Geophysical Research Abstracts
Vol. 19, EGU2017-14137, 2017
EGU General Assembly 2017

Along strike variations of high temperature (350-500°C) thermal histories along the northern Andean margin of South America

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High temperature thermochronometers (apatite U-Pb and muscovite $^{40}Ar/^{39}Ar$; >350°C) are used to constrain the thermal history of the long lived (>450 Ma) Pacific margin of northern South America from the Triassic to the late Cretaceous. We acquired single grain apatite U-Pb and muscovite $^{40}Ar/^{39}Ar$ dates from Triassic monzogranites and migmatites located along a trench-parallel traverse spanning the Andes of Ecuador and Colombia. The relationship between apatite U-Pb dates and their individual grain sizes suggests that Pb was lost by thermally activated, volume diffusion. Apatite U-Pb dates, grain size information and Pb-in-apatite diffusion parameters were then used to recover t-T histories using mathematical inversion (E.g. Cochrane et al., 2014). The best fit t-T solutions corroborate $^{40}Ar/^{39}Ar$ muscovite dates. All t-T solutions yield rapid post-anatexis cooling during the Triassic. However, a sudden change in t-T topology occurs in the northern Cordillera Real of Ecuador. Apatite U-Pb and muscovite $^{40}Ar/^{39}Ar$ dates from southern Ecuador span between 70 to 130 Ma and 70 to 75 Ma respectively, whereas the same techniques yielded dates of 220 to 160 Ma and 165 to 140 Ma, from northern Ecuador and Colombia. The corresponding t-T paths reveal a period of re-heating into the apatite Pb partial retention zone during the Early Cretaceous in southern Ecuador, which is not observed towards the north. This is consistent with previous tectonic interpretations for the N. Andes (Spikings et al., 2015), and is interpreted to be due to increased amounts of extension, subsidence and heat flow in S. Ecuador. The concordance between the best fit t-T paths obtained from the apatite U-Pb data, and the muscovite $^{40}Ar/^{39}Ar$ dates supports the diffusion parameters of Harrison et al. (2009) for Ar-in-muscovite, that yield closure temperatures higher than 400°C. We conclude that Pb-in-apatite closure temperature is slightly higher then Ar-in-muscovite, supporting the closure temperature estimate of Harrison et al. (2009).