Merapi is one of the most persistently active volcanoes in the world, which, throughout history has displayed both explosive and effusive activity. Over the last century, activity has mainly been dominated by the extrusion and subsequent collapse of basaltic andesite domes, producing block-and-ash flows, as observed during the 2006 eruption. The 2006 deposits have previously been mapped, allowing for collection of a well-constrained and extensive set of samples, spanning the entire eruption, including samples taken from the dome in August 2008 during ‘background’ activity.

Although whole rock XRF analysis of the 2006-08 eruptive products shows a narrow bulk composition (~55-56 wt.% SiO$_2$), examination of mineral phases reveals evidence of a dynamic system. Feldspar crystals provide evidence of magma mixing and crustal assimilation. Magnesiohastingsite amphibole phenocrysts and microphenocrysts are usually surrounded by one of two types of reaction rim, formed during magma ascent and via late-stage oxidation. Some amphibole microphenocrysts are less altered and display minimal breakdown textures. Amphibole thermobarometry suggests a magma storage region at between 9- 18 km depth, possibly extending to 22 km depth. Microtextural and CSD analysis reveal differences in crystal population density between different eruptive phases, inferred to be related to differing extrusion rates and dome residence times.

Comparison of these findings with petrological analysis of products from the more explosive 2010 eruption will help to elucidate the processes that enable persistent and long-lived (dome-forming) activity and identify parameters that may drive changes from effusive to explosive behaviour, as observed during the 2010 events.