

Rb-Sr evidence for the genetic links between biotite and Li-F granites: An example of the Spokoinoe, Orlovka, and Etyka deposits, Eastern Transbaikalia

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Abstract

As was determined by the Rb-Sr method, the barren biotite granite of the Oldanda and Khangilai plutons, the rare-metal granites at the Spokoinoe, Orlovka, and Etyka deposits and the Ary-Bulak ongonite in eastern Transbaikalia were formed at 142.1 ± 0.6 Ma. The same age and initial Sr isotopic ratio (0.7067 ± 2) of these granites confidently show their genetic links, i.e., their relations to a common magmatic process. A combination of the relatively low initial Sr isotope ratio with the extremely high Rb/Sr ratio of the rare-metal granites indicates that the rare-metal melt could exist for no longer than 10^4 - 10^5 yr. This indicates that plausible models for the origin of the rare-metal granite should not involve any long-term processes giving rise to a high Rb/Sr ratio of the parental melt, as well as the melting of a source close in composition to the rare-metal granites themselves. Generation of the rare-metal melt was most likely caused by the highly advanced fractionation of a common granitic melt. The simultaneous formation of the granitic plutons hundreds of kilometers apart suggests a common deep-seated source of energy controlling the process. The melting of the crustal rocks could be controlled by a mantle-derived melt emplaced at lower crustal levels.