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Contribution of the Miocene Tectonic Events to the Rearrangement of the Paleozoic to Mesozoic Accretionary Complexes in Japan

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Contribution of the Miocene Tectonic Events to the Rearrangement of the Paleozoic to Mesozoic Accretionary Complexes in JapanKoji Wakita, Masaki Takahashi and Makoto SaitoGeological Survey of Japan, AISTThe pre-Neogene geologic entities of Japan were located on the eastern margin of the Asian continent. The Pacific Plate had been subducted beneath the SW and NE Japan continental margins until Oligocene. In Early Miocene, both the Shikoku and Parece Vela Basins were spread along the eastern margin of the Philippine Sea Plate, and at around 15 Ma, the SW and NE Japan arcs rotated which resulted to the Japan Sea opening. During the Japan Sea opening, a large inter-arc rift, the North Fossa Magna, was formed by the clockwise rotation of SW Japan and the counter-clockwise rotation of NE Japan. More than 200 km right-lateral displacement occurred between these two rotated arcs at 15 Ma (Takahashi, 2006). Consequently, the pre-Neogene basement rocks from both sides of the North Fossa Magna should have been displaced at this time. A large fault, the Median Tectonic Line (MTL), which can be traced from Kyushu to central Japan, divides SW Japan into the Inner and Outer Zones. Accretionary complexes and their metamorphosed affinities form a clear zonal arrangement in the Outer Zone of SW Japan which is not very evident in NE Japan. The extension of MTL and the correlation of the Outer Zone of SW Japan toward NE Japan has been a contentious subject about the geology of Japan. Most geologists maintain that the Tanakura Tectonic Line (TTL) in NE Japan is the extension of MTL. Thus, the Outer Zone of SW Japan is correlated to the fore-arc side of NE Japan (east of TTL). However, the Outer Zone of SW Japan should be extended offshore of NE Japan, below the bottom of the Pacific Ocean, because NE Japan was displaced by about 200 km ocean-ward relative to SW Japan during the Japan Sea opening. The scattered distribution of Cretaceous-Paleogene fore-arc basin deposits distributed in the Outer Zone of SW Japan and the offshore region of NE Japan are strong evidences to support this assumption. The basic structure of pre-Neogene geologic entities in Japan is characterized by “pile nappe” structure. The younger accretionary complex and its metamorphic affinities were tectonically overlain by the older accretionary complex and its metamorphic affinities. Thus, it is suggested that the parallel arrangement of the tectonic units in the Outer Zone of SW Japan was a product of arc-across contraction and uplifting during Neogene. In contrast, the Paleozoic metamorphic rocks, Permian, Jurassic and Cretaceous accretionary complexes and their metamorphic affinities do not form a parallel arrangement in NE Japan. This geologic contrast between the SW and NE Japan was probably caused by the differences in Neogene tectonics, such as the clockwise rotation of SW Japan versus counter-clockwise rotation of NE Japan, and the Philippine Sea Plate subduction beneath SW Japan versus Pacific Plate subduction underneath of NE Japan since Miocene.