

Thermal evolution of mushy silicic magma chambers after basalt replenishments

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A long-lived silicic magma chamber and surrounding crust is composed of crystal-melt mixtures with variable melt fractions. We define the region which behaves as a liquid in a mechanical sense ("liquid part") and the region which is in the critical state between liquid and solid states ("mush") collectively as a magma chamber. Erupted magmas are considered to be derived from the liquid part. The size of a magma chamber is determined by long-term balance between heat supply from basalt and heat loss by conduction, while the temperature and the volume of the liquid part fluctuate in response to individual basalt inputs. The petrological features of the liquid part, such as the amount of unmelted pre-existing crystals, depend on the intensity of individual pulses of the basalt heat source.