

META

Catalogs and waveforms

IMS⁽⁷⁾ Trace software is used to access data of Pyhäsalmi network. Event, blast and correspondence catalogs and event and blast waveforms contain data of Pyhäsalmi mine network.

Information in event, blast and correspondence catalogs and the corresponding waveform data, in addition to information describing the Pyhäsalmi mine seismic network are provided by Pyhäsalmi Mine Oy⁽⁸⁾. The aforementioned data can be referred as microseismic.

Catalogs

fs (s-wave corner frequency) is used to calculate source parameters, *fp* (p-wave corner frequency) is not used in the calculations.

In event, blast and correspondence catalogs, *usedStationLocation* field describes stations in which STA/LTA trigger has registered the event and the station was used to locate the event. *unusedStationLocation* on the other hand describes stations in which STA/LTA trigger has registered the event but the station was not used to locate the event due to bad accuracy.

The elevation of the events and blasts is measured from the sea level in N2000 height system.

The depth of the events and blasts is measured from the ground level, the ground level being 160 meters over the sea level in N2000 height system.

The original Z coordinate in mine coordinates is measured from the ground level of 160 meters over the sea level in N43 height system. In Pyhäsalmi episode, the difference between height systems N2000 and N43 is as follows: $N2000 = N43 + 0.4522m$

Event catalog

Contains seismic events in Pyhäsalmi mine network that are not blasts. Entries are named *PS_CIBIS_EVENT_ID#*, where *ID#* is a running number.

Blast catalog

Contains seismic events in Pyhäsalmi mine network classified as blasts (explosions). Entries are named *PS_CIBIS_BLAST_ID#*, where *ID#* is a running number.

Macroevent catalog

In Pyhäsalmi episode we use macroevent term to describe events and blasts of Pyhäsalmi mine that were recorded by the national seismic networks, for example networks FN, HE and EE. The macroevent catalog contains events and blasts recorded by national seismic networks. Entries are named *PS_CIBIS_MACROEVENT_ID#*, where *ID#* is a running number.

The event information is obtained from monthly bulletins maintained by University of Helsinki. [Final monthly bulletins ⁽¹⁾]

The network and station information is obtained from EIDA⁽²⁾ and GEOFON⁽³⁾.

usedStationLocation describes stations which have registered the event according to the bulletins. The data of these stations is included in the Pyhäsalmi episode.

unusedStationLocation describes stations which have registered the event according to the bulletins. The data of these stations is not included in the Pyhäsalmi episode.

Correspondence catalog

The correspondence catalog consists of events and blasts recorded by Pyhäsalmi mine network which correspond to macroevents described in the macroevent catalog. The corresponding macroevent is included in the *Comments* field of the correspondence catalog. Events and blasts in correspondence catalog are already included in the event or blast catalogs.

Waveforms

Event, blast and macroevent waveforms are included in the Pyhäsalmi episode.

The name of waveformfile follows the format:

[ORIGINTIME]_PS_[BLAST/EVENT/MACROEVENT]_[ID#].[SUFFIX], for example:
20101001185441_PS_EVENT_19.mseed

Macroevent waveforms

In Pyhäsalmi episode is included data from the FN⁽⁶⁾, HE⁽⁴⁾ and EE⁽⁵⁾ seismic networks, obtained from the GEOFON data centre⁽³⁾. link: <https://geofon.gfz-potsdam.de/waveform/webservices.php>

Each of the macroevent waveforms consists of 20Hz BH-channel data starttime being the origin time of the event. Timespan of the files is 120 seconds. 2% cosine taper and 2Hz highpass filter is applied to waveforms.

References

- (1) Final monthly bulletins, Seismic Events in Northern Europe. Institute of Seismology, University of Helsinki. <http://www.seismo.helsinki.fi/bulletin/list/pdfbul.html>
- (2) European Integrated Data Archive, EIDA, <https://www.orfeus-eu.org/data/eida/>
- (3) GEOFON data centre, <https://geofon.gfz-potsdam.de/waveform/webservices.php>
- (4) Institute Of Seismology, U. O. H. (1980). The Finnish National Seismic Network. GFZ Data Services. <https://doi.org/10.14470/ur044600>, link: <http://www.fdsn.org/networks/detail/HE/>
- (5) Geological Survey of Estonia (1998). Estonian Seismic Network. Link: <http://www.fdsn.org/networks/detail/EE/>
- (6) Sodankylä Geophysical Observatory, University of Oulu (2005). Northern Finland Seismological Network. Link: <http://www.fdsn.org/networks/detail/FN/>
- (7) Institute of Mine Seismology, IMS, <http://www.imseismology.org/>
- (8) Microseismic catalog, waveforms and network information © Pyhäsalmi Mine Oy

Geophysical and geological maps

The following meta and license information applies to the following maps:

- Pyhäsalmi aeroelectromagnetic apparent resistivity
- Pyhäsalmi aeroelectromagnetic imaginary component
- Pyhäsalmi aeroelectromagnetic ratio
- Pyhäsalmi aeroelectromagnetic real component
- Pyhäsalmi aeromagnetic anomaly
- Pyhäsalmi aeroradiometric potassium map
- Pyhäsalmi aeroradiometric thorium map
- Pyhäsalmi aeroradiometric uranium map
- Pyhäsalmi bedrock

All maps are in ETRS-TM35-FIN coordinate system.

Lisences

Geological Survey of Finland

Data acquired 2.5.2018, Bedrock of Finland acquired 20.6.2018

Aeromagnetic anomaly map of Finland, 2016

Aeroradiometric potassium map of Finland, 2016

Aeroradiometric thorium map of Finland, 2016

Aeroradiometric uranium map of Finland, 2016

Aeroradiometric total count map of Finland, 2016

Aeroelectromagnetic imaginary component map of Finland, 2016

Aeroelectromagnetic real component map of Finland, 2016

Aeroelectromagnetic apparent resistivity map of Finland, 2016

Bedrock of Finland 1:200000, 2016

Link to license:

http://tupa.gtk.fi/paikkatieto/lisenssi/gtk_open_licence_2.pdf

National Land Survey of Finland

Data acquired 2.5.2016

Place names 2015, 1:20000, <http://urn.fi/urn:nbn:fi:csc-kata00001000000000000511>

Topographic map 2015, 1:100000, Q43, <http://urn.fi/urn:nbn:fi:csc-kata00001000000000000228>

General map 2015, 1:450000, <http://urn.fi/urn:nbn:fi:csc-kata00001000000000000233>

Link to license:

<https://creativecommons.org/licenses/by/4.0/>

http://www.nic.funet.fi/index/geodata/mml/NLS_terms_of_use.pdf

Other data items

- Blast Information, Blast locations and date at Pyhäsalmi mine⁽¹⁾
- Collar Drillhole Position, Drillhole collar positions at Pyhäsalmi mine ⁽¹⁾
- Mining Polygon Advance, Ore quarries for Pyhäsalmi mine⁽¹⁾
- Well Paths, 99 well paths from Pyhäsalmi mine⁽¹⁾
- Drillhole Lithology, Lithological observations from Pyhäsalmi mine drillhole samples⁽¹⁾
- Velocity Model, Seismic velocity model of of Pyhäsalmi mine⁽¹⁾
- Mine Area, The area of the Pyhäsalmi mine⁽²⁾

(1) © Pyhäsalmi Mine Oy

(2) © Finnish Safety and Chemicals Agency [Tukes], 2017