Fragmentation mechanisms revealed trough the ash morphology and texture at Sakurajima volcano (Japan)

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Volcanic ash represents a fundamental source of information on eruptive processes occurring both prior and after explosive eruptions. In particular, many studies evidenced how volcanic ash can be used to extract unique information about the style of volcanic activity and the relative fragmentation processes. We present a detailed study of ash collected during classical vulcanian activity at Sakurajima volcano (Japan), aimed at investigating the relationships between eruption dynamics and the key features of the resulting volcanic ash (e.g. shape and texture). Information about fragmentation mechanism is revealed by a comprehensive investigation over a complete sequence of activity observed in summer 2013 and October 2014. Based on SEM imaging of the ash samples, 4 main categories (Blocky Irregular, Blocky Regular, Rough-Vesicular, and Rough) have been defined. These characterize all the different phases observed in the eruptive activity, without showing important changes in concentration or morphology. The ash morphology has been then quantitatively defined trough a set of shape parameters, and compared with textural features (ground mass crystallinity, vesicularity) in order to outline the relations with different styles of activity observed during the whole sequence. An exhaustive quantitative dataset on the shape and textural variability of Sakurajima ash provide important insights into magma fragmentation mechanisms and their relations with the evolution of eruptive dynamics.