

Catalog of start and end times of lava fountaining episodes from 2 May to 14 June 2021 during the Fagradalsfjall eruption (<https://doi.org/105880/fidgeo.2022.010>)

Eva P. S. Eibl¹, Undine Gnauck¹, Shaig Hamzaliyev¹, Gylfi Pall Hersir², Egill Árni Gudnason², Fridgeir Pétursson²

1. *Institute of Geosciences, University of Potsdam, Potsdam, 14467, Germany*

2. *GeoSurvey (ÍSOR), Reykjavik, Iceland*

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2. Citation

When using the data please cite:

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Eibl EPS, Thordarson T, Höskuldsson Á, Gudnason EÁ, Dietrich T, Hersir GP, et al. Evolving Shallow-conduit Container Affects the Lava Fountaining during the 2021 Fagradalsfjall Eruption, Iceland. Research Square Platform LLC; <https://doi.org/10.21203/rs.3.rs-1453738/v1>

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3. Data Description

The Fagradalsfjall eruption from 19 March to 18 September 2021 featured lava fountaining episodes from 2 May to 14 June. These episodes were recorded as tremor pulses on our broadband seismic station NUPH (Nanometrics Trillium Compact 120s) at 5.5 km southeast of the active vent.

We used the seismic data bandpass filtered between 1 and 4 Hz to mark the start and end of 7058 tremor pulses. The catalog hence comprises 14116 markers, that are statistically further evaluated in Eibl et al. (in review). From 2 May to 14 June, several changes in pulse duration and repose time were found and used to subdivide this time interval into 6 periods with characteristic pulse pattern. We find exponentially decreasing pulse durations, coexisting short and long pulses and stable pulse durations superimposed by gradually increasing or suddenly decreasing repose times. We discuss the findings in the context of an evolving shallow-conduit container, the crater geometries, partial collapses from the crater rim and the amount of accumulating outgassed magma in Eibl et al. (in review). This data publications releases the catalog of 14116 tremor pulses /lava fountaining episodes.

3.1.Sampling method

We installed a Trillium Compact 120 s seismometer (Nanometrics) as station NUPH (RR seismic network) at the southeast corner of Núpshlíðarháls 5.5 km southeast of the eruptive site in Geldingadalir, Iceland. The instrument stood on a concrete base slab shielded from wind and rain using a bucket partly covered by rocks. The instrument was powered using batteries from 16 March, solar panels from 24 March and a wind generator at 10 m distance from 6 April 2021. Data were sampled at 200 Hz, they were stored on a Datacube and regularly downloaded. We used a compass to align the instrument to geographic north.

3.2.Analytical procedure:

3.3.Data processing

The seismic data are detrended, instrument response corrected to velocity, tapered and filtered between 1 and 4 Hz. We use the Pyrocko trace-viewer Snuffler to mark the start and end of the tremor pulses (Heimann et al. 2017). First, we use the built-in STA/LTA triggering algorithm (Trnkoczy et al. 2012) on the sum of the 3 component seismic recordings of station NUPH. We use STA windows of 60 to 120 s and three times larger LTA windows in a moving time window. STA/LTA markers are then moved to the pulse start and end. Finally, we manually review all markers and add, remove and time-correct them if necessary.

4. File description

We provide a text file ("2022_010_Eibel-et-al_Data.txt") that one can load in the trace viewer Snuffler. The four columns contain the (i) date, (ii) time in UTC, (iii) marker color and (iv) station name. The marker color indicates whether the time marks the start or end of a tremor pulse. Note that tremor pulses coincide in time with lava fountaining episodes and hence the markers also mark the start and end of a lava fountaining episode. 1 marks the start of a tremor pulse, while 0 marks the end of a tremor pulse.

4.1. Description of data tables

Table 1: Header information of file "2022_010_Eibel-et-al_Data.txt"

Column header	unit	Description
yyyy-mm-dd	None	Date
hh:mm:ss	None	Time in UTC
markercolor	None	1 marks the start of a tremor pulse (light green when opening in Snuffler) 0 marks the end of a tremor pulse (red when opening in Snuffler)
Stationname	None	Seismic station name following the convention: network.station.location.component

5. References

Eibl EPS, Thordarson T, Höskuldsson Á, Gudnason EÁ, Dietrich T, Hersir GP, et al. Evolving Shallow-conduit Container Affects the Lava Fountaining during the 2021 Fagradalsfjall Eruption, Iceland. Research Square Platform LLC; <https://doi.org/10.21203/rs.3.rs-1453738/v1>

Eibl, E. P. S., Hersir, G. P., Gudnason, E. Á., & Petursson, F. (2022). 2-year seismological experiment near Fagradalsfjall, Reykjanes peninsula in 2021/22. GFZ Data Services. <https://doi.org/10.14470/4S7576570845>