Magmatic recharge buffers the isotopic compositions of continental flood basalts against crustal contamination

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Isotope systematics of continental flood basalts are the keys to understanding the genesis of these large-scale mantle-derived magmatism. Nonetheless, due to crustal contamination, it is hard to evaluate whether these basalts record primitive isotopic signals of their mantle sources. Here we examined radiogenic isotopic compositions (Sr, Nd, Hf, Pb) of basalts from one late Cenozoic small-scale continental flood basaltic field in southeastern China. We found unusual positive correlations of $^{87}Sr/^{86}Sr$ versus $^{143}Nd/^{144}Nd$ and negative correlations of $^{143}Nd/^{144}Nd$ versus $^{176}Hf/^{177}Hf$ ratios for basalts undergoing magmatic recharge, deviating from normal arrays generated by crustal contamination. These lava samples with elevated magmatic recharge recorded obvious signals of recycled sediments in mantle sources characterized by moderate Ba/Th (91.9-106.5), excess $^{208}Pb/^{204}Pb$ relative to $^{206}Pb/^{204}Pb$ and excess $^{176}Hf/^{177}Hf$ relative to $^{143}Nd/^{144}Nd$. These observations suggest magmatic recharge buffers the isotopic compositions of magmas against the crustal contamination, providing a valid route for utilizing the isotope systematics of continental flood basalts to trace their mantle sources.