Hydrothermal quartz records meteoric/magmatic water interaction and as a potential paleoaltimetry

YANG LI[1*], QIU-LI LI[1], MARK ALLEN[2]

[1]*State Key Laboratory of Lithospheric Evolution, and Institutions of Earth Science, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, China;*

[2]*Department of Earth Sciences, Durham University, Durham, DH1 3LE, UK*

[*]*Emails of Y. Li: geoliy@outlook.com; geoliy@mail.iggcas.ac.cn.*

Quartz is a ubiquitous phase that can form during almost all stages of the lifetime of a fossil magmatic-hydrothermal systems, therefor is has the potential to reconstruct the sources and evolution processes of hydrothermal fluids.

Through intergrating crystallographic textures (i.e., petrography and cathodoluminescence), fluid inclusion and *in-situ* ion probe oxygen isotopoe analysis, here we show that single hydrothermal quartz grain from a skarn deposits is characterized by a five-stage growth history. The most pronounced feature is a dramatic decrease in oxygen isotope composition from ~5 ‰ to -9 ‰ followed by a rebound to ~6 ‰. This sharp fluctuation of oxygen isotope composition occures within hundreds of micrometers and is accompanied by changes of crystallographic textures and formation temperatures.

Our results indicates that the quartz inventory faithfully records episodic meteoric water incursion, magmatic fluid recharge events at several to tens of thousands years during ore formation. Critically, the data can be utilized to put tight constraints on the oxygen isotopic composition of meteoric water during ore formation, which in turn can yield implications for the estimation of paleoelevation.