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Nucleation delay of feldspar in water saturated rhyolite during decompression in shallow volcanic systems

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We developed a model of feldspar nucleation delay during decompression in water-saturated rhyolite based on classical nucleation theory (CNT). Using the parameters provided in this study, the model agrees with the experimental data to within a factor of two. We propose expanding the model to a wider range of pressures and temperatures to account for the variety of scenarios encountered by magma during ascent by developing a pressure and temperature dependent model for nucleation delay. We present new measurements of feldspar growth rates during decompression in water-saturated rhyolite, emphasizing the importance of precisely calculating the nucleation delay when estimating growth rates. We present a method for determining the ascent rate of water-saturated rhyolite based on the nucleation delay of feldspar microlites. The findings of this study hold the promise of a better understanding of volcanic timescales during ascent in the conduit, as well as the possibility of extending it to more complicated scenarios with changing pressure and temperature.