

## Combined textural analysis to determine paleo-magmatic flow in dike

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Intrusion direction of magma is one of the important factors to investigate the intrusion, migration and fixation process of magma in the earth's crust from the geological view. Principle method of the determination of magma intrusion direction is the structural analysis of shear-deformation texture between magma body and surrounding solidified rock. Preferred orientations of phenocryst, groundmass crystals, and elongated bubbles have been used for the indicator of magmatic intrusion direction within dike. Recently, AMS becomes a popular technique for the analysis of preferred orientation of magnetic minerals to determine the intrusion direction of dike. In this presentation, a combined 3D analysis with outcrop and specimen observation, X-ray CT analysis and AMS analysis was tested to reconstruction of the intrusion direction of dike.

A radial dike swarm, exposed in the middle Pleistocene Komochi volcano, Gunma Prefecture is the test field. Structural analysis of deformation texture was performed on one of the radial dikes. This dike has a bubble concentrated layer within several 10s centimeters along the both dike walls, in which elongated bubbles are aligned. X-ray CT analysis reconstructed the 3D shape and orientation of elongated bubbles and phenocryst crystals. The result shows that the bubbles show elongated (prolate) outline and their long axis show imbricated alignment with several degrees crossed against the intrusion plane. This preferred orientation of bubbles and crystals is the result of magmatic drag against the dike wall. Shear direction supposed from the micro-deformation texture in groundmass is consistent with the result from the preferred orientation of bubbles and crystals. AMS analysis shows that the K1 axis corresponds to the shear direction indicated by the bubbles and crystals.

These results indicate that the preferred orientations of elongate bubbles and crystals, micro-deformation texture in groundmass, and AMS orientation can be indicators of magmatic flow direction in dike. Shear deformation texture indicate the real direction of magmatic flow. These methods are also able to be applied for the analysis of the flow direction of lava flow and are useful to the reconstruction of volcanic structure of geological age.