

Lithium pegmatites source from the weathered continental-arc rocks

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LCT pegmatites, the primary lithium resources nowadays, are the result of the high fractionation of continental sediment-derived granites i.e., so-called S-type granites, which are generally found in collisional orogenic belts, and temporally coupled with the super-continental assembly. However, why Li-enriched pegmatites intensively mineralize during continental collisions remains poorly understood. Here we use the ubiquitous S-type granite zircons, which host the detrital zircons as their inherited cores, to approach this problem. Detrital zircon cores from parental granites of five super-large lithium pegmatite deposits in northern Tibet are dated and show consistent U-Pb ages with continental arc magmatism, indicating the weathered continental-arc rocks as the source sediments for such Li-pegmatites. These S-type granites' inherited cores also show high europium anomalies like continental arcs' original zircon, suggesting the ancient continental arcs have gone through extensive thickening, which in turn makes arc crust Li-enriched. Weathering of Li-enriched arcs during mountain rising generates endowed continental sediments, the melting of which potentially builds massive Li-pegmatites on the super-continental sutures.