Microporous and micropermeable subgrain microtextures in K-feldspar

D.F. MARK

NERC Ar Isotope Facility, Scottish Universities Environmental Research Centre, Rankine Avenue, East Kilbride, G75-0QF, Scotland, UK (D.Mark@suerc.gla.ac.uk)

K-feldspar has potential to yield a wealth of information on the temperature-time evolution of the rocks in which it is found, as long as we can understand Ar diffusion behaviour with respect to the retentiveness of microtextures. Patch perthite microtextures are characterised by mosaics of slightly misaligned submicron- to micron-sized incoherent subgrains with abundant dislocations along their boundaries and are also typically associated with micropores. Studies suggest subgrain microtextures are not retentive of radiogenic ^{40}Ar even at low-temperatures.

Authigenic K-feldspars show microtextural similarities to patch perthites; that is subgrains separated by dislocation rich boundary networks that potentially act as fast diffusion pathways for radiogenic argon. We analyzed authigenic K-feldspar using Ar-Ar geochronology as a direct analogue for the patch perthite microtexture. Samples were naturally exposed to temperatures in excess of the predicted Ar closure temperature, but unexpectedly still yield Ar-Ar ages representative of precipitation and not cooling.

We propose a theoretical microtextural model that highlights fundamental differences between the microtextures of deuterically formed patch perthites and authigenic K-feldspars, explaining the apparent robustness of authigenic K-feldspar with respect to Ar-retention. The model suggests that whereas short-circuit Ar-diffusion is the dominant process observed within patch perthite, lattice volume diffusion governs Ar-diffusion from authigenic K-feldspar.

Re-Os geochronology of the Várzea do Macaco chromite deposit and Ni-prospect, Jacurici Complex, Brazil

J.C. MARQUES[1,2] AND R.W. CARLSON[3]

[1]CPRM, R.Banco da Província 105, Porto Alegre, Brazil 90840-030 (*correspondence: jmarques@pa.cprm.gov.br)
[2]LGI/IG/UFRGS- Prédio 43129, Porto Alegre, 91501-970
[3]DTM/CIW, 5241 Broad Branch Road, Washington, DC 20015-1305 (rcarlson@ciw.edu)

The Jacurici Complex, located in the NE of the São Francisco Craton, is constituted by several N-S mafic-ultramafic bodies - possible fragments of a single larger sill. The complex evolved from a very primitive parental magma, later disrupted and metamorphosed under amphibolite-facies conditions during regional tectonism [1]. The Complex hosts the largest Brazilian chromite deposit and one recently discovered Ni-Cu sulfide prospect (Várzea do Macaco body).

Six samples of chromite separates (five from chromitites and one from a disseminated interval) and four pyrrhotite separates (two from a magmatic ore and two from a metassomatized interval) from the Várzea do Macaco body were selected and performed at the Department of Terrestrial Magnetism/Carnegie Institution of Washington.

All chromites from chromitites show sub- to near-chondritic initial Os isotopic composition ($\gamma_{Os(2085Ma)}$= -4), but the disseminated chromite show significantly higher initial Os composition than typical of the mantle ($\gamma_{Os(2085Ma)}$ = +18). The same relationship was observed when comparing typical magmatic sulfide ($\gamma_{Os(2085Ma)}$= -2 to +2) and sulfide associated to metasomatized intervals ($\gamma_{Os(2085Ma)}$= +11 to +15).

A Re-Os isochron using all data was not possible. One the other hand, considering the higher γ_{Os} samples as a group, the three samples yield an isochron age of 2084±0.9Ma (2σ, MSWD=0.43). The data from the sub to near-chondritic γ_{Os} samples show some scatter (chromites have very low ^{187}Re/^{188}Os ratios), but suggest an older age.

Similar ages were already previously reported as the age of magmatic crystallization (2085 ± 5Ma SHRIMP U/Pb in zircons) and as the age of the intrusive and undeformed Itiúba Syenite (2084 ± 16 Ma SHRIMP U/Pb in zircons) [2].

The results obtained suggest that the complex is possibly older than considered before and the Ni-sulfide mineralization was partially remobilized during an event at 2084Ma. Metamorphism or the Itiúba intrusion are both significant thermal events that could remobilize the sulfides and also reset the Re-Os isotopic system in some chromites.

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[1] Marques *et al.* (2003) *J. Petrol*. **44**, 659-678. [2] Oliveira *et al.* (2004) *Precamb. Res*. **128**, 143-165.