Along-Arc geochemical variations in the Southern Volcanic Zone, Chile

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The origin of enriched isotopic signatures in volcanic rocks from the northern segment of the Southern Volcanic Zone (SVZ) in Chile is controversial. Hildreth and Moorbath (1988) argued for crustal assimilation in the context of their MASH model. Stern (1991) and recently Kay et al. (2005), however, proposed that subduction erosion can best explain the increasing enrichment of the magmas from the Miocene to present. We present new trace element and isotope data from young olivine-bearing volcanic rocks along the volcanic front of the SVZ in Chile. We observe systematic spatial variations in Sr, Nd, Hf and Pb isotopic compositions along the arc with the northern part of the Southern Volcanic Zone (NSVZ) having the most enriched signatures. Oxygen isotope data, with one exception, show uniform compositions, close to that expected for the upper mantle. Mixing calculations using O and Sr isotope ratios suggest that the enriched signature of the NSVZ lavas is primarily acquired in the mantle, favoring the subduction erosion model. Crustal assimilation, however, could also affect the composition of these lavas.

[1]Hildreth and Moorbath, (1988) “Crustal contributions to arc magmatism in the Andes of Central Chile” Contrib. to Mineralogy and Petrology **98**-: 455-489. [2]Stern, C.R. (1991) “Role of subduction erosion in the generation of Andean magmas” Geology **19**-:78-81. [3]Kay et al., (2005) “Episodic arc migration, crustal thickening, subduction erosion, and magmatism in the south-central Andes” GSA Bulletin **117**-: 67-88.