The continuing inflation of Montserrat – and the end of the intrusion

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Soufrière Hills volcano on Montserrat in the West Indies showed five episodes of magma extrusion and as many pauses in its 25 years of volcanic activity. This eruptive behaviour exhibited cyclic deformation pattern where extrusive “phases” showed island-wide deflation and all “pauses” have been linked to inflation, the last of which remains ongoing. Several models have been developed over the years; all based on magma intrusion and extrusion, into, or from one or several reservoirs, respectively. Using the entire eruptive history, we demonstrate that both, pauses and phases can be linked to a single magma body. Through extensive numerical modelling, we explore in this presentation some alternative routes to magma intrusion, considering several magmatic processes. These range from crystallisation of magma (second boiling) to pressurisation through a free gas phase, to the extreme case where intrusion of fresh magma has ceased years ago, while the inflation is continuing.