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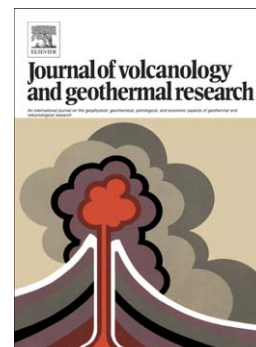
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Dike model for the 2012-2013 Tolbachik eruption constrained by satellite radar interferometry observations

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Abstract:

A large dike intrusion and fissure eruption lasting nine months began on November 27, 2013, beneath the south flank of Tolbachik Volcano, Kamchatka, Russia. The eruption was the most recent at Tolbachik since the Great Tolbachik Eruption from 1975-1976. The 2012 eruption was preceded by more than six months of seismicity that clustered beneath the east flank of the volcano along a NW-SE trend. Seismicity increased dramatically before the eruption, with propagation of the seismicity from the central volcano conduit in the final hours. We use interferometric synthetic aperture radar (InSAR) to compute relative displacement images (interferograms) for SAR data pairs spanning the eruption. We use satellite SAR data from the Canadian Space Agency's RADARSAT-2 and from the Italian Space Agency's COSMO-SkyMed missions. Data are modeled first through a Markov Chain Monte Carlo solution for a single tensile dislocation (dike). We then use a boundary element method that includes topography to model a distributed dike-opening model. We find the best-fitting dike dips  $80^\circ$  to the

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