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Dating C/S structures

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The widespread occurrence of C/S structures in granites is commonly used to argue for their syntectonic crystallization. Strain localization in shear bands (‘C’ stands for ‘Cisaillement’ in French) is accompanied by deformation, recrystallisation and/or crystallisation of new muscovite and quartz, whereas larger muscovite porphyroclasts, often referred to as ‘micas fish’, align with feldspar grains during deformation, defining the schistosity planes (‘S’ stands for ‘Schistosité’ in French). Thus, two types of muscovite grains coexist in syntectonic granites. Here, we focus on the Questembert granite (Armorcan Massif, France) where superb C/S structures can be observed. We apply in situ Rb-Sr analyses on muscovite grains from both shear bands and schistosity planes to better understand the significance of C/S structures in syntectonic granites, in terms of relationships between magmatism, deformation and fluid circulations. For that purpose, we selected four samples from different sites in the granite (Figure 1A), which represent different amounts of finite strain, from isotropic structure to highly strained C/S granites. We also carried out U–Pb dating on apatite in these samples as apatite is likely to react with magmatic–metamorphic fluids, providing independent information on the fluid regime in the system. The results show that the Rb-Sr system in muscovite records about 25–30 Ma of geological activity, from crystallization of the granite at *ca*. 320–315 Ma, recorded by muscovite porphyroclasts, to late-stage permeation of small quantities of fluids along pre-existing shear planes at 290 Ma, recorded by fine-grained muscovite in these C planes. We propose that the late fluids induced recrystallization and/or neocrystallization of fine-grained muscovite in C planes, leading to weakening that allowed the resurgence of some localised deformation. The main take away is that while attempting to date syn-magmatic deformation through targeting C plane muscovite, one actually gets information on post-magmatic, localised synkinematic circulation of hydrothermal fluids along these C planes.