Model of the formation of the Kurosegawa Terrane in SW Japan: a transform fault originated by ridge subduction (Part 2)

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The Kurosegawa Terrane in SW Japan is a longitudinal fault zone that divides the Chichibu Composite Terrane into the Northern Chichibu and Southern Chichibu Terranes. Both of these terranes are composed mainly of the Jurassic-Early Cretaceous accretionary complexes. Besides the Jurassic-Early Cretaceous accretionary complex, the Kurosegawa Terrane contains exotic tectonic rocks, which include granitoids having ages of about 440 Ma, variously metamorphosed rocks, Siluro-Devonian deposits. Understanding of the Kurosegawa Terrane is regarded as a key to clarify the Mesozoic geotectonic history of the western circum-Pacific orogenic belts as well as the evolution of the Japanese Islands.

We propose a model for the tectonic evolution of the Kurosegawa Terrane in which the Kurosegawa Terrane was a transform fault zone formed due to oceanic ridge subduction (Kato and Saka, 20003). We came up with the model based on the synchroneity of the grand-scale strike-slip movement of the Kurosegawa Terrane, the strike-slip faulting within the South Kitakami region, the age gap among formations within the accretionary complexes, the eruption of HMA and adakites, the formation of the paired metamorphic terranes and similar events towards SW and NW Japan.

The model attaches importance to the changes of tectonic regime (from subduction to transform faulting and from transform faulting to subduction again) initiated by the oceanic ridge subduction. In the model, the chronological series of events in a close causality with each other is as follows: 1) Collision of the South Kitakami Microcontinent (ca. 155 Ma), 2) Start of tectonic erosion due to the subduction of a young plate (ca. 125 Ma), 3) Oceanic ridge subduction and formation of the Kurosegawa Transform Fault System (ca. 120-100 Ma), 4) Reset of oblique subduction and formation of decollement between the older Chichibu AC and the younger Shimanto AC (ca. 100 Ma-).

How can this model be extrapolated to the continental margin of East Asia? The continental margin covering Eastern China, Hokkaido and Far Eastern Russia should have been affected extensively by these shifts of tectonic regime. The following key situations in the continental margin may be coeval with the key situations in SW and NW Japan: 1. Age gap, serpentinite diapir and high P/T type of metamorphism in Hokkaido. 2. Initiation of the sinistral Tan-Lu fault system in the Hauterivian, which may be due to the strong coupling between the continental and oceanic plates due to approaching of the oceanic ridge. 3. Magmatism of the Khingan-Okhotsk Belt (Sato, 2000) seems to be connected to the coeval magmatism of the Ryoke Metamorphic Terrane probably by slab window. 4. Episodic appearance of a giant volcanic belt (ca. 4000 km) along the continental margin in Far East and E Russia (Kirillova, 2003). 5. Onset of rapid Pacific-hotspot motion toward the northwest (Engebretson et al., 1985).

The model is very simple. Just one ridge subduction can comprehensively describe not only the features of the Kurosegawa Terrane but also the key situations of the adjacent areas. The indication of the synchroneity in orogeny and modification in the accretionary wedge will enhance additional researches in isotopic geochronology, orogeny and accretion process in every place, and will contribute interdisciplinary elucidation of the western circum-Pacific orogenic belts and the other similar orogenic belts.