

## Toward an integrated understanding of magmatic-volcanic processes in subduction zones

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Subduction zones are characterized by magmatism and volcanism caused by melt generation, transportation and storage, and volcanic eruption. These magmatic processes and volcanic dynamics have been investigated on the basis of field observations, laboratory experiments and sophisticated numerical modellings. Recent progress in observational techniques has revealed structures under the volcanoes. Besides, the studies based on seismological observations and geochemical analyses attempt to determine the regional variations in the processes of melt generation. This session aims to discuss the latest studies concerning magmatism and volcanic dynamics from various perspectives and attempts to integrate these understandings.

Of the different aspects, “source” and “transportation” of heat and material are key for the integrated understanding. For instance, “heat source” for arc magmatism has long been enigmatic and remains unresolved. Numerical modeling for mantle convection with fluid generation and migration shows that inflow of an uncooled mantle from back-arc encounters fluids to cause flux melting. However, the temperature estimate for the uncooled mantle has an uncertainty of ~200 degrees, and the estimate for fluid amount varies from 0.1 to several percent (weight percent of fluid added to the melting source) for the same single arc. The fluid carries elements characteristic to arc magmatism. Therefore, the uncertainty in the fluid amount causes a large difficulty in understanding transport and budget of elements, including water. Accordingly, water contents in primary magmas that are supplied to volcanic eruption systems are poorly constrained; in fact, there are discrepancies in the water content among models, experimental estimates, and observations.

In this presentation, we overview the relevant studies, including the discrepancies, concerning “heat and material” aspects of magmatic-volcanic processes in subduction zones. If a volcano is the result of successive processes as above, there is a possibility to resolve the whole chain once at least one the factors are independently constrained. We try to provide some perspective of these issues based on the latest studies, to provoke discussions.