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Twinkle, sparkle and follow the flow: conduit and dyke flow dynamics from PIV and PTV

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Through the mean of experimental studies, we investigate different conditions for degassing (e.g., conduit geometry, volume of gas and elasticity of the medium) and magma migration (e.g., input flux, temperature, viscosity and elasticity of the medium). Particle Image/Tracking Velocimetry (PIV/PTV) techniques were used to extract twoand three-dimensional measurements of the flow dynamics in both settings. 2D-PIV was used to analyse the flow in a conduit as well as the corresponding deformation of the solid medium (the crust) due to ascending bubbles. The rising bubbles would contribute both to deformations observed at the surface, and the rising/falling of magma level depending on the size of the bubble. 3D-PTV was used to analyse the internal flow of fluid within a propagating dyke. As a dyke grows, due to continuous injection at the base, the internal flow structure evolves from circulation (before the eruption) to a unidirectional ascending flow after onset of the eruption. These types of flow can be related to crystal growth patterns which can vary from complex to simple.