

# **The inner workings of crustal distillation columns; the physical mechanisms and rates controlling phase separation in magmatic systems**

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Igneous processes have had a fundamental impact on how our planet is shaped today; they contribute to the growth of continents, control volcanic activity, form ore deposits, and supply most volatile elements to our atmosphere. In the course of this igneous differentiation, phase separation plays a key role, as in all distillation processes. Understanding how and how fast this phase separation occurs is therefore critical in our understanding of the inner workings of the Earth (and other planets). In this presentation, we will review the most important magma reservoir processes that control igneous distillation, considering the effect of three distinct phases (crystals-melt-fluid, in decreasing order of viscosity and density) on mechanical separation in a gravity field. We will also discuss the potential impacts of external factors (e.g., tectonic forces, seismic waves, magma recharge) on phase separation.