Geophysical Research Abstracts
Vol. 20, EGU2018-14269, 2018
EGU General Assembly 2018

Eruptive events in 2016-2017 at Bezymianny volcano, Kamchatka, measured by high-resolution TerraSAR-X and photogrammetric data

René Mania (1,2), Jacqueline T. Salzer (1), Thomas R. Walter (1), Marina Belousova (3), Alexander Belousov (3), and Sergey Senyukov (4)

(1) GFZ German Research Centre for Geosciences, Physics of Earthquakes and Volcanoes, Telegrafenberg, 14473 Potsdam, Germany (mania@gfz-potsdam.de), (2) Institute of Earth and Environmental Science, University of Potsdam, Karl-Liebknecht-Strasse 24, 14476 Potsdam, Germany, (3) Institute of Volcanology and Seismology, Far East Branch, Russian Academy of Sciences, bul'var Piipa, 9, Petropavlovsk- Kamchatskii, 683006 Russia, (4) Kamchatkan Branch of Geophysical Survey, Russian Academy of Sciences, bul'var Piipa, 9, Petropavlovsk-Kamchatskii, 683006 Russia

Lava dome development is closely tied with volcanic explosions and destructive pyroclastic flows that constitute vital hazards in many volcanically active regions. Thus, close monitoring of dome building processes is crucial, but often limited to low data resolution, hazardous access and poor weather conditions. However, satellite Synthetic Aperture Radar (SAR) data enables sustained and precise detection and quantification of ground motion. Here, we investigate the explosive activity of the Bezymianny stratovolcano on the Kamchatka peninsula, Russia, in 2016-2017 by employing TerraSAR-X acquisitions in high resolution spotlight mode. We analyze systematic changes occurring in consecutive SAR scenes by composite image analysis, and quantify deformation by feature tracking algorithms, to determine stages and directions of extrusion and eruption. We could identify three well defined extrusive episodes succeeded by eruptions with increasing strengths. While the first (12/2016) was preceded by plug extrusion within the summit crater, the second (03/2017) and third (06/2017) eruption were also accompanied by deformation of the flanks outside the summit crater and continuous spreading of lava flows. The last and strongest explosion yielded in a new summit crater morphology and partial fill-up of the 1956 crater moat with pyroclastic material. We complement our analysis with webcam imagery observing the eastern flank of Bezymianny, and with seismic records, both of which comply with satellite-derived dome growth and eruption history. The integration of optical and SAR data in our work allows identifying precursory deformation, and helps understanding geomorphologic as well as structural processes culminating in explosive eruptions at dome building volcanoes.