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Triggering of seismicity at Tungnafellsjökull volcano, during the 2014-2015 eruption within the neighbouring Bárdarbunga volcanic system

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The 48 km dyke propagation and 65 m slow collapse of Bárdarbunga caldera, associated with the 2014-2015 Holuhraun eruption, was accompanied by intense seismic activity, but also significantly increased seismicity at the neighbouring Tungnafellsjökull volcano, 25 km NW of Bárdarbunga caldera. Over 500 earthquakes above M1 occurred at Tungnafellsjökull, with a maximum size of M3.6, during the period of dyking and caldera collapse at Bárdarbunga. We investigate possible mechanisms for increased seismicity at Tungnafellsjökull during this major event, including new intrusive activity/a pressure increase beneath Tungnafellsjökull volcano and stress transfer related to the Bárdarbunga unrest and eruption. For that purpose we carry out new deformation and stress modelling utilising a wealth of diverse geodetic observations acquired during the 2014-2015 unrest and eruption within the Bárdarbunga volcanic system. These comprise a combination of InSAR, GPS, LiDAR, radar profiling and optical satellite measurements. We model six separate time periods throughout the course of the eruption and find a strong correlation between the locations of increased seismicity at nearby Tungnafellsjökull volcano and regions of increased tensile and Coulomb stress changes. Our results suggest that stress transfer during this major event has resulted in earthquake triggering at the neighbouring Tungnafellsjökull volcano by unclamping faults within the associated fissure swarm. This work has immediate application to volcano monitoring; to distinguish the difference between stress transfer and new intrusive activity.