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Episodic earthquake mechanisms and intervening seismicity during the 2018 summit collapse at Kilauea caldera

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The 2018 rift zone eruption of Kilauea volcano was accompanied by a remarkable and episodic collapse of its summit. Between May-August the eruption and collapse sequence included over 70,000 earthquakes (M≥0) and 54 major earthquakes (M≥5). We analyzed the seismicity in the Kilauea summit region and estimated seismic full moment tensors with their uncertainties for the 54 M≥5 events. These events occurred at almost daily intervals and were accompanied by intense seismicity which was concentrated between 0-3 km depths beneath the Halema‘uma‘u pit crater. The hypocenters reveal partial elliptical patterns (map view) that migrated downward by 200 m. The moment tensors reveal remarkably consistent mechanisms, with negative isotropic source types and localized uncertainties, and vertical P-axis orientations. From the moment tensors we derived Poisson’s ratios which are variable ($\nu = 0.1 - 0.3$) for the first half of the collapse events and converged to $\nu \approx 0.28$ from June 26 onward.