Special Issue

Trans-Crustal Evolution of Magmas: Clues from Thermodynamic and Geochemical Modelling, Thermo-Barometry and Experimental Petrology

Message from the Guest Editors

Magmas in transcrustal reservoirs undergo several processes, such as crystal-melt separation, mixing, assimilation of cumulates or crustal rocks, and decompression-driven crystallization, leading to their evolution and differentiation. These processes occur under a broad range of pressures and temperatures, affecting mineral chemistry, crystal/melt ratios, and the extraction of residual melts from mush zones. This results in a wide range of compositions in erupted/exhumed products, showcasing distinct differentiation regimes. Thermo-barometry based on mineral-melt pairs and high-temperature, high-pressure experimental petrology aids in understanding the formation and evolution of magmatic systems by estimating crystallization temperatures, storage depths, and chemical exchanges in response to pressure and temperature variations. Geochemical models based on major and trace elements, isotopic compositions, and thermodynamic models based on energy minimization and mass balance in open magmatic systems quantify processes such as magma mixing, crystallization, and crustal assimilation.

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Minerals welcomes submissions that report basic and applied research in mineralogy. Research areas of traditional interest are mineral deposits, mining, mineral processing and environmental mineralogy. The journal footprint also includes novel uses of elemental and isotopic analyses of minerals for petrology, geochronology and thermochronology, thermobarometry, ore genesis and sedimentary provenance. Contributions are encouraged in emerging research areas such as applications of quantitative mineralogy to the oil and gas, manufacturing, forensic science, climate change, geohazard and health sectors.

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