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Did the 2014-2015 Bárðarbunga eruption trigger the ongoing unrest at Öræfajökull volcano in southeast Iceland?

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Öræfajökull is potentially one of the most hazardous volcanoes in Iceland, capable of producing large ash-rich eruptions. These may include devastating pyroclastic flows and jökulhlaups. There have been two reported eruptions at this ice-covered stratovolcano in the last 1000 years. The 1362 eruption was a major Plinian event, inundating nearby areas with pyroclastic flows, tephra fallout, ballistic ejecta and jökulhlaups. The 1727 eruption was a smaller flank eruption, but nonetheless produced damaging earthquakes, tephra fallout and jökulhlaups.

At the beginning of 2017, Öræfajökull volcano entered a phase of increased activity. This was initially characterized by elevated seismicity, followed by heightened geothermal activity, gas emissions, and inflation. At the time of writing (January 2019) the unrest is continuing. Outward displacements have now exceeded 10 cm at GNSS station ROTH situated on the southern rim of the caldera and 18 earthquakes of magnitudes 2.5 to 3.6 have been recorded, mostly inside or in the vicinity of the volcano's caldera.

This presentation will provide an update on the current status at Öræfajökull, including revised deformation maps derived from the analysis of Sentinel-1 and COSMO-SkyMed interferograms and GNSS observations, and magma supply rates derived from revised deformation models constrained by geodetic and seismic data, including a caldera ring fault system connected to a sill at depth. We also investigate potential triggers for the cause of this unrest by calculating new regional crustal stress changes incorporating the caldera collapse, subterranean magma migration and loading from lava extruded during the 2014-2015 eruption within the Bárðarbunga volcanic system. We explore the hypothesis that small-scale regional stress perturbations, resulting predominantly from the caldera collapse, magma withdrawal beneath Bárðarbunga and dyke emplacement during this major event, may have contributed to the onset of unrest at Öræfajökull volcano situated $\sim$ 80 km to the southeast.