

ABSTRACT

The connection between Diffusion in solids and the 79 AD ("Pompeii") eruption of Mt. Vesuvius

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The 79 AD eruption of Mt. Vesuvius that buried the towns of Pompeii and Herculaneum is perhaps the most iconic of all volcanic eruptions. The Archeological sites are major tourist attractions today, even as the region around Naples continues to remain volcanically active, underscoring the need to understand the processes that occur underground before an eruption. The eruption has been a topic of study by volcanologists as well as historians for a long time, but many aspects of the magma storage system for the eruption remain unclear. It turns out that diffusion in solids – in the silicate mineral clinopyroxene – is now helping to understand some of these aspects. Notably, along with clarification of the different levels at which magma is stored before eruption (using thermodynamics), diffusion modeling is helping to elucidate the timescales over which the magma moved upward. It is being found that about a decade before the eruption was a particularly active period, and this happens to coincide with the occurrence of earthquakes that destroyed many buildings in Pompeii, as recorded in historical Latin texts from the period. This provides context to those historical records, and planning guidance for future events. This talk will elaborate how diffusion in solids is helping to address this and other volcanological questions in the region.