Geophysical Research Abstracts
Vol. 17, EGU2015-10420, 2015
EGU General Assembly 2015

Dyke propagation mechanisms and the immediate pre- and syn-eruptive seismicity of the 2014 Holuhraun fissure eruption, Iceland

Jennifer Woods (1), Thorbjörg Ágústsdóttir (1), Tim Greenfield (1), Robert G Green (1), Robert S White (1), Bryndís Brandsdóttir (2), Sveinbjörn Steinthórsson (2), and Simon Redfern (1)

(1) Department of Earth Sciences, University of Cambridge, Cambridge, United Kingdom, (2) Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland

We present data from our dense seismic array which captured the micro-seismicity associated with the propagating dyke intrusion from the subglacial Bárðarbunga volcano, during the 24 hours preceding and following the onset of effusive magmatism at the Holuhraun lava field in central Iceland. The Bárðarbunga volcano is located at the centre of the Iceland hot spot within the Eastern Rift Zone, beneath the Vatnajökull ice cap.

Local magmatic intrusions can be tracked through the swarms of micro-seismicity accompanying dyke propagation, arising from crustal failure and fracture of both the country rock and solidifying magma plugs. August 2014 saw the beginning of a period of unrest of Bárðarbunga volcano during which a dyke propagated first out of the caldera and then towards the northeast. It continued north of the Dyngjujökull outlet glacier and resulted in a fissure eruption in the old Holuhraun lava field on 29 August 2014. At time of writing it has erupted $\sim$1km^3 of lava covering over 64km^2, making this the largest eruption in Iceland for 150 years.

Our extensive, local seismic network covers the numerous volcanic systems beneath the Vatnajökull glacier and their transecting fissure swarms (rifting units) along the divergent plate boundary. This work focusses on the immediate pre- and syn-eruptive seismicity of the 2014 Holuhraun fissure eruption. Rock fracture mechanisms are determined from fault plane solutions of these seismic events, produced as the magma migrated from beneath the surface to the eruption site.