# Lower crustal melting during Mio-Pliocene arc volcanism and thrusting in the Payenia volcanic province, Argentina

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Calk-alkaline volcanic rocks from the late Miocene to Pliocene arc volcanism in the Payenia volcanic province, Argentina, have been analysed for major and trace elements and Sr, Nd, Pb-isotopes. The volcanism occurred 4-500 km from the Chile trench during a period of slab shallowing and compressional tectonics. Volcanism in this period mainly occurred in the vicinity of the main thrust faults which probably acted as pathways for the magma.

Whereas most samples follow a normal calk-alkaline fractionation trend and have trace element compositions similar to modern day arc rocks, ~28% of the samples have elevated Sr/Y (up to 165) and Ba/Th (up to 855) and generally low concentrations of incompatible elements except Sr, Pb and Ba. These high Sr/Y samples have Mg-numbers in the range 45-55 and $SiO_2$-contents 64-68 wt.% matching low degree experimental melts of mafic lower crust and can be termed high-Si “adakites”. The high positive Sr, Pb and Ba anomalies and lack of Eu-anomalies suggests that they contain an important plagioclase melt component, but the otherwise low trace element concentrations indicate that their source rocks were highly depleted. Due to the very low trace element contents, the high Sr/Y magmas cannot have been produced by fractional crystallisation or AFC processes from a low Sr/Y magma. Instead we suggest that the observed compositional trends represent mixing between crust and mantle derived magmas.

Isotopically, the high Sr/Y samples have more unradiogenic Pb, lower Nd-isotope ratios and only slightly higher Sr-isotope ratios (0.7041-0.7044) compared to the low Sr/Y samples and the modern day arc. The Pb-isotopic trends for the eastern and western Payenia samples are indistinguishable suggesting a rather uniform lower crust in the region. It is clear from the results that lower crustal melting was a widespread fenomenon in the region and that it is important to consider when interpreting arc magma geochemistry.