OPPOSITE DEVELOPMENT PATHS OF NATURAL SILICATE MELTS CAUSED BY MAGMA MIXING, INTERDIFFUSION AND EXTRACTION

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Until now, genesis of alkaline melts is a not satisfyingly solved problem. A new model explains the alkali enrichment in the undersaturated alkaline series by an extraction process (Globule Model): during the intrusion of a high tempera- ture melt into a reservoir with a cooler melt, swarms of small melt droplets (globules) of the guest are formed due to surface tensions. Initial inter- diffusion between host and globules is reinforced by convectional movement of the swarms in the magma chamber. As a result, the globules become continuously enriched in alkalis and fluids while the contents of alkaline earths, Fe, and Ti are reduced. Due to the alteration of the globules, their physical properties are changed: density, melt temperature and viscosity of the globules are re-duced in respect to the host melt. Therefore, the globules are able to rise up within the magma chamber. Beneath the top of the magma chamber the globules collect themselves generating an extrac- tion melt highly enriched in alkalis and volatiles. Depending on the volume rates, the composition of the host melt is also changed. The degree of compositional change of both melts has been estimated. Generally, the development path of the host leads to the picritic field while that of the guest has a direction to the phonolitic/trachytic field. The magmatic development by the Globule Model tends to a bimodal magmatism that can be observed in many magmatic fields. Zonation of magma chambers depends on the quantity of following intrusions.