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Source processes of near-field deformation accompanying recent lava lake level decrease at Nyiragongo, DR. Congo

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Nyiragongo volcano in the Democratic Republic of Congo, Central Africa, is one of the rare volcanoes that host a long-living lava lake. The evolution of this lava lake is very dynamic, with height changes spanning hundreds of meters over the past decades and including drastic height changes in relation to flank eruptions of the volcano in 1977 and 2002 (Smets et al., this meeting). Since September 30, 2011, the level of the lava lake has been progressively falling, reaching ∼70 m below the lowest platform (termed "platform P3" hereafter) in July 2014. Platform P3 is constructed from successive overflows of the lava lake from 2002 to 2011, amounting to ∼400 m thickness since the emptying of the lava lake following the 2002 flank eruption. Coinciding with the recent fall of the lava lake, differences of photogrammetry-derived DEM models, and InSAR time series, show a very near-field (out to ∼200-300 m distance from the ∼200 m-wide lava lake, i.e. on platform P3) deformation signal with up to meter-scale deformation near the crater. Ring-fractures have also formed in platform P3. Here we compare and contrast plausible models of processes contributing to this near-field deformation, including thermal contraction, elastic response, block rotation, structural weaknesses, and subsurface shape of the lava lake.