Relationships between lithium-rich intrusions and partial melting of metasediments: clues from the French variscan belt

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Geological processes leading to lithium-rich rare metal (RM) pegmatites and granites remain poorly constrained. To acknowledge geological processes related to Li-rich melt generation, we applied complementary approaches in the Montagne Noire (MN) and in the Monts d'Ambazac (MA). In the MN, the mineralogy of pegmatite clusters depends of the nature of the migmatitic host rock. Geostatistical studies demonstrate that pegmatite clusters are scattered and do not appear randomly. Lithium isotopes tracing (δ^7Li, ‰) show that the mineralized pegmatites are not fractionated and display likely a crustal signature. Rb/Sr dating on lepidolites shows that their emplacements are synchronous with regional partial melting. In MA, structural studies and 3D modelling suggest the presence of an anatectic dome masked by a granite. Geostatistic studies demonstrate that emplacement of pegmatite clusters are controlled by normal faulting. Lithium isotopes show that the mineralized pegmatites are not fractionated and have a crustal signature. Rb/Sr dating on lepidolites show that pegmatite emplacement postdates the granite emplacement.
A compilation of RM intrusions in France has been conducted in the present work and shows that: i) they are usually located in or along antiformal structures; ii) the core of antiformal structures consists of migmatites, amphibolite-grade metasediments or anatectic granites; iii) RM granites are spatially associated with major faults; iv) Li-rich RM pegmatites are absent in the case of LP-HT partial melting. These results point to an anatectic origin of RM pegmatite fields with a strong tectonic control of the intrusions near migmatitic domes. Then, the presence of RM pegmatite indicates presence of an underlying partial melting zone which should be more distal in the case of a granite. Moreover, the absence of Li-rich intrusions in the case of LP melting conditions suggests that pressure has a key role in magma enrichment processes during partial melting.

Mots-Clés : rare-metal pegmatites, granites, partial melting, french variscan belt, lithium

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.