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Lithium-chlorine correlation in lithium-rich zircons

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Trace elements in zircon can serve as geochemical indicators to estimate the source melt, the crystallization environment, and so on. For example, lithium (Li) concentration in zircon is approximately on the order of a few to several tens of ppm and is reported as a geochemical indicator in previous studies (e.g., [1]). A previous study [2] reported the zircons with extremely high Li concentrations (59-668 ppm) in felsic gneiss samples of Harvey Nunatak, the Napier Complex, East Antarctica. Li isotope ratios in the zircons are fractionated (δ7Li: -2.79‰ to 12.74‰) and at least two populations. The Li isotope ratios themselves suggest the contribution of weathered surface materials [3]. There is a positive correlation between Li and chlorine (Cl) in the zircons, which indicates that Li was incorporated with Cl at the interstitial sites of the zircon lattices, and the zircons crystallized in melts with an abundant supply of Li and Cl.

In addition, zircons from the syenite samples collected in the Yamato Mountains, East Antarctica, also show high Li concentrations and a similar relationship between Li and Cl concentrations. These trace element concentrations and isotope ratios in the zircons suggest that the melt in which the zircons crystallized interacted with lower crustal material, and further discussion will be provided in this study.

References:

[1]Li & Schmitt (2021) Geochimica et Cosmochimica Acta, 313, 173-194.

[2]Takehara et al. (2023) Journal of Mineralogical and Petrological Sciences, 118(ANTARCTICA), 230331.

[3]Ushikubo et al. (2008) Earth and Planetary Science Letters, 272, 666-676.