Archaean TTG discriminant criteria applied to Phanerozoic granitoids – significance from a study case in the Getic basement, South Carpathians

ANCA DOBRESCU

Geological Institute of Romania, Bucharest 32, Romania; (ancadobrescu2003@yahoo.com)

A comparison to Archaean TTGs was made on two Ordovician granitoids [1] from Buchin (BG) of I-type and Slatina-Timis (STG) of I-S-type from the Getic basement (NE Semenic Mts.) - South Carpathians, because of peculiar trace elements behavior. Diagnosed as trondhjemites-tonalites-granodiorites-granites, the samples fit geochemically to Archaean TTGs [2] except higher K_2O contents (1.48-3.91%) and slightly lower $(La/Yb)_N$ (10.56-39.93). Low Y (4-12 ppm), mid-high Sr (554-965 ppm) and Sr/Y (48-175), small to no Eu anomalies, (-) Nb-Ti anomalies, low Nb/Ta and HREE (Yb<1.3 ppm) signify variable clinopyroxene, Ti-phase, amphibole, garnet, +/- scarce plagioclase in the residue [2, 3, 4]. The rocks overlap Archaean-Ptz TTG composition [5] close to the amphibolites batch melting products on Nb/Ta-Zr/Sm diagram; alternatively [6] the rocks plot close to the eclogite melting field. The TTG signature tempted us to plot the samples on the discriminant diagrams for Archaean TTGs [7]. The diagrams on immobile elements (Y, Yb, La, Ce, even Sr, SiO_2) plot BGs systematically in the high pressure (HP-TTG) group and STGs in the medium pressure (MP-TTG) group. The diagrams using LILE (K, Eu) plot BGs in the K-group and STGs in the low pressure (LP-TTG) and K-group of enriched sources. MgO, FeO, SiO_2 used as indicators for T^0/degree of melting plot the BGs in and around LP-TTG and K-group. In the BG-STG case as Phanerozoic granitoids, the conclusion on immobile elements behavior refers to pure melts related to source/P-depth conditions, while the rest of elements relate the end-rocks to the subsequent evolution during ascent and emplacement. The HP-MP coupled with moderate T^0 are consistent with early stages of continental collision - proper setting for an origin related either to partial melting of heterogeneous old continental crust eclogitized at its lower part because of wet conditions induced by a former subduction, or to partial melting triggered at the continental crust/oceanic crust/mantle tectonic contact during collision (setting described in [8, 9]).

[1] Dobrescu *et al*.. (2010) *Proc. XIX, CCBGA Spec*. 99, 225-232. [2] Drummond &Defant (1990) *J. Geophys. Res*. 95, 21503-21521. [3] Rollinson & Martin (2005) *Lithos* 79, ix-xii. [4] Martin *et al*.. (2005) *Lithos* 79, 1-24. [5] Foley *et al*.. (2002) *Nature* 417, 637-640. [6] Rapp *et al*.. (2003) *Nature* 425,605-609. [7] Moyen (2011) *Lithos* 123, 21-36. [8] Conovici (1999) *PhD th*. [9] Săbău (1999) *PhD th*.

Asymmetric plate tectonics and asymmetric mantle convection

CARLO DOGLIONI[1]

[1]Sapienza University, Roma, Italy (carlo.doglioni@uniroma1.it)

Subduction zones have hinges which move toward or away with respect to the upper plate. Assuming null the velocity of the upper plate, the velocity of the subduction is given by $V_S=V_H-V_L$, where V_H is the velocity of the subduction hinge, and V_L is the velocity of the lower plate. In case of subduction hinge diverging relative to the upper plate, the subduction results faster than the convergence rate, whereas in case of subduction hinge converging relative to the upper plate, the subuction is slower than the convergence. The dip of slabs, topography, type of rocks, foredeep subsidence rates, metamorphic PTt path, plus a number of other parameters characterize the two end-members of related orogens (Doglioni *et al*.. 2007, ESR). This anthitetic behaviour appears as geographically tuned, i.e., west versus east or northeast. Moving along the tectonic equator described in Crespi *et al*.. (2007, GJI) and Cuffaro and Doglioni (2007, GSA SpPu), slabs having the hinge diverging relative to the upper plate occur dominatly along W-directed subduction zones. This implies a 3-5 times faster subduction recycling of the lithosphere along those margins with respect to the opposed E-or NE-directed subduction zones. Moreover, delamination and thicker asthenospheric mantle wedge occur along W-directed subduction zones. A thicker lithosphere with faster shear waves and few hundreds meters deeper oceanic bathymetry charaterizes the western limb of rift zones (Panza *et al*.. 2010, Geology), suggesting a global asymmetry of plate tectonics, and consequently of the primary mantle convection. This setting reconciles with the westward drift of the lithosphere. However, only a shallow source (LLAMA, Anderson, 2011, JP) of the hotspot reference frame matches the global tectonic asymmetry as the one described, where the net rotation of the lithosphere relative to the mantle amounts to more than 1°Ma. An astronomical input is required in order to satisfy this geodynamic configuration (Riguzzi *et al*.. 2010, Tectonophysics).

www.minersoc.org
DOI: 10.1180/minmag.2013.077.5.4