionary prisms), represent the shallow parts of the present Nankai accretionary prism from sedimentary and structural view points.

References:

