Integrating Zircon and Monazite Saturation with Metamorphism in Melt-bearing Systems

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Data collected from zircon and monazite is used to draw fundamental inferences about the Earth, including early conditions, plate tectonics and the mantle. Despite the emphasis placed on data from zircon and monazite, relating their growth to an evolving rock system remains unclear. Here we integrate experimental data for zircon and monazite saturation in melt-bearing rocks with forward models of crustal rock compositions. Our calculations constrain the growth of zircon and monazite with respect to evolving pressure, temperature and silicate mineral assemblages and account for many of their age patterns observed in crustal rocks.

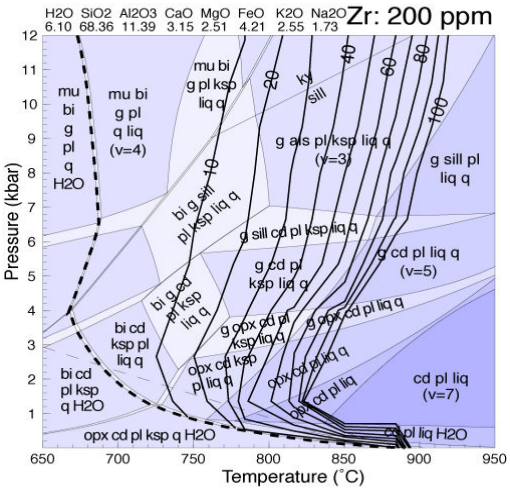

Figure 1. Calculated phase diagram in NCKFMASH (composition expressed in mol%), contoured for % dissolution of Zr in silicate melt. The location in *P-T* space of the 100% dissolution contour is a function of rock composition, melt composition, melt abundance and bulk rock Zr content. The spacing and *P-T* location of dissolution contours may be used to make inferences about causes of inheritance, and, along a cooling path, inferences about growth age distributions.