Geophysical Research Abstracts, Vol. 7, 07820, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07820

Geochemistry of the 20-30 ka dacitic volcanic products from the Ciomadul volcano, Carpathian-Pannonian Region – petrogenetic implications.

A.P. Vinkler(1,2), S. Harangi (1), T. Ntaflos (3), A. Szakács (4)

(1) Department of Petrology and Geochemistry, Eötvös University, Budapest, Hungary, (2) Bolyai-Babes University, Cluj-Napoca, Romania, (3) Institute of Earth Sciences, University of Vienna, Austria, (4) Sapientia University, Cluj-Napoca, and Institute of Geodynamics, Romanian Academy, Bucharest Romania (e-mail addresses: vapaula@freemail.hu, szabolcs.harangi@geology.elte.hu)

The geodynamic evolution of the Carpathian-Pannonian Region (CPR) was accompanied by eruptions of various (basaltic to rhyolitic) magmas during the last 20 Ma. The last volcanic eruptions occurred quite recently (about 20-30 ka) at the southeastern part of the CPR. Here, a continuous younging of the volcanism is observed along the Calimani-Gurghiu-Harghita calc-alkaline volcanic belt towards south. The composition of the erupted magmas changed abruptly at about 1.5 Ma, becoming more potassic and strongly enriched in large ion lithophile elements (LILE).

The youngest volcano of the CPR is the Ciomadul dacitic lava dome complex with a double crater inside. The volcanism of Ciomadul can be divided into an effusive, lava dome-building phase (500-700 ka) and an explosive volcanic phase (220?-20 ka). During the second volcanic phase, two subplinian/phreatoplinian eruptions took place within the lava dome complex, resulting in pumiceous fall and surge suites and pyroclastic flow deposits. The sites of these eruptions are clearly indicated by the Mohos swamp and the St. Anna crater lake. Distal pumiceous fall deposits have been found even 30 km distance from the vent area. The pumices are dacites and their chemical composition resembles the older lava dome rocks. The phenocryst assemblage comprises plagioclase, amphibole and minor amount of phlogopite sitting in fresh rhyolitic glass. The composition of these mineral phases is fairly uniform in different localities, except for the Tusnad pyroclastic flow deposits. The Tusnad pumices differ from the other localities also in the composition of the matrix glass having more differen-

tiated character. The plagioclases are mostly andesines (An=35-50 mol%), whereas they show more sodic composition in the Tusnad pumices (An=25-35 mol%). The amphiboles are magnesio-hornblende and magnesio-hastingsite and they occasionally show oscillatory zoning. The Tusnad amphiboles show a little bit different chemistry from the others, having lower tetrahedral Al at given Na+K values. Composition of the coexisting plagioclase and amphiboles indicates crystallization temperature of 810-840 ^{o}C. One of the peculiarities of the amphiboles is that they include orthopyroxene, clinopyroxene and olivine xenocrysts. Among them, orthopyroxenes are the most common and they show high mg-value (0.87-0.90) with relatively low Al2O3 (0.6-1.3 wt%) and CaO (0.8-1.2 wt%) values. Some of the clinopyroxenes, which usually crystallized around the orthopyroxenes, have also high mg-value (0.88-0.90). Thus, these pyroxenes could represent xenocrysts deriving from the lithospheric mantle or mineral phases formed early from primitive mantle-derived mafic magma. The composition of the orthopyroxenes resembles those occurring in depleted harzburgite, metasomatized by subduction-related fluids or those found in boninites. In any case, they suggest that mantle-derived mafic magma played an important role in the genesis of the Ciomadul dacites.

The pumices are high-K dacites, which show strong enrichment in LILE, particularly in Ba and Sr and have depletion in Y and heavy rare earth elements. This geochemical nature characterizes also the lava dome dacites, too and is similar with the 1.3-1.4 Ma old shoshonites formed nearby. This peculiar geochemistry can be explained either as the adakitic affinity of the magmas as suggested by Seghedi et al. (2004) or by derivation of strongly metasomatized portion of the lithospheric mantle. The geodynamic circumstances may favor both model. The Ciomadul volcano is situated close to the Vrancea zone, where the final stage of slab break-off is going on and where the detaching near vertical subducted slab causes intermediate depth seismicity. Upwelling of hot asthenospheric material at the edge of the subducting lithosphere could result in partial melting of the oceanic crust providing adakitic magma. Alternatively, the juxtaposition of hot asthenosphere with the shallow lithospheric mantle due either partial delamination process (Chalot-Prat and Girbacea, 2000) or due to the thinning of the lithosphere could lead to small degree partial melting of the metasomatized portion of the lithospheric mantle leaving garnet residue. Possible rejuvenation of the volcanism of the Ciomadul volcano should be evaluated in the context of these petrogenetic features and the geodynamic situation around the Vrancea area.