Investigating Arc Magmatism Using Mineral Apatite

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Magma's journey in the Earth's outermost layer comprises a variable combination of processes and reaches an end by generating volcanic/plutonic rocks. Rocks preserve (at least some) records of the variation in magmatic pressure-temperature-composition conditions, however, decoding the records is often difficult. The challenges include that most minerals only witness part of the history of magmatic processes, and some may have their original geochemical records modified/reset by subsequent processes. Our recent work has shown that apatite - a calcium phosphate mineral commonly found in terrestrial and extraterrestrial materials - serves as an excellent tool for (1) quantifying the abundance of elements (volatiles and trace elements including rare earths) in magmas and their variations during magma differentiation and degassing, (2) determining time-rates of magma ascent that are responsible for changes in eruption explosivity, and (3) investigating arc magmatism and volatile cycling on a global scale.

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Zoom Link (Mixed-mode)

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