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## **An investigation into the conditions promoting lava dome instabilities: a new global database.**

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Structural instabilities of lava domes can generate pyroclastic flows and debris avalanches that can be devastating to areas surrounding the edifice. Investigating the conditions that promote collapse by examining historical events is a fundamental method for understanding what activity might be expected in the future. A global historical analysis not only expands our understanding of a poorly characterised volcanic process, but also informs decision-makers of the various end member scenarios concerning the stability of lava domes. Here we compile a catalogue of individual dome collapse events alongside stable domes to allow a comparison of the pre-collapse environments. The Global Archive of Dome Instabilities (GLADIs) database contains information for 287 individual collapse events from 38 different domes, and presents 102 structures that have remained stable after emplacement. This information includes: reported causal mechanisms for collapse, collapse volumes, extrusion rates, dome morphology, dome confinement, and precursors to collapse. A key challenge for volcanologists is to explicitly define collapse in a manner that has an equal connotation when applied to any dome. We propose a new classification scheme for the scale of collapse events that uses the proportion of dome volume shed to allow collapses to be classified globally. This allows us to explore if different magnitudes of collapse are affected by different trigger mechanisms. We identify patterns in collapse behaviour and where possible, link these to conceptual ideas of processes that exist in a volcanic system.