*Les migmatites d'Emosson et leurs encaissants, massif cristallin externe des Aiguilles-Rouges (VS)

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Chemical and structural data give new insight into the Variscan anatexy from the pre-Carboniferous metasedimentary (metapelites, metagreywackes, quartzites) and magmatic (amphibolites, ordovicien
orthogneiss) rocks from the Lake Emosson. At the end of a complex Barrowian metamorphic evolution, uplift and erosion led to a low pression stage of the massif.

Metagreywackes of variable mineralogical composition (biotite, plagioclase, quartz ± garnet ± muscovite) and orthogneiss are containing many leucosomes. The little one, with melanosomes, are formed in situ, mainly by segregation metamorphic, instead of the big one without melanosome, melts which have migrated into the crust along deformation zones. Conditions of 750 ± 30 ° C may have been attained into this unit. The anatectic melts were formed in this temperature interval by peritectic dehydration-melting with the reaction:

Muscovite + plagioclase + quartz = melt + sillimanite
+ biotite + K-feldspar

The leucosomes have granitic composition range, but the bigger are the leucosomes, the lowerer in REE they are. Chemical data indicate that the little leucosomes are manly formed by metamorphic segregation, instead of the big ones, which are practically pure melts. The plagioclase formed by anatexy is very poor in REE and rich in albite (90-100 %Ab) and anatectic muscovite is very poor in titane. A system in which the actually metagreywackes produce the leucosome and melanosome is not close; K_2O is too rich in those melts, indicating a mineralogical mixing (incorporation of micas' restites) during the migmatisation. More probably that the gneiss witch have produced the melt (paleosome) have yet disappeared by migmatisation. Calculation shows that it was containing a lot of muscovite (more than 20%) and was poor in feldspath. So it seems that the oh type of migmatisation (melting or segregation metamorphic) was depending directly of the original mineralogy of the gneiss.

This migmatitic unit is in tectonic contact with a metapelite unit globally not melted. But, fluids rich in H_2O, probably relaxed by amphibolites containing into this unit, at the thermal peak of 600-650°c, melted the metapelites neighborhood of the amphibolites by hydration-melting reaction:

Muscovite + plagioclase + quartz + H_2O = melt + sillimanite + biotite + K-feldspar

The melt produced was trondhjemitic, rich in sodium and strontium, and moved around and into the amphibolites.

The fluids riches in H_2O moved also into the metapelites, destabilizing plagioclases, mobilizing and producing Na^+ and Sr^{++}. Those elements produced spectaculars albite porphyroblasts, in interaction with muscovite by the reaction:

Muscovite + 6 quartz + 3 Na^+ = 3 Albite + K^+ + $2H^+$

Melting and porphyroblastese are taking place during a continuous progressive compression deformation. Fluids and melts used shear zones and deformation planes to mobilize. They are strongly deformed and elongated in the direction of the main foliation planes.

After the thermal peak, the two main units of Emosson (metagreywackes and metapelites) comed in direct contact moving along big tardi-Variscan ductile-brittle verticals faults.