Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.12411

# Potassium isotope geochemistry in island arc volcanism

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Potassium isotope geochemistry in island arc volcanism

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Arc lavas display significant chemical and isotopic variation related to recycled materials from subducting slabs. However, to what degree that different types of subducted materials were incorporated into the petrogenesis of arc magmas remains less constrained. Here, we report stable K isotopic compositions for 32 well-characterized arc lavas from the circum-Pacific margins. We find low $\delta^{41}K$ values (from -0.86 to -0.38‰) in samples that result from metasomatism by sediment-derived melts, suggesting the addition of isotopically light sediments. By contrast, arc lavas metasomatized by slab-derived fluids have high $\delta^{41}K$ values (from -0.36 to +0.02‰). Their $\delta^{41}K$ positively correlates with Ba/Th and negatively with Th/La, which indicates inputs of isotopically heavy K in fluids released by dehydration of altered oceanic crust. Adakites have higher than the mantle $\delta^{41}K$ values (from -0.44 to -0.01‰). The co-variations of $\delta^{41}K$ with Sr/Y, La/Yb and K/U suggest that the slab melting is the primary source for adakites with a small contribution from mantle wedge. Our study shows that K isotope geochemistry is a powerful tool in studying petrogenesis of arc magmas and demonstrates that fluids and melts derived from the subducting sediments and basaltic slabs contributed differently to different types of arc magmas.