Noble gas systematics of Central and South America arc volcanism from Fluid Inclusions in minerals

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Trace volatiles like helium are key for understanding the lithospheric mantle signature and the complex role of subduction in global geochemical cycles. Here, we investigate the noble gas systematics of fluid inclusions in olivine and pyroxene phenocrysts from Central (CAVA) and South American (AVB) arc volcanism. Within low He conc. ranges ($<10^{-13}$ mol/g) diffusive fractionation is the dominant process causing the large $^{3}He/^{4}He$ variations measured in FIs from erupted products. Such disparity is also reported here for high to low-T volcanic and geothermal fluids from the Northern Volcanic Zone (Ecuador and Colombia) that show a wide range of $^{3}He/^{4}He$ (2.49 – 8.33 Ra; avg. 5.55 ± 1.86), with avg. $^{40}Ar/^{36}Ar$ = 298.0 ± 2.9, thus emphasizing the susceptibility of this sampling media to: (i) mixing with atmospheric components; and/or (ii) record radiogenic ^{4}He-rich crustal signatures at relatively shallow levels through which magmas may erupt. However, $^{3}He/^{4}He$ values for olivine and pyroxene from CAVA (e.g Pacaya) and AVB (e.g. Reventador and Tungurahua) of ~ 8 to 7 Ra, respectively, are within MORB range (8±1 Ra) and may suggest slight contamination of the mantle at zones of melt generation as a result of distinct subduction environments. This is further supported by Ne-Ar systematics with $^{20}Ne/^{22}Ne$ (10.02-9.88), $^{21}Ne/^{22}Ne$ (0.029 – 0.038) and $^{40}Ar/^{36}Ar$ (292.16 – 471.66) values that confirm the MORB-range signature of fluid inclusions and highlight variable percentages of air contamination typical of subduction-related settings. The on-going investigation aims to account for possible $\delta^{13}C_{CO2}$ variability within these CO_2-depleted bubbles that coupled with data here reported, will help constraining the arc-scale effectiveness of trace volatiles transfer via slab fluids and melts along convergent margins.