

showing the intense compression formation at the margin, reflecting the characteristic of conformable intrusion of the pluton. The relatively gentle lineation reflects a kind of rotatory emplacement mechanism. Relatively steep marginal foliation shows the characteristic of compression expanding. Affected by the thermal power of the pluton, the metamorphism of the contact zone has zonation. Both the strike of the axial plane of fold at the contact zone and that of the flow cleavage of the ductile shear zone are consistent with the boundary, which reflects the features of conformable intrusion. The hinges of folds are mostly inclined and erect, which reflects emplacement mechanism of spiraling ascent. Both boudins developed at contact zone and the steep strata indicate that the emplacement characteristic of the balloningly expanding of the pluton. The surrounding rock of the contact zone horizontally shortens. The average percentage of shortening is 39.7%, which further presents the forcefully expanding mechanism of the pluton, and the space occupied by the active expanding intrusion is offered by the shortening of the surrounding rock. The characteristics of left-lateral shearing shown by ductile shear zone and rheomorphic fold reveals that the pluton emplacement and the deformation of surrounding rock are controlled by NNE-striking left-lateral shear stress field in eastern China. The above characteristics of pluton structures suggest a mechanism of emplacement. In the deep, the pluton apirally arose left lateral, and in the shallow, the one forcefully emplaced balloningly.

194-32 Poster Sial, Alcides Nobrega

THE HIGH K CALC-ALKALIC TAVARES BATHOLITH: MAGMA TRANSPORT RATE AND MAGMA CHAMBER BUILDING

PESSOA Ricardo Ribeiro¹, SIAL Alcides Nobrega¹, FERREIRA Valdez Pinto¹
1 - Federal University of Pernambuco

Keywords: magmatic epidote; chamber building; upward transport rate; flow rate; high K calc-alkalic

The well-exposed Tavares batholith is the best known representative, among the magmatic epidote (mEp)-bearing high K calc-alkalic granitic plutons in northeastern Brazil. This batholith intruded gneisses (Alto Pajeu terrane) and schists (Cachoeirinha terrane), and is bounded by shear zones along its northern (dextral) and southern (sinistral) margins. Lithological units comprise syenite to quartz monzogranite with K-feldspar megacrysts up to 6 cm long. The pluton is marked by pervasive magmatic foliation with curved, elliptical geometries mainly delineated by biotite + amphibole and K-feldspar, observed on centimeter to hundred-meter scale. Tonalitic to quartz dioritic rocks, linearly distributed, are common and have been interpreted as disrupted narrow synplutonic dikes. Layered xenoliths up to 10-m long (amphibolite alternates with epidote-rich layers) are found in the central portion of this batholith, possibly transported upward from the amphibolite source. The pluton shows a four-sided polygonal geometry with the major sides converging towards northeast. Besides the magmatic foliation that cuts across the pluton, structures include ladder-dikes, snails, mushroom-shaped structures, blobs and concentric rings. Composition of epidote (42 grains) clusters around 19 and 25%Ps (f02 in the N-NO field). Measured dissolution zone width (mm) of highly corroded subhedral mEp grains, varies from 0.02 to 0.24mm (avg. 0.2mm) and indicates an average of 30yr for dissolution and minimum upward magma transport rate around 600myr⁻¹. Thermal and fluid dynamical analysis, based on Petford et al. (1993, 1994) allows to estimate that the time necessary to build the Tavares magma chamber (about 1100km³ in volume) was approximately 200yr. The conduct through which magma flew had an estimated width of about 2m and the magma flow rate was 2cm³yr⁻¹. Well-preserved magmatic epidote crystals, up to 0.65mm long require 260yr for complete dissolution and set the maximum time for magma crystallization in this chamber. Petford, N. et al., 1993. *Geology* 21(9): 845-848. Petford, N. et al., 1994. *Lithos* 32 (1-2): 161-168.

194-33 Poster Sial, Alcides Nobrega

TRANSPORT RATE AND EMPLACEMENT OF MAGMATIC EPIDOTE GRANITOIDS IN NORTHEASTERN BRAZIL

SIAL Alcides Nobrega¹, FERREIRA Valdez Pinto¹, PESSOA Ricardo Ribeiro¹, BRASILINO Roberta Galba², TORRES Helton Heler Falcão³, BRITO-NEVES Benjamin Bley⁴

1 - NEG-LABISE, Department of Geology, UFPE, Recife, Brazil

2 - NEG-LABISE, Department of Geology, UFPE, Brazil

3 - Companhia de Pesquisa de Recursos Minerais, Recife, Brazil

4 - Institute of Geosciences, University of São Paulo, São Paulo, Brazil

Keywords: magmatic epidote; transport rate; emplacement; granitoid; NE Brazil

Magmatic epidote (mEp)-bearing granitoids are known from five tectonostratigraphic terranes in the Borborema province, northeastern Brazil. They are mainly calc-alkalic to high K calc-alkalic plutons, although some shoshonitic to trondhjemitic ones are also known. The high K calc-alkalic and calc-alkalic plutons were emplaced within the 630-650Ma interval with only few exceptions (e.g. Caldeirão Encantado pluton is 880Ma old). Granitoids which share same petrological/geochemical features with them, but were emplaced within the 580-570Ma interval, are free from mEp. All the studied calc-alkalic and high K calc-alkalic granitoids show epsilon Nd between -1 and -4 and TDM (630) between 1.1 and 1.4 Ga (source material formed during rifting pre-Cariris Velhos = Grenville orogeny) except for the Curral de Cima calc-alkalic granitoid (epsilon Nd = +2 and TDM (600) = 0.9Ga). The Nd isotope behavior for this pluton assures that there was also Neoproterozoic juvenile crust formation at this province. Most plutons carry amphibole-rich clots, interpreted as pieces detached from the source. One large layered amphibolite xenolith at the Tavares pluton yielded a TDM (600Ma) of 1.4Ga, in the range of model ages for most of these plutons. The studied mEp-bearing granitoids were emplaced at 5 to 7 Kbar pressure (outside the Transversal Domain of the province, however, some mEp-bearing plutons were emplaced at shallower depth (3 to 4 Kbar). In high K calc-alkalic and calc-alkalic plutons, mEp was transported upward at rates <2000m.year⁻¹ and show dissolution time <35 years. When in contact with microcline, mEp is less corroded than when it is in contact with/hosted by plagioclase. In the São Rafael pluton (Seridó terrane), mEp was transported upward at ~1200m.year⁻¹ with average dissolution time of ~15 years. Within three plutons examined in the Cachoeirinha-Salgueiro terrane, mEp underwent corrosion during 15-35 years and were transported upward at 450-1300 m.year⁻¹. A similar behavior was observed for the mEp studied from six plutons in the Alto Pajeu terrane indicating variable rates of upward migration (650-1050 m.year⁻¹) and time of dissolution (10-25 years). Finally in the Gloria pluton (Macururé terrane), mEp were transported much faster (~1800m.year⁻¹) with shorter mEp dissolution time (~10 years). Plutons usually display elongate shape suggesting transport by dikes and, in a few cases, seem to be products of inflation, at lower pressure, of dike-transported magmas.

194-34 Poster Sial, Alcides Nobrega

DIFFERENTIAL CHARACTERISTICS OF CORDIERITE-BEARING GRANITOIDS FROM ARGENTINA, BRAZIL AND CHILE

TOSELLI Alejandro José¹, PARADA Miguel Angel², ROSSI DE TOSELLI Juana³,

SIAL Alcides Nobrega⁴, FERREIRA Valdez Pinto⁴, SAAVEDRA Julio⁵, CELINO Joil⁶

1 - Instituto Superior de Correlación Geológica, Universidad Nacional de Tucumán, S.M. Tucumán, Argentina

2 - Departamento de Geología, Universidad de Chile, Casilla 13518, Correo 21, Santiago, Chile

3 - Instituto Superior de Correlación Geológica, Universidad Nacional de Tucumán, S.M. Tucumán, Argentina

4 - NEG-LABISE, Department of Geology, UFPE, Brazil

5 - Instituto de Recursos Naturales y Agrobiología, Apartado 257, Salamanca, 37080, Spain

6 - Institute of Geosciences, Federal University of Bahia, Salvador, Brazil

Keywords: cordierite; Argentina; Brazil; Chile; granitoid

Cordierite-bearing granitoids (CBG) in Brazil, Argentina and Chile are, respectively, Neoproterozoic, Early Paleozoic and Early Jurassic in age, emplaced at distinct tectonic environments and structural levels reflected in their mineralogy, geochemistry and metamorphic host rocks. In eastern Brazil, CBG from Nanuque (states of Bahia and Minas Gerais) intruded granulite/metatexite terrains, typical of the mid-crust related to subduction environment. Cordierite-bearing granitoids from Capillitas and Mazán, Pampean Ranges in Argentina, are associated to greenschist- to amphibolite facies host rocks, shallowly emplaced in a syn-collisional environment. Los Tilos pluton in the Chilean Andes (30°S) was emplaced at a shallow level during extensional/transitional period between Late Paleozoic magmatism and typical mid-Jurassic magmatism. Granitoids from Brazil and Argentina are coarse-grained, porphyritic and in plutons at Nanuque, Brazil, cordierite is associated to garnet or appears as quartz-cordierite nodules of magmatic origin. Garnet-spinel granulites are mingled with granitoids suggesting in situ partial melting. La/Yb > 40 ratios suggests presence of garnet in the source. In the Mazán and Capillitas batholiths, Argentina, rests of migmatites in garnet-free granitoids, contain spinel, andalusite, muscovite, and high amounts of biotite. La/Yb < 25 ratios suggest absence of garnet in the source and the cordierite from migmatites and granitoids shows similar chemistry which differs from that of cordierite produced by contact metamorphism. In the Los Tilos pluton, Chile, rocks are equigranular, coarse- to medium-grained and lack garnet. La/Yb = 23-30 ratios suggest possible garnet in the source. In Los Tilos pluton, cordierite-quartz nodules are similar to those from Nanuque. Cordierite displays the highest Fe and Mn contents (0.9 and 1.6-1.8, respectively) whereas at Nanuque and Capillitas-Mazán, cordierites exhibit, respectively, 0.7-0.8 and 0.04-0.4. The available data indicate syn-collisional origin for the Capillitas-Mazán granitoids. High abundance of biotite, cordierite and andalusite and absence of garnet associated to migmatite enclaves, indicate melting with little migration from the source. Cordierite nodules in Nanuque and Los Tilos plutons could represent near-liquidus mineral assemblages, formed and equilibrated in the source region, and further transported to emplacement levels, under stress regime related to arc plutonism.

194-35 Poster Barbosa Leite JR., Washington

HYBRIDIZATION IN A GRENVILLEAN TIN-BEARING RAPAKIVI GRANITE SUITE, SOUTHWESTERN AMAZONIAN CRATON, RONDONIA, BRAZIL

BARBOSA LEITE JR. Washington¹, LEONELO PAYOLLA Bruno², SILVA BETTENCOURT Jorge³

1 - University of São Paulo State

2 - Centrais Elétricas do Norte do Brasil S.A.

3 - University of São Paulo

Keywords: hybridization; magma mixing; rapakivi granite; Amazonian craton; Brazil

The 1.08-1.07 Ga Santa Clara Intrusive Suite (SCIS) is composed of several early- and late-stage intrusions, emplaced in older metamorphic rocks. The volumetrically smaller late intrusions have been subdivided into two subgroups: metaluminous to peralkaline and peraluminous. The former is composed mainly of hornblende alkali-feldspar syenite and microsyenite, biotite (sodic amphibole) alkali-feldspar microgranite, trachyandesite, trachyte, and minor basalt, and the latter is composed of biotite alkali-feldspar granite, alaskite, tin-bearing Li-mica alkali-feldspar granite, and rhyolite porphyry (ongonite), showing Nd signatures that indicate dominant mantle and crustal sources, respectively. Late-stage hybrid rocks are found in small subvolcanic complex in the Oriente Novo massif, where black trachyandesite and pink leucorhyolite porphyry, as well as dark gray microsyenite and pink microgranite are interpreted as end-members, although no separate trachyandesite, leucorhyolite and microsyenite bodies are recognized within the complex, and all of them show signs of hybridization. In both cases the hybrid rocks contain high proportion of micro- and macro-enclaves and xenocrysts, and a gradual contact is only observed with microgranite. Xenoliths (< 10 cm in diameter) of coarse-grained rapakivi granite and fragments of others subvolcanic felsic rocks are also present in varying amounts, and larger (0.5 to 4.0 cm in diameter) quartz, alkali-feldspar, plagioclase and biotite xenocrysts are interpreted to have been derived from disaggregated rapakivi granite xenoliths. Hybrid rocks are trachydacite and quartz-alkali-feldspar microsyenite in composition. The trachydacite is gray to pinkish gray in color and is characterized by quartz and alkali-feldspar megacrysts rimmed by biotite, whereas the quartz-alkali-feldspar microsyenite is pinkish gray and show quartz megacrysts mantled with biotite and hornblende, antirapakivi texture and acicular apatite. Field and petrographic evidence suggest that magma mingling and mixing occurred at moderate to high crustal levels. Unlike hybrid rocks in the classical rapakivi granites of Finland that are product of mixing of mafic and felsic magmas, the hybridization in the SCIS involves magmas of intermediate and felsic compositions.

194-36 Poster Gomes, Maria

GEOCHEMISTRY OF MICROGRANULAR ENCLAVES AND HOST GRANITES FROM REBORDELO AND TELÓES, NORTHERN PORTUGAL

GOMES Maria¹, NEIVA Ana²

1 - Department of Geology, University of Trás-os-Montes and Alto Douro, 5000-911 Vila Real, Portugal

2 - Department of Earth Sciences, University of Coimbra, 3000-272 Coimbra, Portugal

Keywords: microgranular enclaves; granites; hybrid rocks

At Rebordelo, a medium-grained porphyritic biotite-muscovite peraluminous granite crops out along small shear bands subparallel to the Laza-Rebordelo dextral NW-SE shear zone. It is a syntectonic granite of 357±9 Ma old yielded by a whole-rock Rb-Sr isochron. It contains peraluminous tonalitic and granodioritic enclaves. At Telões, a medium- to coarse-grained porphyritic biotite subaluminous granite crops out along the Vila Real NNE-SSW fault. It is a post-tectonic granite of 299±3 Ma old given by U-Pb isotopic data on zircon has

(⁸⁷Sr/⁸⁶Sr)₀ = 0.7059±0.0017 and εNd(299) = -2.5, with T_{DM} = 1.1 Ga (Martins, 1998). It contains metaluminous to subaluminous tonalitic, granodioritic and monzogranitic enclaves. At both areas, the microgranular enclaves show rounded or ovoid shapes and commonly are of 25 cm in diameter, but at Rebordelo some enclaves have irregular shapes and range from