Lithium isotopic evidence for subduction of the Indian lower crust beneath southern Tibet

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The recycling of Indian continental crust is commonly considered to account for the formation of the Tibet Plateau, although it is unclear which part of the crust was involved in plateau uplift. Lithium serves as a tracer of materials recycled by subduction, due to its variable isotopic compositions in different end-members and isotopic fractionation in low-temperature environments. Here we report Li isotopic data for potassic, ultrapotassic and Mg-rich potassic volcanic rocks in SW Tibet, with Li contents of 12.7–64.9, 15.3–46.1 and 11.2–15.3 ppm, and δ^7Li values of −4.9‰ to +3.2‰, −3.9‰ to +1.7‰ and −1.2‰ to +3.5‰, respectively. The Li isotopic compositions of these rocks can be classified into two groups, Group I with heavier δ^7Li values (1.0‰ to 3.5‰) similar to those reported for mid-ocean-ridge and ocean-island basalts, and Group II with lighter values (−4.9‰ to +0.9‰) similar to those of Indian lower crust. These highly variable isotopic compositions are indicative of derivation from a region of subcontinental lithospheric mantle modified by interaction with fluids from the Indian lower crust. The Li isotopic data indicate that the Indian lower crust was subducted beneath the Lhasa terrane, and this sheds new light on the formation of the Tibet Plateau.

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