Geophysical Research Abstracts
Vol. 19, EGU2017-14747, 2017
EGU General Assembly 2017


# The Bárdarbunga 2014-2015 caldera collapse and its implications for evolution of central volcanoes

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Many central volcanoes in Iceland and elsewhere are dominated by large calderas. Most of these centers are associated with a fissure swarm, together forming a volcanic system. The favored model for the origin of calderas is that they form by withdrawal of magma from a reservoir in the roots of the volcano during major eruptions. Several examples of this exist. However, the frequency of such events appears limited to a per/century worldwide. As a consequence, data on the mechanics have been sparse. The slow caldera collapse of Bárdarbunga, central Iceland, in August 2014-February 2015 was monitored in more detail than possible in earlier caldera collapses. It occurred during a major rifting event when ∼2 km3 of basaltic magma was withdrawn from underneath the volcano, partly intruded in the crust as a dyke while the majority was erupted, forming the Holuhraun lava field, 40-50 km to the northeast of the volcano. The unique time series obtained demonstrates how the interaction of lateral withdrawal of magma and the push of the piston-like roof of the magma reservoir regulate both caldera collapse and the resulting eruption. The Bárdarbunga 2014-15 events suggest that repeated caldera collapses along ring faults in active basaltic central volcanoes may be quite common. Several events, where a major lava flow formed over a period of several months or years, may be explained in this way, partly draining magma reservoirs lying at several kilometers depth in the crust. Interaction of an initially pressurized magma reservoir with the regional extensional stress field triggers the onset, with rapid lateral outflow of magma leading to a large pressure drop in the reservoir. During some eruptions the pressure drop is sufficient to re-activate the pre-existing ring faults, causing long, high volume eruptions as the piston overlying the magma reservoir subsides and maintains high enough pressure in the reservoir to sustain drainage.