

Secondary origin of K-rich leucosomes and feldspathisation of peraluminous migmatites (Velay, Massif Central, France)

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Peraluminous migmatites from the variscan Velay complex (Eastern Massif Central, France) exhibit strong textural evidence of hydrothermal reworking. In the leucosomes, K-feldspar is formed at the expense of quartz and plagioclase, locally producing monomineralic veinlets, while elsewhere early Al-silicates (sillimanite and garnet) are rimmed by cordierite and plagioclase. A series of reaction zones is generated between Al rich layers (sillimanite, garnet) and Si-rich leucosomes where reaction products are distributed as a function of their respective Al and Si contents, i.e. according to the simplified sequence :

sillimanite / cordierite / plagioclase / K-feldspar / quartz

This distribution is imaged under optical cathodoluminescence and compared with analogous textures and mineralogical zoning patterns that are commonly observed in gresopelitic formations located at the immediate vicinity of skarns. In both cases, K-feldspar and plagioclase are developed extensively at the expense of Si-rich and Al-rich layers, respectively.

In a skarn context, the bulk reaction is interpreted as a feldspathisation of the gresopelites. It is obviously driven by the influx into the (peraluminous) gresopelites of Ca-rich fluids equilibrated with the (metaaluminous) skarn mineralogy. It involves a substantial addition of Ca and the probable removal of Fe from the gresopelites.

In the Velay migmatitic complex, these transformations are closely linked to the occurrence of metabasalt layers, intimately interbedded within the aluminous migmatites. We suggest that, upon hydrothermal reworking of the whole system, these metabasalts are transformed into amphibolites and they act as a source of Ca that drives the feldspathisation of the surrounding migmatites.