Oxygen isotope ratio of zircons from the Taitao granite: Implications for slab-melting

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Slab-melting is one of the most important processes for formation of granite. The detailed mechanism of slab-melting, however, is not revealed; for example proportions of melting components in subducted oceanic crust. Oxygen isotope ratio is an important tool to understand the mechanism of slab-melting because the components in oceanic crust have different oxygen isotope ratios. Oxygen isotope ratios from olivine in adakites are reported by [1], however, it is suspected that reaction with the mantle changed the initial value or that some of adakites are not actually slab melts.

The Taitao granite in Chile is ideal for determining the oxygen isotope ratio of initial slab-melts, because the granitoids were generated by modern (*ca.* 4-5 Ma [2]) slab-melting beneath relatively thin crust (<30 km) without an overlying mantle wedge [3]. We analyzed 132 spots for $\delta^{18}O$ in magmatic zircon rims from five granitic plutons using an IMS-1280 SIMS. The zircon $\delta^{18}O$ value from the Seno Hoppner pluton (5.4 ± 0.5‰) is consistent with mantle-equilibrated zircons (5.3 ± 0.6‰ [4]), while those from the other four plutons are relatively high (from 5.6 to 7.2‰). We also analyzed whole rock oxygen isotope ratios of 11 rocks exposed around the granites. $\delta^{18}O$ values from sedimentary rocks (from 7.9 to 11.3‰) and altered basalt (from 8.0 to 8.3‰) suggest that the mildly elevated zircon $\delta^{18}O$ values were caused by (1) contamination of granitic magmas by sedimentary rocks or (2) higher proportion of altered basalt as protolith of the Taitao granitoid. In any case, our results indicate that granites formed by slab-melting have similar or slightly higher $\delta^{18}O$ compared to the average mantle value.

[1] Bindeman et al. (2005), *EPSL*, **235**, 480-496. [2] Anma et al. (2009), *Lithos*, **113**, 246-258. [3] Behrmann et al., (1994), *Geol Rundsch*, **83**, 832-852. [4] Valley et al. (1998), *Contrib. Mineral. Petrol*, **133**, 1-11.