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Ridge subduction and evolution of continental crust - Chile ridge subduction zone

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The Taitao ophiolite (5.7 to 5.2 Ma) exposed at approximately 50 km southeast from the present day Chile triple junction and accompanied granite intrusions with various compositions. A part of the subducting ridge center was emplaced to form the present Taitao ophiolite at ? 5.6 Ma. Five intrusive bodies of the Taitao granites have U-Pb ages ranging from 5.7 Ma (Tres Montes pluton in southeast) to 3.9 Ma (Cabo Raper pluton in southwest). Three intrusions that fringe eastern margin of the ophiolite have U-Pb ages ranging from 5.2 Ma to 4.9 Ma. Recycled zircon cores are common only in the Tres Montes pluton. Our data indicates that the generation of the granitic melts started in the Tres Montes area when a short segment of the Chile ridge system started to subduct ca. 6 Ma ago. This magmatism involved contamination with sediments/basement rocks. Generation of granitic melts continued after the emplacement of the ophiolite, as the spreading center of the same ridge segment subducted, due perhaps to partial melting of the ophiolite and/or oceanic crust enhanced by heat from upwelling mantle beneath the ridge. Subduction of transform fault system, that connected the subducted ridge and the next ridge, also resulted in basaltic to dacitic magmatism that exhibit influence of sediment contamination during around 5.1 to 5.0 Ma. Granitic magmas with various compositions developed during subduction of the ridge and transform fault. Emplacement of the ophiolite and formation of continental crust took place almost simultaneously.

Keywords: ridge subduction, ophiolite, granite, continental crust