

# Implementation of array analysis on seismic signals from volcanoes in Iceland recorded on the small-aperture HEKSISZ array

Session: GMPV9.8 EUROVOLC - Networking of the European volcanological community  
D1653 | EGU2020-20877

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# Locations of Interest

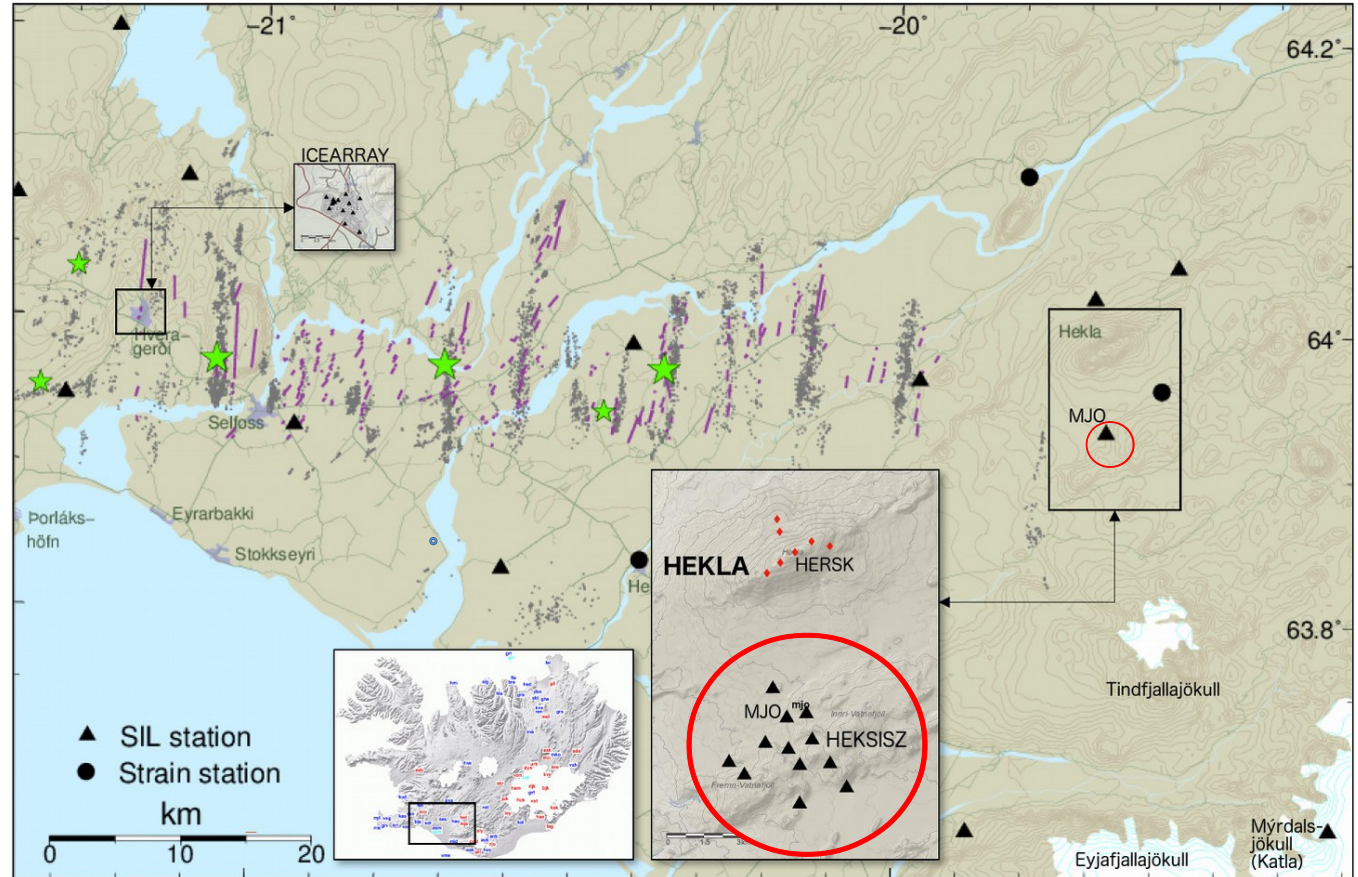
**Purpose** is to monitor Icelandic volcanoes in Eastern Volcanic Zone (EVZ) and tectonic faults of South Iceland Seismic Zone (SISZ)

**Near volcanoes** (in direction):

Hekla (N)  
(Tindfjallajökull (S))  
Eyjafjallajökull (S)  
Katla (SSE)  
Torfajökull (E)

**Active fault zone:**

SISZ (W)



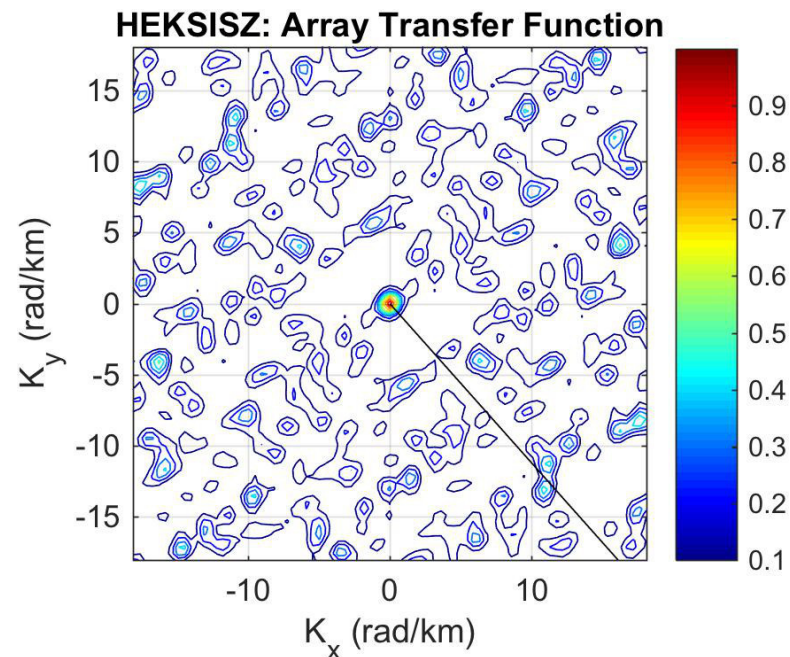
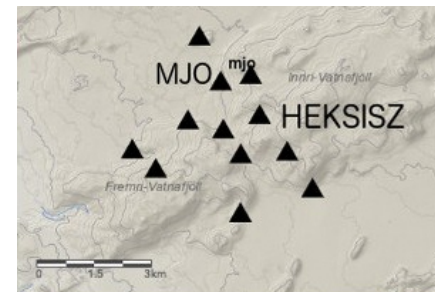
# Array Setup

## Configuration (intended):

- 7 broadband seismometers
- 5 or more Raspberry PI seismometers with colocated accelerometers to capture strong motion
- Geometry such that array transfer function focused for all directions and wide slowness range

## Issues:

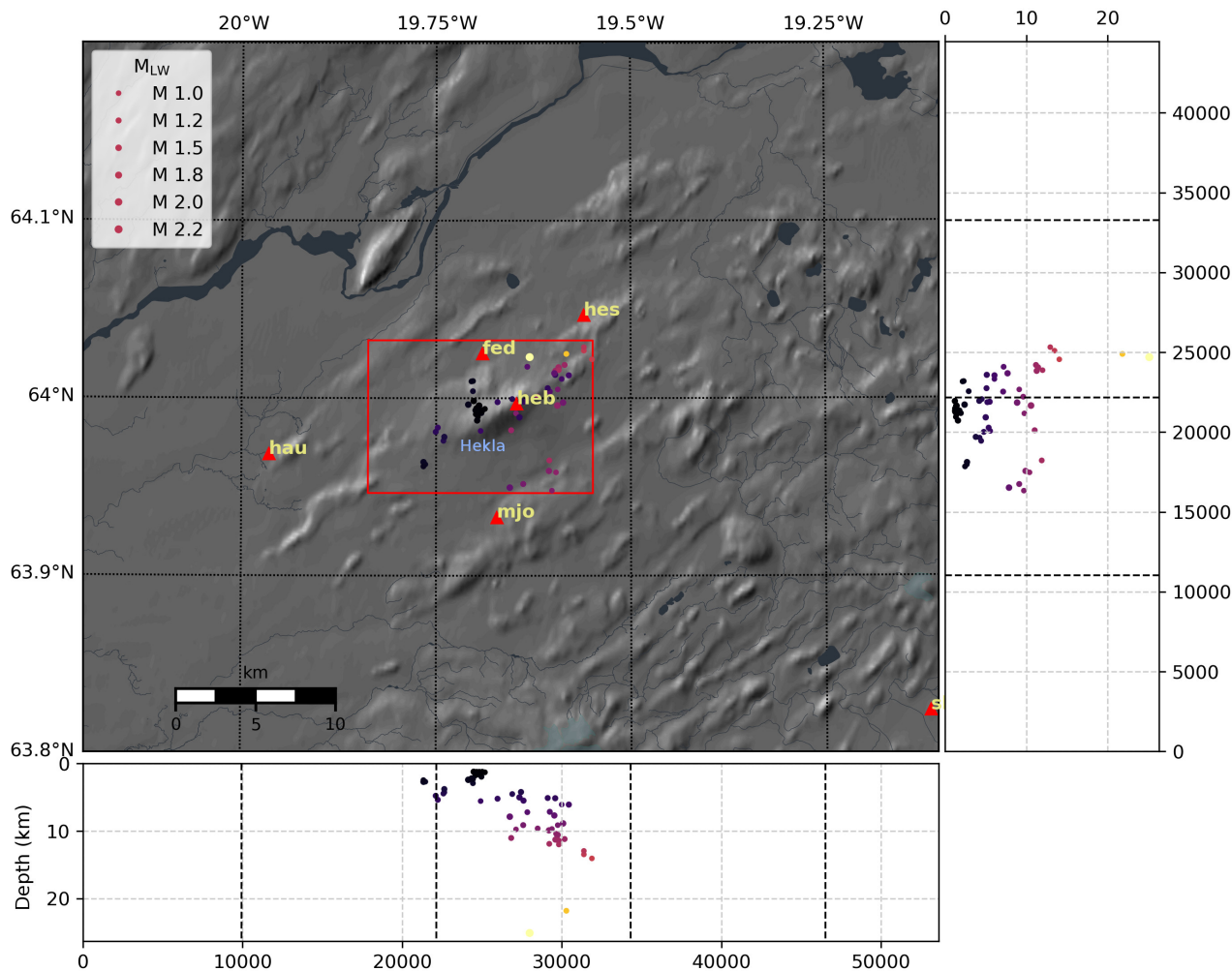
- Electricity and connectivity not sufficient yet due to number of instruments, rough terrain and long distance to nearest grid access
- Most stations not deployed yet, only one always online (MJO)
- To be finished this summer 2020



# Preliminary Analysis

No active array yet, so select various events recorded by single stations in regions of interest, such as Hekla

Detailed analysis of past observations can guide specific array processing later

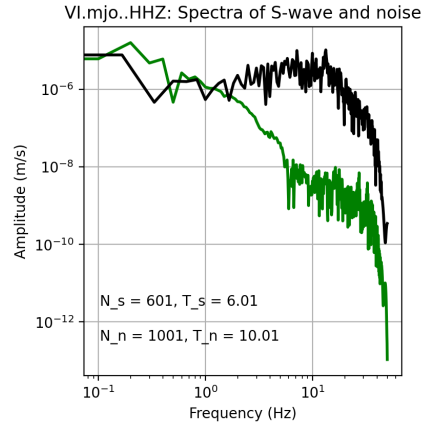




# Various Source Types

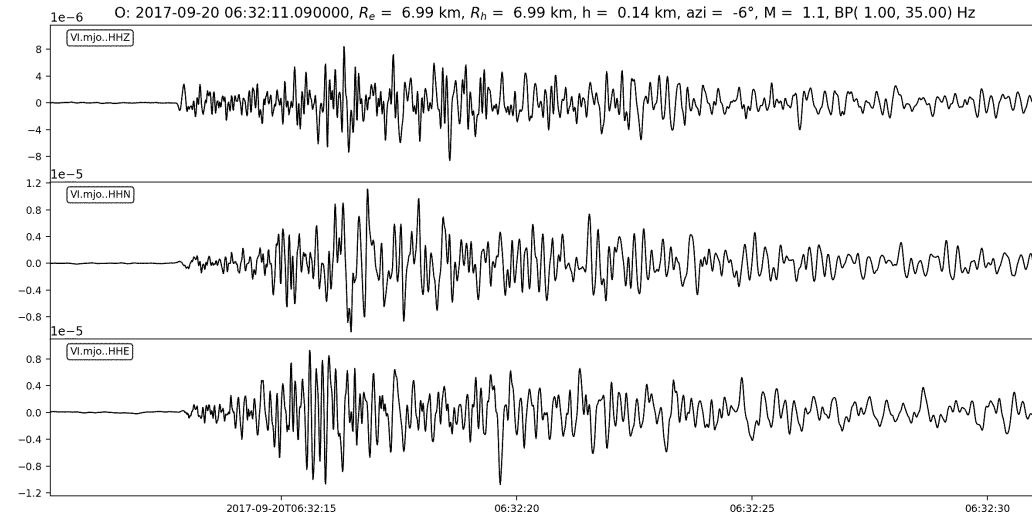
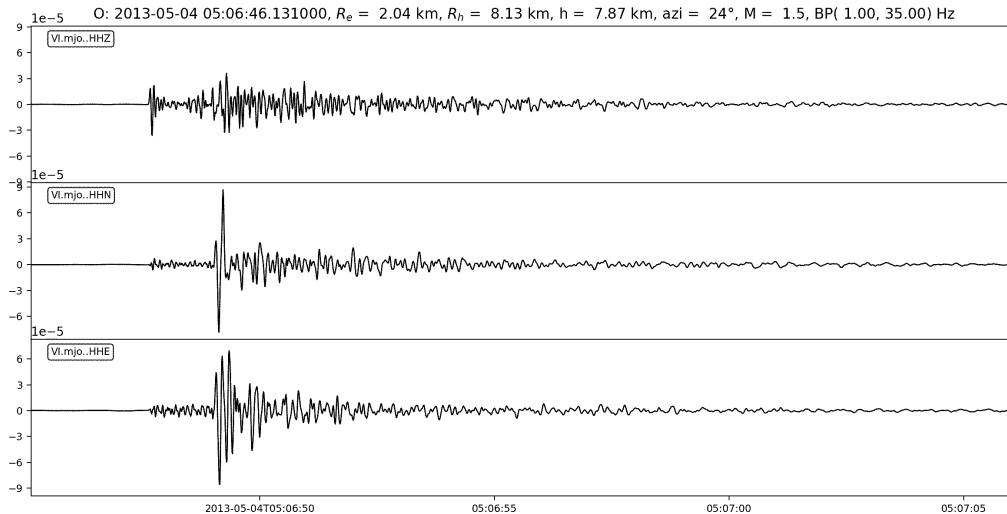
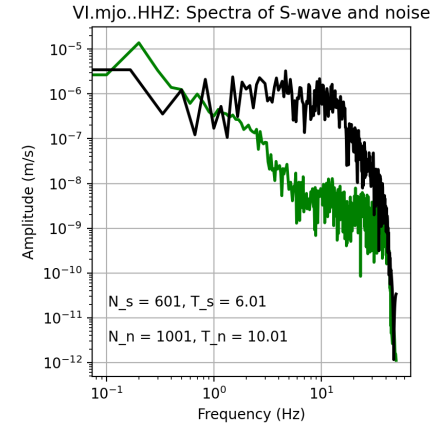
## Tectonic events:

- Clear P and S phases
- Duration < 10 s
- Tectonic or volcanic faulting process



## Hybrid events:

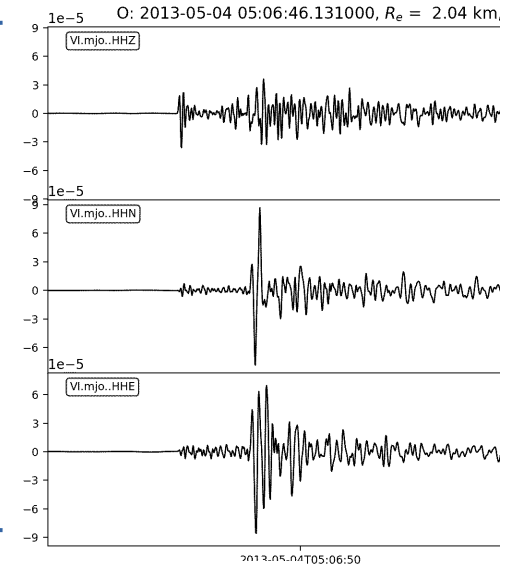
- Emergent, S onset unclear
- Duration > 10 s
- Mix of volcanic source processes



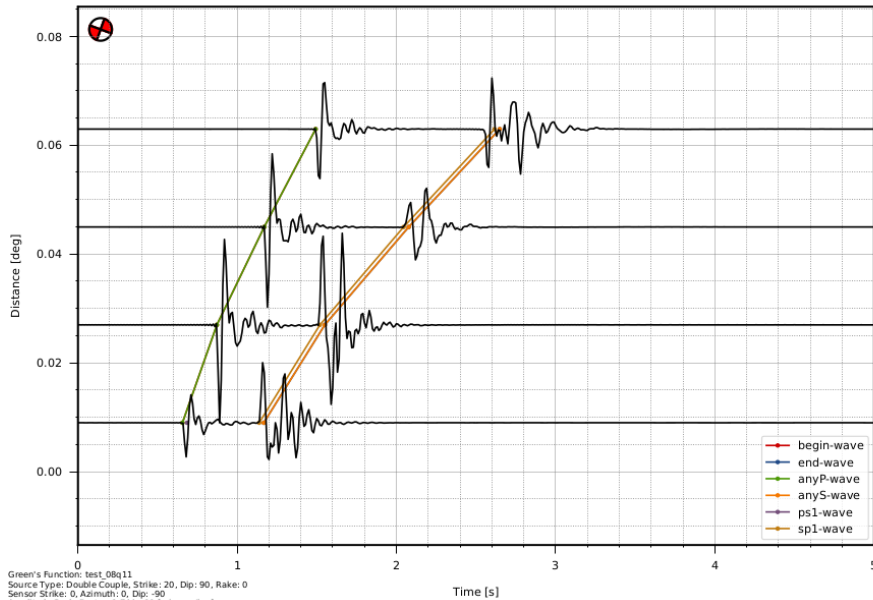
# Site Effects

**Simulated waveforms (QSEIS), velocity model has thin, alternating soft and hard layers sandwiched at top, point source**

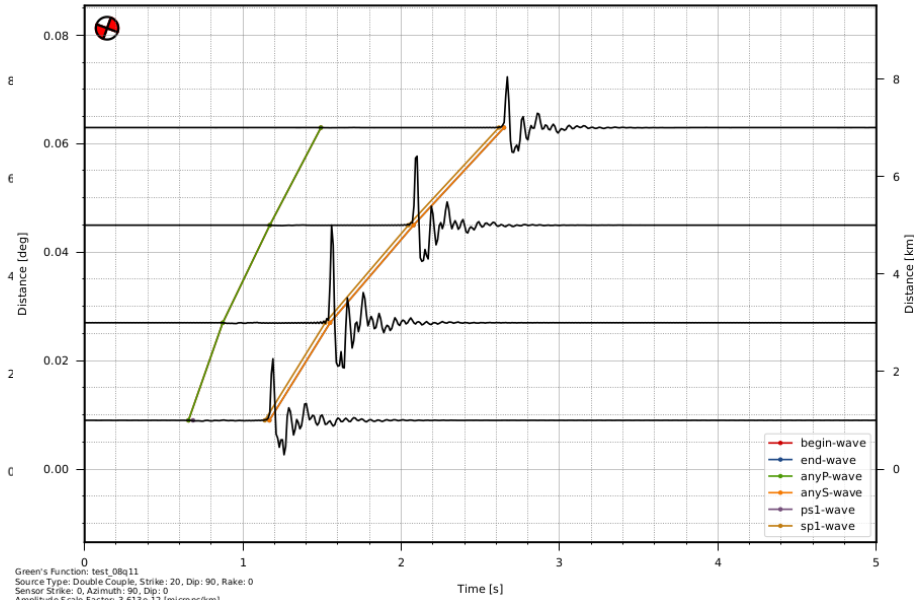
**Observed waveforms**



Velocity traces (Z), unfiltered



Velocity traces (T), unfiltered



# Array Analysis Software

- Python (obspy + original code)
- Input: files, seedlink, FDSN
- Response removal, multiple bandpass filters
- Moving window multiband fk analysis
- Simple triggers for tectonic events
- Further algorithms will be added and tested on other array datasets (e.g. ICEARRAY1 strong motion array, see figures)

