

HIGH PRESSURE METAMORPHISM IN THE SEBEȘ-LOTRU LITHOGROUP (SOUTHERN CARPATHIANS, ROMANIA)-AN OVERVIEW

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Basically, the Alpine structure of the Southern Carpathians is quite simple. There is a Danubian basement nappe sequence, also called the Danubian Euxinides (Balintoni, 1997), because they originates in the sheared margin of the Euxinic plate. This sequence outlines mainly what is much known in the Romanian geological literature as the Danubian realm or the Danubian autochthon. Covering this autochthon, there is also another nappe sequence, generally known as the Getic realm, consisting in a large tectonic unit called the Getic Nappe and a series of smaller tectonic units covering the Getic Nappe known generally as the Supragetic units. All the Getic and Supragetic units originate in the sheared margin of the Getic craton. Between these two Alpine nappe stacks, the Severin nappe stays as the alpine suture of the two Getic and Danubian plates.

The basement of the Getic Nappe consists mainly in poly-metamorphosed rock associations most of them being assigned to the Sebeș-Lotru lithogroup.

As a variscan structure, in the Getic realm Iancu et al, 1998, Iancu&Mărunțiu, 1994 separated several litho-tectonic units:

Calusu Paleozoic formation;

Sebes unit, sub-divided in 3 sub-units (from the base to the top) in: Sebes 1, Sebes 2 and Sebes 3;

Lotru unit, sub-divided in 2 sub-units (from the base to the top) in: Lotru 1 and Lotru 2;

Cumpana unit sub-divided in 3 sub-units (from the base to the top) in: Cumpana 1, Cumpana 2 and Cumpana 3;

Ursu unit;

Fagaras unit;

Leresti unit

Jidosita, Mioarele and Jigureasa formations.

The Sebes and Lotru units can be easily united in the Sebes-Lotru lithogroup based on their pre-metamorphic features. All sub-units of the above mentioned Sebes and Lotru units contain HP/HT rock associations and mineral assemblages.

The meta-ultramafics, eclogites and subordinately granulites rock bodies represents one of the main features of the Sebeș-Lotru lithologic group. These bodies are generally dispersed in all units and sub-units. They have been classified by Iancu et al, 1998, Iancu et al, 1988 in three large groups:

Meta-ultramafics associated with crustal origin rocks entrapped in country rocks (Savu & Strusievicz, 1986, Balintoni, 1986). This association contains meta-gabbros and eclogites.

Meta-ultramafics with garnet and spinel, associated with eclogites, mafic bodies and felsic granulites of sub-crustal origin. The presence of this subcrustal association in crustal country rocks (micaschists, plagio-gneises, amphibolites) is due mainly to the tectonic factors, indicating a relic Proterozoic suture.

Meta-ultramafics associated with rocks with anisofacial feature – amphibolites and metagabbros with relic piroxen and, metapelites and quartzo-feldspatic rocks with cordierite, sillimanite and alkali-feldspar (Hann & Balintoni, 1988, Săbău et al, 1987).

The mineral assemblages of these rocks suggest that there is at least one metamorphic event prior to the oldest metamorphism M1 that affected the country rock. Although these rocks are quantitatively insignificant reported to the country rocks, their large distribution together with

intensive migmatization at a regional scale, trace one of the main features for the Sebeş-Lotru tipology.

The eclogites widely spread in the Sebes-Lotru group are MT-type according to Bucher&Frey, 1994 or type II according to Miyashiro 1994, containing relics of a prograde evolution preserving locally some magmatic structures or mineral relics of the pre-eclogitic stage. The main aspects of retrogression are symplectitic structures given by the decomposition of the omphacite, kelyphitic structures surrounding the garnet and kyanite. They are massive or stratificated, compact or penetrated to some extent by a foliation and associated lineation. The main assemblage is represented by garnet+omphacite+rutile associated sometimes with phengite, kyanite or paragonite.

Garnet bearing granulites are considered as being equilibrated at approximately 11.7 kBar by Medaris et al, 2003, but the presence of plagioclase coronas around the garnet as well as the symplectitic like intergrowth of Na poor clino-pyroxene with amphibole and plagioclase indicate a new thermal peak.

The garnet bearing amphibolites are generally associated with eclogites, some of them probably being a retrograde re-adaptation of previous eclogites.

The garnet is a solid solution of almandine-pyrope-grossular with less than 1% spessartine component. It have a frequent retrograde zonation but sometimes it can be found a prograde compositional zonation indicated by a decreasing in Mn and Ca content together with an increasing in Mg content from the core towards the margin.

Clino-pyroxenes are characterized by a decrease in Al and Na and an increase in Mg, Ca and Fe content at the grain boundary, the central zones being usually homogenous. The marginal inhomogeneity appears in the vicinity of the symplectitic structures probably as a response of the partial re-equilibration during the decompression. The jadeitic component is generally related to the rock chemistry, the maximum in the jadeite content equalizing with the total absence of the plagioclase. The omphacite is frequent but the augite is the stable pyroxene, especially in the high Mg and poor Na eclogites. The clino-pyroxene in the symplectites have a variable composition in Na starting with a high Na content and ending with a completely lacking in Na clino-pyroxene.

The amphiboles are the major components of granulites and amphibolites, their presence in the eclogites being restricted to inclusions in garnets or isolated grains in the matrix, being Ca type. Yet the amphiboles appear frequently in eclogites as retrograde products, especially in poikylitic or symplectitic structures. These ones are Ca-Na type.

Some data (Săbău, 2000 Medaris et al, 2003) indicates for the Sebes-Lotru eclogites a PT window corresponding to 1.12-2.23 GPa and 545-745°C lower than those in Leaota Mountains whose maxima reached 3.3 GPa and ~800°C. The PTt paths for these two zones appears to be different (e.g. Sebes-Lotru and Leaota), yet both indicates a subsequent isobaric heating corresponding to high P granulites.

Dating the HP/HT metamorphism as variscan by Medaris et al, 2004, brings the M2 thermo-tectonic event closer and largely correlates it with HP/HT event in the Bohemians Massif.

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