

Burial process of segmented backarc basins: Hokuriku-oki, San'in-oki and Kitakyushu-oki shelves of southwest Japan

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Backarc sedimentary basins of southwest Japan have developed since the Miocene rifting and opening of the western part of Japan Sea. They are bordered by the eastern Noto Plateau and western Korean Peninsula, and segmented by the Oki Plateau in between. From east to west, Hokuriku-oki, San'in-oki and Kitakyushu-oki shelves have undergone different burial histories reflecting spatiotemporal variation of tectonic events. Hokuriku-oki subbasin is characterized by large topographic reliefs of Oki Trough and Oki Ridge, which were originated from divergent rift system of the western part of Japan Sea. It has a complicated deformation history reflecting successive collision episodes in front of the Izu-Bonin arc and Fossa Magna region. Miocene sedimentation pattern implies development of gentle warping of the backarc shelf having nearly perpendicular trend to the elongate direction of the arc. Thermally subsided margin of the San'in-oki subbasin is buried by a thick pile of Miocene sediments accumulated after post-opening stagnant sedimentation in middle Miocene. Distribution and stacking pattern of the Miocene clastics suggest emergence of highs and lows aligned across the arc, just the same as those in the Hokuriku-oki shelf. Apart from the northern domains, northwestern shelf of the Kyushu Island was a site of Miocene short-lived pull-apart basin formation upon a regional right-lateral fault system bounding the Japan Sea backarc basin. The most remarkable transversal tectonic event on these segments is a strong N-S compression and deformation around the end of Miocene, which is probably related with a change of convergence mode of the Philippine Sea Plate. Seismic profiles delineate intensive folding along the backarc margin and clear angular unconformity at that age for both of the Hokuriku-oki and San'in-oki subbasins. Rifting-induced horst/graben blocks on the Oki Plateau were also strongly inverted and their landward extension is known as the Shinji Folded Zone generated at ca. 5 Ma. The regional fold zone was converging on the Tsushima Islands at the western end of the San'in-oki subbasin, and some of numerous transcurrent faults in the Kitakyushu-oki subbasin were reactivated in an opposite (left-lateral) sense. The latest tectonic episode was brought about by the Quaternary fluctuation of convergence mode of the Philippine Sea Plate. As a result of enhanced highly oblique subduction on the Philippine Sea/Eurasian margin, recent southwest Japan has suffered wrench deformation under simple shear stress, and the backarc shelf is eventually bisected by a right-lateral fault running parallel to the Median Tectonic Line. Although the westward indentation of the forearc sliver of southwest Japan inevitably causes active extrusion of the Kyushu Island, the deformation front has not reached backarc domain since the Kitakyushu-oki subbasin is immune from notable neotectonic deformation.

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