Zircon paragenesis and timing of UHT metamorphism in the Anápolis-Itauçu Complex, Brazil

JULIA A. BALDWIN, MICHAEL BROWN, WILLIAM F. MCDONOUGH, PHILIP M. PICCOLI, AND SEAN TIMPA

Department of Geology, University of Maryland, College Park, MD 20742 (jbaldwin@geol.umd.edu)

The Anápolis-Itauçu Complex (AIC) forms a NNW-oriented terrane of predominantly granulite facies rocks within the internal zone of the Brasília Fold Belt, central Brazil. UHT granulites (Opx-Sil-Qtz and Spr-Qtz) occur in at least two localities within the AIC. Magmatism and metamorphism are interpreted to have occurred in the interval 650-630 Ma (Piuzana *et al.* Precambrian Res, 2003). This study reports data from an integrated electron microprobe and LA-ICP-MS *in situ* microstructural, chemical, and U-Pb geochronological study of zircon from paragranulites of the AIC. Four samples with different high-grade mineral assemblages (Spr-Qtz, Opx-Sil-Qtz, Grt-Opx-Spr-Crd-Pl, and Spl-Qtz) were investigated. Zircon occurs in a variety of petrographic settings, including armored inclusions in peak metamorphic phases such as garnet, retrograde reaction microstructures (e.g. as inclusions in Crd reaction rims on garnet), and as a breakdown product of Ilm in Qtz-deficient granulites. The rich variety of textural settings of zircon affords the opportunity to place constraints on different points along the *P-T* evolution of the AIC (Baldwin *et al.* JMG, in review). REE (+Y) profiles of garnet and zircon are used to evaluate equilibrium between zircon and garnet and constrain the timing of peak metamorphism in the complex as well as the duration of UHT metamorphism. Coarse porphyroblastic garnet from a Spr-Qtz locality displays zoning in HREE (+Y), with an increase from core to rim and a slight negative Eu anomaly. Garnet from a second locality with the assemblage Grt-Opx-Spr-Crd-Pl has low REE abundances, core to rim zoning, and substantial negative Eu anomalies. Garnet from Spl-Qtz granulites have moderate REE abundances with flat, unzoned REE patterns. Knowledge of the petrographic setting, internal structure, and REE chemistry of zircon combined with *in situ* geochronology will be used to place constraints on the tectonic evolution of this segment of the Brasília Fold Belt.

Synchronized study on micro-scale U-Pb ages and oxygen isotopes for metamorphic zircons from Dabie-Sulu orogen, Eastern Central China

D. CHEN[1], E. DELOULE[2], Q. XIA[1] B. LI[1] AND T. NI[1]

[1]School of Eatrth and Space Science, University of Science and Technology of China, Hefei, Anhui 230026 China (dgchen@ustc.edu.cn)

[2]CRPG-CNRS, BP20, 54501Vandoeuvre-les-Nancy, France (deloule@crpg-cnrs-nancy.fr)

In-site zircon oxygen isotope analyses and U-Pb dating of eight metamorphic rocks from Dabie-Sulu HP-UHP terrain have been carried out. The rocks are eclogite, granitic gneiss, jadeite quartzite and granulite. According to CL images as well as mineral inclusions, REE and other trace element, two kinds of zircons domain could be recognized. One is unzoned rims with low Th/U, steep HREE pattern and other one has partial faded oscillatory cores with high and dispersed Th/U. The first has its concordant ages of 220-245 Ma. The latter has quite different apparent ages, constracting a discordia with lower and upper intercept ages of around 179 to 220 Ma, and 8.1 to 2.5 Ga, respectively. The concordia and lower intercept ages represent overgrowth or completely recrystallization of protolith zircon and the upper intercept ages protolith formation. More than 120 analytical results show that oxygen isotopes of zircons were also quite heterogeneous either in regional or in micro-scale. The total ranges of $\delta^{18}O$ values are from –8.5 to +9.7‰.

Combining U-Pb ages and oxygen isotopes, the most pronounced character of studied samples is that there are two group of rocks. Five of eight with protolith ages 1.9-2.7 Ga have average$\delta^{18}O$ values of 5.7-7.3 ‰, whereas other three with protolith ages of 0.7-0.8 Ga have $\delta^{18}O$ values of 1.9 to − 0.0 ‰, much lower than that of mantle-derived zircons (5.3 ‰). The anomalous low $\delta^{18}O$ values for both core and rim indicate a pre-subduction, pre-UHPM acquisition of depleted oxygen isotopic signature and inheritance of protolith zircon $\delta^{18}O$ during metamorphism. The magmatic activity of 0.7-0.8 Ga in Dabie-Sulu could be related to rifting at northern margin of Yantze craton and it overlapped with South China Proterozoic glaciation, which may correlated with snowball earth of Neoproterozoic. We suggest that the low $\delta^{18}O$ values were printed on the rocks by high T geothermal alteration charged with cold meteoric water or it produced by partial melting of altered magma.

Acknowledgement

This research is financial supported by grants No. 20040358050.