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Pre-eruptive inflation caused by gas accumulation: Insight from detailed gas flux variation at Sakurajima volcano, Japan

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Volcanic gas measurements provide crucial insights for the condition of conduit system at a volcano. Sulfur dioxide (SO_2) emission rate observations were made at Sakurajima volcano, Japan, to quantify the relationship between the SO_2 emission rate and inflation prior to Vulcanian explosions. The explosions associated with precursory inflation events were preceded by decreases in SO_2 emission rates by 10–60 min. The amounts of accumulated gas were calculated using time series of SO_2 emission rate. The amounts of accumulated SO_2 and increases in strain records before the explosions showed a positive relationship. The volume increase of a deformation source calculated using the strain records was of the comparable order of magnitude as the volume of the accumulated volcanic gas. The results suggest that the inflations before the explosions were caused by the gas accumulation.