WANG Chao, LI Rong-She, SMITHIES R. Hugh, LI Meng and PENG Yan, 2015. Felsic Magmatic Evolution and the Role of Post-Collisional Process in Continental Crustal Growth at Convergent Margins: Insights from the Western Part of the Central Qilian Belt, Northwestern China. *Acta Geologica Sinica* (English Edition), 89(supp. 2): 92-93.

Felsic Magmatic Evolution and the Role of Post-Collisional Process in Continental Crustal Growth at Convergent Margins: Insights from the Western Part of the Central Qilian Belt, Northwestern China

WANG Chao[1*], LI Rong-She[1], SMITHIES R. Hugh[3], LI Meng[2] and PENG Yan[2]

1 State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China
2 Xi'an Center of Geological Survey, China Geological Survey, Xi'an 710054, China
3 Geological Survey of Western Australia, 100 Plain Street, East Perth, WA 6004, Australia

1 Introduction

Long-lived early Palaeozoic magmatism in the Qilian orogen, of the Northeastern Tibet Plateau, formed an extensive linear belt of plutonic and volcanic rocks as a result of subduction of the Proto-Tethyan Ocean beneath, and subsequent accretion of resulting arc crust onto, the proto-margin of the North China Craton (NCC) (Song et al., 2013). Magmatism comprises intermediate to acidic intrusive rocks thought mainly to be subduction-related. These are widespread throughout the Central Qilian belt (CQB) and particularly well-exposed in the western part of the CQB, where our study is focused. However, the complex evolution of this Palaeozoic crust and orogenic belt remains poorly understood. One reason for this is that the magmatic history of the western part of the CQB remains poorly constrained due to limited geochronological and geochemical data. In this study, we present new geochemical and zircon U-Pb and Hf isotope data for representative granitoids (*sensu lato*) of the CQB and discuss their likely source compositions and petrogenesis. We then add available high-quality data from other mainly Ordivician to Silurian magmas from the belt and attempt to constrain how the range of source compositions and petrogenetic processes might have changed through time. This allows us to propose a geodynamic model for the generation and evolution of the crust during the early Palaeozoic magmatic events of the Northern Tibet Plateau. We show that the role of post-subduction magmatism in overall crustal evolution may have been significantly underestimated, mainly because the period when magmatism changed from subduction-related to post-collisional may not have been properly recognized, at least within the CQB.

2 Conclusions

The Paleaozoic evolution of the Qilian orogen describes a complex, long-lived, convergent margin setting that appears to encompass most features of such settings and appears to preserve evidence for all stages of a classic Wilson Cycle. This region represents an ideal laboratory for studies on magmatic evolution at both the subduction stage and post-subduction stage of convergent margin evolution.

Our study has highlighted the compositional diversity of magmas contributing to crustal growth within the western part of the CQB from the Cambrian to late Silurian. We show that early evolution of this region involved formation of, and subsequent destruction and accretion of, a series of oceanic island arcs, and included periods of hot subduction with partial melting of oceanic lithosphere to produce adakites. Onwards from this period, crustal evolution occurred at a continental setting. Previous suggestions that the change from a subduction-related to post-collisional setting occurred in the period from 440 to 420 Ma (e.g. Song et al., 2014) do not appear to be correct, at least for the WCQB. Here, abundant shoshonite magmas, and rarer shoshonite-OIB associations, occurring from c. 465 to 445 Ma rather suggest asthenospheric upwelling and remobilization of subduction modified lithosphere characteristic of a post-collisional setting. Younger plutons show evidence for compositional evolution at progressively lower pressures, indicating that this tectonic regime continued until at least c. 415 Ma. Granitic plutons within this age range dominate a southeast-trending belt adjacent to the Danghe Nanshan.

* Corresponding author. E-mail: wangc-mail@163.com

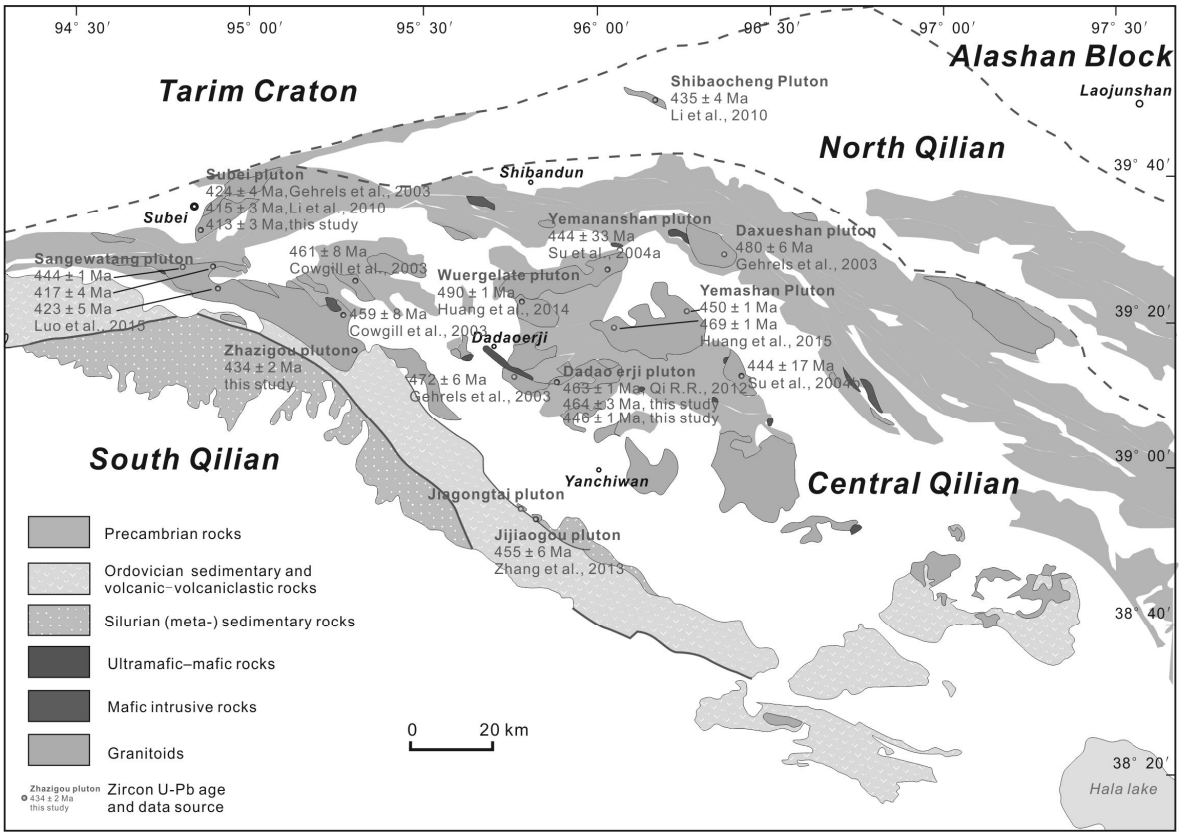

Fig. 1. Geological and tectonic map of the Qilian orogen. Inserted map shows location of the Qilian orogen in Tibet. TRB - Tarim basin; AL - Altyn Tagh; QL - Qilian Mountains; QDB – Qaidam basin; WKL - Western Kunlun Mountain; EKL - Eastern Kunlun Mountain; HMLY - Himalaya Mountains; INP - Indian plate.

They form a significant (>30%) proportion of presently exposed Paleozoic felsic intrusions in the WCQB and suggest a major contribution of post-collisional magmatism to the overall evolution of continental crust within the region. This study suggests post-subduction or post-collisional processes could also be an important mechanism for continental crustal growth.

References

Song, S.G., Niu, Y.L., Su, L., Xia, X.H., 2013. Tectonics of the North Qilian orogen, NWChina. *Gondwana Res*. 23: 1378–1401.

Song, S.G., Niu, Y.L., Su, L., Zhang, C., Zhang, L.F., 2014a. Continental orogenesis fromocean subduction, continent collision/subduction, to orogen collapse, and orogen recycling: the example of the North Qaidam UHPM belt, NWChina. *Earth Sci Rev.* 129: 59–84.