How to make 'syn-plutonic dike' --- Another story from the Ryoke granitic province, Southwest Japan

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Syn-plutonic dike is interpreted to express a magma chamber process with intermingling silicic and mafic magmas in fluidal state.

In the Ryoke granitoids in Southwest Japan, mafic rocks often occur in so-called syn-plutonic dikes. They are pillow-like balls in the silicic matrix (pillow-type), and dikes intruding silicic matrix with silicic back-veins into them (dike-type). We found the 14-20Ma time discrepancies between mafic and silicic rocks in above both two types of syn-plutonic dikes in the Ryoke granitoids, 90-94Ma of silicic rocks and 70-75Ma of mafic rocks in zircon U-Pb ages. The time duration of 14-20Ma seems too long to imagine that these two components of the syn-plutonic dike was generated during a lifetime of a single magma chamber.

In a silicic rock of those syn-plutonic dike, we found a partly dissolved and re-grown intrastructure of a zircon grain in the CL image, with the ages of cc.70Ma in the re-grown part and cc.90Ma in the undissolved core. The mafic rocks of the syn-plutonic dike nearby gives cc.70Ma and the host Ryoke granitoids around them give 90-96Ma. So it could be interpreted that the syn-plutonic dike was formed with injection of the mafic magma at cc.70Ma into the already solidified 90-96Ma granitoids and partially melted them, which led the physical interaction of local silicic mushy melt and mafic magma. The partly dissolved and re-grown zircon described above could tell that story of forming syn-plutonic dike.

As this type of the “syn-plutonic dikes” occur widespread in a km-sized area in the Ryoke granitoids, that process may be regarded as local and partial revival of granitic magma chamber.

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