Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19479

Plagioclase as archives for incremental construction of the Quxu batholith in the Gangdese magmatic belt: implication for the nature of magma reservoirs

BING RUAN[1], BIJI LUO[1], HONGFEI ZHANG[1], XIN-FU ZHAO[2], WANGCHUN XU[1], LIANG GUO[1] AND FABIN PAN[1]

[1]State Key Laboratory of Geological Processes and Mineral Resources, and School of Earth Science, China University of Geosciences, Wuhan

[2]Faculty of Earth Resources, China University of Geosciences, Wuhan

Presenting Author: ruanbing@cug.edu.cn

Formation of magma reservoir and resultant construction of large batholith is increasingly considered to be a long-term incremental process. In this study, textures, in-situ major and trace element, and Sr isotopes of plagioclase were carried out from the Quxu batholith (south Tibet), which revealed the nature and incremental construction process of batholith. Plagioclases from the five lithologies display diverse textures and show differences in geochemistry and Sr isotopes, indicating that they were derived from multiple magma sources and had experienced complex magmatic processes. Plagioclases with resorption and sieved textures in Group I mafic dykes and mafic magmatic enclaves show larger variations in An (20-90) values, with low Sr and Ba contents, and low initial $^{87}Sr/^{86}Sr$ ratios (I_{Sr}) (0.7035-0.7050), suggesting that Group I was generated by fractional crystallization of basaltic magmas, and mixing with evolved felsic magmas. Plagioclases in Group II granodiorites show similar textural features and Sr and Ba contents, and I_{Sr} to those of Group I, suggesting that Group II was evolved from the similar basaltic magma and has underwent recharging of mafic magmas. Plagioclases in Group III monzogranites have a similar An range to those of Group II, but show higher Sr (900-2200 ppm) contents and I_{Sr} values (0.7045 to 0.7066). It suggesting that Group III was generated by partial melting of juvenile mafic crust and their magma sources are heterogeneous spatially. Plagioclases from Group IV granodiorites and Group V monzogranites exhibit higher Sr (500-3000 ppm) contents than other groups, and their I_{Sr} values show a similar range to those of Group III, indicating that they were produced by partial melting of thickened lower crust. Plagioclase glomerocrysts in Group V indicate that it had experienced mush rejuvenation. The Quxu batholith, constructed by long-term magma pulses, is a mixture of evolved melts and crystals cargoes. The different lithologies represent different evolution states of magma reservoirs. Magma reservoir with incremental growth is an open system, in which magma convection, mixing and recharge, crystal accumulation and mush rejuvenation commonly occur. This study shows that textures and geochemistry of plagioclase can reveal the incremental growth processes of batholith in detail.