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Hafnium isotope data suggesting the contribution of crustal material at the source in the Andean Austral Volcanic Zone

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Volcanic rocks of the Andean Austral Zone (AVZ) in southernmost South America show adakitic geochemical signatures with low Y ($<$ 16 ppm), high Sr/Y (30-440), and highly fractionated REE ([La]n/[Yb]n=6-26). We determined Hf isotopic compositions for the AVZ volcanoes of Lautaro, Aguilera, Reclus, Mt. Burney, and Cook Island, and also for the Miocene Cerro Pampa adakitic volcanic rocks. The values of ^{176}Hf/^{177}Hf vary from 0.28278 (εHf=0.3) to 0.28313 (εHf=12.6) and are positively correlated with ^{143}Nd/^{144}Nd and negatively correlated with ^{87}Sr/^{86}Sr and ^{208}Pb/^{204}Pb. The isotopic compositions and their variations are distinctly different from the Izu-Mariana and New Britain arcs, but comparable to those from the Lesser Antilles and Sunda arcs. The linear arrays of compositional and isotopic variation from the Andean Austral zone suggest two end member components for their parental magmas. One component has isotopic compositions similar to MORB, but slightly enriched in ^{87}Sr and low ^{176}Hf compared to N-MORB source. It has high Sr/Y ($>$ 300) and high LREE/HREE ($>$ 30). The magma is high in MgO ($>$ 3.5 wt%) and Ni and Cr ($>$ 50 ppm). This is most likely partial melt of young subducted oceanic plate that variably interacted with mantle peridotites. The second component has moderately high Sr/Y, $\sim$ 35, and continental crust-like isotopic compositions, but relatively low Ba/Th. The data suggest that bulk assimilation of continental rocks raised ^{87}Sr/^{86}Sr and lowered ^{143}Nd/^{144}Nd and ^{176}Hf/^{177}Hf. This assimilation of continental crust could have occurred either within the crust during magma ascent, or in the slab source by fusion

of subducted clastic sediments and/or crust tectonically transported into the mantle by subduction erosion. We prefer the latter, the source region contamination, because of the linear compositional and isotopic variations.