4-25-2019

Data for Stromboli Volcano: An Infrasound Primer

Jeffrey B. Johnson
Boise State University

Volcano Infrasound Signal and Array Analysis: A Primer

Overview

Provided data are high quality (i.e., high signal-to-noise) and come from Stromboli Volcano in Italy from a week-long experiment conducted in September 2018. Eight channels of continuous infrasound data are provided corresponding to a network of three mini-arrays. Data correspond to volcanic activity when at least six vents were erupting with a variety of styles including discrete explosions, gas jetting, and pulsed degassing. These data are provided in electronic supplements as MATLAB data files along with MATLAB scripts under development. These scripts are provided to facilitate analysis and visualization of the data in a useful way. The routines are provided to help non-specialists become self-sufficient to learn volcano infrasound signal analysis and also, perhaps, offer more experienced infrasound analysts a few useful tricks.

Data

Data were converted first to miniSEED format using DataCube conversion software and then to MATLAB using the rdmseed.m function version 1.2.0.0 (364 KB) by François Beauducel and available from MATLAB's Matlab Central File Exchange at https://www.mathworks.com/matlabcentral/fileexchange/28803-rdmseed-and-mkmseed-read-and-write-miniseed-files. Multi-channel data from an individual station were saved as dayfiles in .mat format with the naming convention ST[ABC]MMDDhhmm where MM, DD, hh, mm are month, day, hour, and minute start time of the data files. Files created during the 2018 deployment (and their size) are listed in Table 1. These data may be downloaded from a dedicated infrasound dataset directory hosted at Boise State University's ScholarWorks archive: https://scholarworks.boisestate.edu/infrasound_data/

Table 1

STA		**STB**		**STC**	
STA09081559.mat	80 Mb				
STA09090000.mat	238 Mb	STB09090945.mat	149 Mb	STC09090956.mat	140 Mb
STA09100000.mat	241 Mb	STB09100000.mat	259 Mb	STC09100000.mat	240 Mb
STA09110000.mat	241 Mb	STB09110000.mat	256 Mb	STC09110000.mat	238 Mb
STA09120000.mat	146 Mb	STB09120000.mat	146 Mb	STC09120000.mat	137 Mb
Data download on 09101345 *Acquisition end at 09121431*		*Data download at 09100936* *Acquisition end at 09121401*		*Data download at 09100945* *Acquisition end at 09121401*	
These data may be downloaded from					

The .mat files contain both data and header variables. Data is a structure with time series (`data.ts`) and data point (`data.trace`) matrices. There are three columns in each matrix corresponding to three channels of data (note: channel three on the 2-channel STC is noise). The time series matrices are serial dates, which indicate decimal days elapsed since the first of January of the common era, i.e., ~2018.7 years before the experiment began.

The header variable (`hdr`) contains all the information needed to make sense of the time series data. An example hdr variable for STA09081559.mat is shown below with the various structure fields commented.

```
experiment: 'STROMBOLI_2018' % experiment name
name: 'STA09081559' % .mat file name
das: 'STA' % data acquisition system name
station_name: 'STA' % same as above
llzs_coords: [3x3 double] % latitude, longitude and altitude of channels 1-3
utm_coords: [3x3 double] % easting, northing, vertical (in m) for chs 1-3
utm_zone: '33 S' % UTM zone of Stromboli
all_channels: [1 2 3] % these are the channels that are in the matrices
good_channels: [1 2 3] % these are the channels that have data
ac_calib: 8.2928e-05 % in-band conversion between Pa and counts (see below)
ac_calib_type: 'Pa/count' % see above
sps: 200 % sample rate in Hz
filter_type: 'none' % unfiltered data
start_times: [3x24 char] % start time string for the three channels
end_times: [3x24 char] % end time string for the three channels
start_time: '08-Sep-2018 15:59:02.975' % same as above
end_time: '08-Sep-2018 23:54:49.720' % same as above
npts: [5709350 5709350 5709350] % number of points in each channel
data_gap: 'no' % yes means data interruption of a few minutes during download
```