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InSAR for volcano monitoring and the need for global baseline data

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Analysis of Synthetic Aperture Radar (SAR) imagery has great potential for volcano monitoring. It is already widely used to measure deformation associated with magmatic processes and has provided useful measurements of topographic change and the emplacement of eruptive products. Obstacles to the use of SAR data for monitoring have historically included irregular satellite acquisition strategies and long repeat measurement intervals, as well as high data costs. To maximise the usefulness of SAR for volcano monitoring and hazard assessment it is essential to characterise the spatial and temporal properties of volcanic signals detected by InSAR. From global InSAR catalogues of volcano deformation we show that, on average, InSAR detected deformation has a higher magnitude, longer duration and greater footprint than deformation detected with ground based instruments. The average interval between the start of InSAR-detected deformation and eruption onset is over 200 days, and the duration of satellite-detected precursory deformation is consistently longer than that detected from GPS or tiltmeters. Regional deformation surveys have resulted in the detection of 43 displacement signals 5- 25 km away from the nearest volcano. Some of these cases capture previously unidentified active volcanoes or crustal magma bodies. Others demonstrate the presence of laterally extensive zones of magma around active volcanoes. In 8 cases distal deformation can be associated directly with eruptions, demonstrating the importance of broad spatial footprint monitoring at volcanoes. InSAR volcano deformation observations are now being catalogued and made accessible by several projects that aim to improve InSAR's visibility and usefulness as a tool for volcano monitoring. We discuss the objectives of compiling global datasets of volcano deformation and various strategies for the recording and classification of displacement events. The collation of global InSAR volcano deformation datasets is essential for exploiting InSAR as a monitoring tool and for future probabilistic hazard assessments. [POSTER REQUESTED]