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# Alternating Plinian and dome-forming eruptions at Montagne Pelée (Martinique): Toward an integrative spatiotemporal architecture of the magma plumbing system.

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Montagne Pelée is one of the most active volcanoes of the Lesser Antilles arc with 2 to 3 magmatic eruptions per millennium and an estimated magmatic production in the order of 0.7 $km^3$/1000 years. Montagne Pelée is also an infamous volcano because of its sad record of victims in the historical period (30 000), directly killed by an eruptive phenomenon during the first phase of the 1902-1905 dome-forming eruption. During the last 25 kyrs, the volcano has produced a succession of Plinian-Sub-Plinian and dome-forming eruptions, making this volcano a textbook case for studying this duality, which sometimes occurred during the same eruption. More than 55 magmatic eruptions were identified with a ratio of ~2:1 of dome-forming vs. Plinian eruptions. A behaviour of this volcano is that dome-forming eruptions often start with violent, superficial and laterally directed explosions. These generate devastating dilute and turbulent pyroclastic density currents on the southwest and southern flanks of the volcano as illustrated by the 7 events of this type during the first months of the 1902-1905 eruption.

The dynamics of the crustal magma reservoir may be at the origin of pressure/temperature variations that may trigger magma ascent and eruption. These changes can be registered during crystal growth and can probably produce at the surface geophysical or/and geochemical signals that could be registered by monitoring network, constituting precursory signals. This is overwhelmingly crucial in case of reactivation, as now.

By studying the last eruptions of this volcano the question of the systematic occurrence of identifiable, disrupting events at depth prior to eruption will be discussed. To achieve this goal we performed a detailed petrological description of the eruptive products of these eruptions to build a CSA diagram through EPMA and SEM analyses, coupled to Fe-Mg diffusion modelling in orthopyroxenes to retrieve timescale between the perturbation identified in the reservoir and the eruption.

We thus highlight that the timescale that separate this event from the eruptions is in the order of 1-2 years, significantly shorter that what was up to now estimated for large silicic eruptions.