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Evidence for multiple magma bodies beneath Kilauea volcano, Hawaii

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The volcanoes of the Hawaiian Islands are some of the most active volcanoes in the world. Kilauea Volcano on the Big Island has been continuously erupting since 1983. We have identified multiple sources of deformation in and around the summit caldera using interferometric synthetic aperture radar (InSAR) and the global positioning system (GPS) for the time period 2004 to 2007. The magmatic system beneath Kilauea volcano is not a simple magma chamber geometry but rather a complex series of reservoirs. Movement of magma in and out of these reservoirs is seen at the surface as the ground moves up and down. The InSAR technique provides a way to measure centimeter scale deformation over a large area from satellite radar data while GPS stations measure deformation at only one location but have the advantage of providing daily measurements. An intrusion in the East Rift Zone occurred on June 17, 2007, at which time the deformation sources identified around the summit area switched from inflation to deflation. The spatial and temporal coverage of the InSAR and GPS data provide the means to locate the deformation sources, identify the timing of the inflation and deflation events, and help track the movement of magma beneath the surface to better understand the magmatic system.