



Coupling RSCM paleothermometry with $^{40}\text{Ar}/^{39}\text{Ar}$ analysis in the south Variscan belt (Cévennes, France): new constraints on the late-orogenic metamorphic gradient in an orogen outer domain.

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Coupling RSCM paleothermometry with $^{40}\text{Ar}/^{39}\text{Ar}$ analysis in the south Variscan belt (Cévennes, France): new constraints on the late-orogenic metamorphic gradient in an orogen outer domain.

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In the SE part of the Variscan French Massif Central, the Cévennes area belongs to the para-autochthonous unit of the southern Variscan belt. This area underwent three metamorphic events (Faure et al., 2001). I) A green schist to low amphibolite facies one (500°C, 4.5Kb Arnaud, 1997) developed in micaschists and quartzites. These rocks were stacked as south-directed nappes during the final stage of the Variscan crustal thickening dated at ca 340 Ma by $^{40}\text{Ar}/^{39}\text{Ar}$ on biotite (Caron, 1994). This early event was responsible for the flat-lying foliation, the N-S striking stretching lineation, and intrafolial foliation. II) A high temperature event (680°C, 4.5kb Rakib, 1996) dated at ca 325 Ma ($^{40}\text{Ar}/^{39}\text{Ar}$ on two biotites, Najoui et al, 2000) overprinted the early one. On the basis of the mineral assemblages of this event, a NE-ward increase of the T conditions was interpreted as a remote effect of the Velay Dome (Rakib, 1996). III) Finally, the M^t-Lozère and Aigoual-S^t-Guiral-Liron monzogranitic plutons intruded the Cévennes para-autochthonous unit. Monazite and biotite yield U-Pb, and $^{40}\text{Ar}/^{39}\text{Ar}$ ages at 315-303Ma and 306 Ma, respectively (Brichaud et al. 2008). The pluton emplacement conditions are determined at 695°C, 1.5Kb (Najoui et al, 2000).

We report Raman Spectrometry of Carbonaceous Matter (RSCM) paleotemperature data acquired on more than 100 samples throughout the entire Cévennes area. These show a regional homogeneous thermal distribution with a 535 ± 50 °C mean temperature without any geometric correlation with the nappes structure, nor the granitic intrusions. Moreover, no thermal increase towards the NE can be documented. SW of the Aigoual-S^t-Guiral-Liron massif, our RSCM data document a temperature jumps between the overlying Cévennes micaschists and the underlying epimetamorphic rocks belonging the the Fold-and-Thrust belt unit of the French Massif Central.

In order to constrain the age of this regional thermal event, we $^{40}\text{Ar}/^{39}\text{Ar}$ dated 25 new regionally-distributed syn- and post-folial muscovites by step heating along two N-S cross sections within the Cévennes micaschists series. In areas distant from the plutons, the muscovite yields a ca 325 Ma age interpreted as the one of the HT event recorded by the RSCM measurements. However, young muscovite ages at ca 305Ma are observed around the plutons. We assume that the heat supplied by the plutons reset these muscovites at around 400°C while the organic matter cannot record the contact metamorphic peak lower than the regional one. Moreover, $^{40}\text{Ar}/^{39}\text{Ar}$ in-situ analyses

carried out on 5 mm-sized post folial (but deformed) biotites in the central part of the micaschist series provide ages around 320Ma. The presence of a hidden dome, underneath the Cévennes micaschists, similar to the pre-Velay migmatites exposed in the northern part of the Cévennes area (Faure et al., 2001, Be et al., 2006) is discussed.