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Outline

In order to clarify origin of granitic rocks, temporal-spatial-compositional variation of the granitoids in SW Japan was investigated. As a result, several important points have been clarified as follows.

(1) U-Pb zircon dating for 92 rock samples from Tottori, Okayama, Kagawa Prefectures suggests that the initiation of the Ryoke granitoid magmatism occurred almost simultaneously at ~95 Ma along the arc and then migrated northward during 95-60 Ma.

(2) Kinematic models associated with (i) temporal changes of subduction angle or (ii) ridge subduction have been compared quantitatively. As result, the ridge subduction model fits the observations with tectonic configuration represented by migration velocity of ridge and its temporal change (from 25.2 cm/yr to 1.6 cm/yr at the arrival of ridge crest at trench), distance among the ridge segments (45km), the segment length (100km), and the angle between ridge axis and trench (30°) with shallow subduction angle (～10°).

(3) Systematic temporal variations are observed for the whole rock isotopic composition: with time, (i) initial Sr, Nd and Pb isotopic ratios broadly changes from radiogenic to less radiogenic characters, and (ii) rock types of the granitoids change

from ilmenite-series to magnetite-series. In addition, across-arc variations of the geochemical-petrological signatures are also observed: (i) the $^{87}Sr/^{86}Sr$ initial ratios are depleted in the back-arc region (latitude 35.0°－35.5°N) compared to the fore-arc region (latitude 34.5°－35.0°N) (ii) initial Pb and Nd ratios in the back-arc are more scattered than those in the fore-arc between 95 and 77Ma.

(4) Sr-Nd-Pb isotopic compositions suggest several end members contributing to granitic magma genesis. Based on the reference values of possible end members and isotopic variation of the granitic rocks, AOC, the Shimanto sediment, and arc lower crust are suggested to have been involved.

(5) 2-D numerical simulation for ridge subduction model clarified the following points: (i) thermal impact of ridge subduction is large enough to explain the voluminous granitic magmatism as observed in the circum-Pacific orogenic belts, especially when the subduction velocity changes from high to low associated with creation of slab window, (ii) after the ridge subduction, the melting region, mainly of slab melting, spreads extensively over the across-arc range, and then shrinks from the trench-side to the back-arc side, (iii) the subduction angle and the subduction velocity are important to control the overall duration and spatial range of magmatism, and (iv) slab melting of AOC occurs extensively, while comparable arc crustal melting also

occurs if slab window is created.

(6) Based on the numerical results, spatial-temporal variation of isotopic composition was calculated using partition coefficient, and mineral mode. Numerical results suggest behavior of Sr, Nd, and Pb as follows: For Sr, AOC derived Sr is the main component. For Nd , sediment contribution is high where sediment melting occurs. For Pb, sediment and LCC contribution is observed. In this numerical framework, apparent temporal change is not observed, suggesting assimilation and change of concentration due to melting also play important roles. In the initial stage of ridge subduction.

(7) Spatial-temporal variation of the granitic rocks in Sierra Nevada is also explained by the ridge subduction model if the segmented ridge subduct with the parameters as follows: velocity of ridge and its temporal change (from 25.2 cm/yr to 0.5 cm/yr at the arrival of ridge crest at trench), distance among the ridge segments (50km), the segment length (30km), and the angle between ridge axis and trench (30°). Therefore, ridge subduction may be an important mechanism to contribute to the continental growth.