Tectonics and magmatism around the Chile ridge subduction zone

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Emplacement of 6 Ma Taitao ophiolite and subsequent granite magmatism took place near the on-going Chile ridge subduction zone. Transcurrent component of obliquely subducting Nazca and Antarctic plate is compensated by dextral Liquine-Ofqui fault zone in the east. The Liquine-Ofqui fault zone, sub-parallels the subduction zone, was developed in the Cretaceous Patagonian batholith belt and accompanied Miocen granite intrusions that now fill graben structure. A chain of active volcanoes developed above it. Our recent study revealed that the granite magmatism continued until 2.6 Ma along the fault zone. Recent earthquakes in Aysen area indicate that the fault zone is still active. Late Miocene - Pliocene Taitao ophiolite is composed of a complete sequence of classic oceanic lithosphere and exposed around 50 km southeast of the Chile triple junction where the Chile ridge subducts beneath the South American plate. Gabbros and ultramafic rocks are folded into a complex pattern, whereas only evidence for post-emplacement block rotation was found in the overriding sheeted dike complex and volcanic rocks. We applied SHRIMP U-Pb and fission track dating methods on zircon crystals separated from gabbros and sheeted dikes. Two sets of radiometric ages of gabbros range between 5.9 +- 0.4 Ma and 5.6 +- 0.1 Ma. These ages coincide within error ranges and imply rapid intrusion and cooling of gabbros. U-Pb age of a dacite dike intruded into the sheeted dike complex was determined to be 5.2 +- 0.2 Ma. Our data indicate that the magmas of the Taitao ophiolite were formed during the 6 Ma Chile ridge collision event and emplaced in a shorter period than previously thought. A short segment of the Chile mid-oceanic ridge must be emplaced during the 6 Ma event. The ophiolite is surrounded by 6 Ma to 3 Ma young granites and partly underwent thermal metamorphism. Our recent study suggests a possibility of the granite magmas developed by partial melting of amphibolite crust. More accurate age controls are desired to understand relationship between ridge subduction events and granite emplacement.