

Problem with the Frequency Rejection using the Geopsy command line

1a. Manual: no window rejection: 198 windows,

The screenshot displays the Geopsy software interface. The main window shows a spectrogram of seismic data for station BE_00039, with three channels (Z, N, E) plotted against time (09:20 to 11:00). The spectrogram shows a prominent peak around 09:30. The bottom window displays the H/V Results, including a plot of H/V ratio vs Frequency (Hz) and a parameter list. The parameter list includes:

- 1 # GEOPSY output version 1.1
- 2 # Number of windows = 198
- 3 # f0 from average 0.946237
- 4 # Number of windows for f0 = 196
- 5 # f0 from windows 0.932947 0.850965 1.02283
- 6 # f0 amplitude 7.3288
- 7 # Position 0 0 0
- 8 # Category Default

The H/V plot shows a sharp peak at approximately 0.9 Hz, with the H/V ratio reaching a maximum of about 12. The parameter list also includes the following settings:

- Global time range: From TO 2022-12-02 09:20:00.000000, To End 2022-12-02 11:00:00.000000
- Reference signal: (empty)
- Time windows: Length Exactly 60.00 s.
- Bad sample: Tolerance 0.00 s., Gap 0.00 s., Threshold relative 60.00 %.
- Anti-triggering on raw signal: Anti-triggering on filtered signal: Seismic event trigger: Delay -0.100 s.
- View: all stations, Number of windows: 198

Problem with the Frequency Rejection using the Geopsy command line

2a. Manual: frequency rejection: 141 windows and reduced stdv. Good.

The screenshot displays the Geopsy software interface. The main window shows three seismic waveforms (Z, N, E) for station BE_00039, with a color-coded background indicating frequency rejection windows. The x-axis represents time from 09:20 to 11:00. The y-axis represents amplitude.

Overlaid on the interface are several windows:

- Frequency domain window rejection (Settings):**
 - Minimum frequency: 0.50 Hz
 - Maximum frequency: 50.00 Hz
 - Standard deviation v factor: 1.80
 - Maximum number of iterations: 500
- Frequency domain window rejection (Results):**

```
# GEOPSY output version 1.1
# Number of windows = 141
# f0 from average 0.937562
# Number of windows for f0 = 141
# f0 from windows 0.938665 0.90467 0.973937
# f0 amplitude 8.99902
# Position 0 0 0
# Category Default
# Frequency Average Min Max
```
- Log:**

```
[PARAM] # number of samples is either set to a fixed value (Count) or through a step
[PARAM] STEP_TYPE_FREQUENCY=Count
[PARAM] SAMPLES_NUMBER_FREQUENCY=500
[PARAM] # STEP=difference between two successive samples for 'linear' scales
[PARAM] # STEP=ratio between two successive samples for 'log' scales
[PARAM] # STEP=difference between two successive inverted samples for 'inversed'
[PARAM] STEP_FREQUENCY=1.00925
[PARAM] HIGH_PASS_FREQUENCY=0
[PARAM] # Possible values for HORIZONTAL_COMPONENTS: Squared, Energy, Azim
[PARAM] HORIZONTAL_COMPONENTS=Squared
[PARAM] # HORIZONTAL_AZIMUTH is used only when HORIZONTAL_COMPONENTS
[PARAM] HORIZONTAL_AZIMUTH=0
[PARAM] # Used only for rotated output
[PARAM] ROTATION_STEP=10
[PARAM] # Frequency domain window rejection (Cox et al. (2020, GJI)
[PARAM] FREQUENCY_WINDOW_REJECTION_MINIMUM_FREQUENCY=0.0001
[PARAM] FREQUENCY_WINDOW_REJECTION_MAXIMUM_FREQUENCY=5000
[PARAM] FREQUENCY_WINDOW_REJECTION_STDDEV_FACTOR=2
[PARAM] FREQUENCY_WINDOW_REJECTION_MAXIMUM_ITERATIONS=50
[PARAM]
Process started at 2023-02-08 17:21:31
BE_00617: 48 windows
task index 0: processed during 0.463 s
task index 0: processed during 0.464 s
task index 0: processed during 0.464 s
task index 0: processed during 0.465 s
task index 0: processed during 0.465 s
task index 0: processed during 0.466 s
task index 0: processed during 0.468 s
task index 0: processed during 0.478 s
task index 0: processed during 0.481 s
```

Problem with the Frequency Rejection using the Geopsy command line

1b. From command line: no window rejection: 190 windows,

Param string

```
paramsString = ''\  
PARAMETERS_VERSION=1  
FROM_TIME_TYPE=Absolute  
FROM_TIME_TEXT={tStart}  
TO_TIME_TYPE=Absolute  
TO_TIME_TEXT={tEnd}  
REFERENCE=  
COMMON_TIME_WINDOWS=false  
WINDOW_LENGTH_TYPE=Exactly  
WINDOW_MIN_LENGTH(s)={winLen}  
WINDOW_MAX_LENGTH(s)={winLen}  
WINDOW_MAX_COUNT=0  
WINDOW_MAXIMUM_PRIME_FACTOR=11  
BAD_SAMPLE_TOLERANCE (s)=0  
BAD_SAMPLE_GAP (s)=0  
WINDOW_OVERLAP (%)={overlap}  
BAD_SAMPLE_THRESHOLD_TYPE={threshold}  
BAD_SAMPLE_THRESHOLD_VALUE (%)={threshold_pct}  
ANTI-TRIGGERING_ON_RAW_SIGNAL (y/n)=n  
ANTI-TRIGGERING_ON_FILTERED_SIGNAL (y/n)=n  
SEISMIC_EVENT_TRIGGER (y/n)=n  
SEISMIC_EVENT_DELAY (s)=-0.1  
WINDOW_TYPE=Tukey  
WINDOW_REVERSED=n  
WINDOW_ALPHA=0.1  
SMOOTHING_METHOD=Function  
SMOOTHING_WIDTH_TYPE=Log  
SMOOTHING_WIDTH={KO}  
SMOOTHING_SCALE_TYPE=Log  
SMOOTHING_WINDOW_TYPE=KonnoOhmachi  
SMOOTHING_WINDOW_REVERSED=n  
MINIMUM_FREQUENCY={minFreq}  
MAXIMUM_FREQUENCY={maxFreq}  
SCALE_TYPE_FREQUENCY=Log  
STEP_TYPE_FREQUENCY=Count  
SAMPLES_NUMBER_FREQUENCY=500  
#STEP_FREQUENCY=1.00231  
HIGH_PASS_FREQUENCY=0  
HORIZONTAL_COMPONENTS={horizontal}  
HORIZONTAL_AZIMUTH={azimuth}  
ROTATION_STEP={rotSteps}  
#FREQUENCY_WINDOW_REJECTION_MINIMUM_FREQUENCY={rej_min_freq}  
#FREQUENCY_WINDOW_REJECTION_MAXIMUM_FREQUENCY={rej_max_freq}  
#FREQUENCY_WINDOW_REJECTION_STDDEV_FACTOR={rej_stddev}  
#FREQUENCY_WINDOW_REJECTION_MAXIMUM_ITERATIONS={rej_it}  
...
```

No freq. rejection

Fill in values

```
# window length for each HV curve  
time_window_len = 60. # [s] standard 60 or 120s  
  
#overlapping windows  
win_overlap = 50  
  
# threshold and percentage  
threshold = 'RelativeSampleThreshold'  
threshold_pct = 0.7  
  
#Smoothing (in digits)  
KO = 0.4  
  
# lower frequency bound  
min_freq = 0.5 # [Hz]  
  
# upper frequency bound  
max_freq = 50 # [Hz]  
  
# how to calculate horizontals (Squared, Energy, Azimuth, Geometric)  
horizontal_method = 'Squared' # standard 'Squared'  
  
# if 'Azimuth is given'  
azimuth = 0  
  
# in case you want run the HV rotate module  
want_rotation = False # True, False  
rotation_steps = 10 # [degree]
```

Run command

```
!C:/Users/[USER]/geopyspack-win64-3.4.2/bin/geopsy-hv.exe  
-hv [miniseedfile] # running the HV on the miniseed  
-param geopsy-hv-auto.params # loading the parameter file  
-o [outputfolder] # export the .hv file
```

Output

```
1 # GEOPSY output version 1.1  
2 # Number of windows = 190  
3 # f0 from average 0.937562  
4 # Number of windows for f0 = 190  
5 # f0 from windows 0.918577 0.832021 1.01414  
6 # f0 amplitude 7.81342  
7 # Position 0 0 0  
8 # Category Default
```

Almost same results as slide 1

Problem with the Frequency Rejection using the Geopsy command line

1b. From command line: no window rejection: 190 windows -> loading the log file to check

The screenshot displays the Geopsy software interface with several key components:

- Main Window:** Shows three stacked seismic waveforms labeled BE_00039 Z, BE_00039 N, and BE_00039 E. The x-axis represents time from 09:20 to 11:00. The waveforms are color-coded by amplitude, ranging from red (high) to blue (low).
- Events Panel:** A table with columns for Time, UTM zone, X, Y, Z, Type, and F. It is currently empty.
- Log Panel:** Contains a list of processing parameters and their values, including:
 - [PARAM] STEP_TYPE_FREQUENCY=Count
 - [PARAM] SAMPLES_NUMBER_FREQUENCY=500
 - [PARAM] # STEP=difference between two successive samples for 'linear' scales
 - [PARAM] # STEP=ratio between two successive samples for 'log' scales
 - [PARAM] # STEP=difference between two successive inversed samples for 'inversed'
 - [PARAM] STEP_FREQUENCY=1.00925
 - [PARAM] HIGH_PASS_FREQUENCY=0
 - [PARAM] # Possible values for HORIZONTAL_COMPONENTS: Squared, Energy, Azim
 - [PARAM] HORIZONTAL_COMPONENTS=Squared
 - [PARAM] # HORIZONTAL_AZIMUTH is used only when HORIZONTAL_COMPONENTS
 - [PARAM] HORIZONTAL_AZIMUTH=0
 - [PARAM] # Used only for rotated output
 - [PARAM] ROTATION_STEP=10
 - [PARAM] # Frequency domain window rejection (Cox et al. (2020), GJI)
 - [PARAM] FREQUENCY_WINDOW_REJECTION_MINIMUM_FREQUENCY=0.0001
 - [PARAM] FREQUENCY_WINDOW_REJECTION_MAXIMUM_FREQUENCY=5000
 - [PARAM] FREQUENCY_WINDOW_REJECTION_STDDEV_FACTOR=2
 - [PARAM] FREQUENCY_WINDOW_REJECTION_MAXIMUM_ITERATIONS=50
 - [PARAM]
- H/V Results Panel:** Displays a plot of H/V ratio versus Frequency (Hz) for station BE_00039. The y-axis ranges from 0 to 12, and the x-axis ranges from 0.60 to 40 Hz. The plot shows a prominent peak at approximately 1 Hz.
- H/V toolbox Panel:** A configuration window for H/V analysis with the following settings:
 - Global time range: From TO (2022-12-02 09:20:00.000000) to To End (2022-12-02 11:00:00.000000).
 - Time windows: General tab selected. Length Exactly 60.00 s. Overlap by 50.00 %.
 - Bad sample: Tolerance 0.00 s, Gap 0.00 s, Threshold relative 60.00 %.
 - Anti-triggering on raw signal: (unchecked)
 - Anti-triggering on filtered signal: (unchecked)
 - Seismic event trigger: (unchecked), Delay -0.100 s.
 - Common (unchecked), Update (unchecked).
 - View: all stations. Number of windows: 100.
 - Buttons: Load parameters, Stop, Start.

Problem with the Frequency Rejection using the Geopsy command line

2b. From command line: frequency rejection: 190 windows!

Param string

```
paramsString = '''\nPARAMETERS_VERSION=1\nFROM_TIME_TYPE=Absolute\nFROM_TIME_TEXT={tStart}\nTO_TIME_TYPE=Absolute\nTO_TIME_TEXT={tEnd}\nREFERENCE=\nCOMMON_TIME_WINDOWS=false\nWINDOW_LENGTH_TYPE=Exactly\nWINDOW_MIN_LENGTH(s)={winLen}\nWINDOW_MAX_LENGTH(s)={winLen}\nWINDOW_MAX_COUNT=0\nWINDOW_MAXIMUM_PRIME_FACTOR=11\nBAD_SAMPLE_TOLERANCE (s)=0\nBAD_SAMPLE_GAP (s)=0\nWINDOW_OVERLAP (%)={overlap}\nBAD_SAMPLE_THRESHOLD_TYPE={threshold}\nBAD_SAMPLE_THRESHOLD_VALUE (%)={threshold_pct}\nANTI-TRIGGERING_ON_RAW_SIGNAL (y/n)=n\nANTI-TRIGGERING_ON_FILTERED_SIGNAL (y/n)=n\nSEISMIC_EVENT_TRIGGER (y/n)=n\nSEISMIC_EVENT_DELAY (s)=-0.1\nWINDOW_TYPE=Tukey\nWINDOW_REVERSED=n\nWINDOW_ALPHA=0.1\nSMOOTHING_METHOD=Function\nSMOOTHING_WIDTH_TYPE=Log\nSMOOTHING_WIDTH={KO}\nSMOOTHING_SCALE_TYPE=Log\nSMOOTHING_WINDOW_TYPE=KonnoOhmachi\nSMOOTHING_WINDOW_REVERSED=n\nMINIMUM_FREQUENCY={minFreq}\nMAXIMUM_FREQUENCY={maxFreq}\nSCALE_TYPE_FREQUENCY=Log\nSTEP_TYPE_FREQUENCY=Count\nSAMPLES_NUMBER_FREQUENCY=500\n#STEP_FREQUENCY=1.00231\nHIGH_PASS_FREQUENCY=0\nHORIZONTAL_COMPONENTS={horizontal}\nHORIZONTAL_AZIMUTH={azimuth}\nROTATION_STEP={rotSteps}\nFREQUENCY_WINDOW_REJECTION_MINIMUM_FREQUENCY={rej_min_freq}\nFREQUENCY_WINDOW_REJECTION_MAXIMUM_FREQUENCY={rej_max_freq}\nFREQUENCY_WINDOW_REJECTION_STDDEV_FACTOR={rej_stddev}\nFREQUENCY_WINDOW_REJECTION_MAXIMUM_ITERATIONS={rej_it}\n'''\n
```

with freq. rejection

Fill in values

```
# window length for each HV curve\ntime_window_len = 60. # [s] standard 60 or 120s\n\n#overlapping windows\nwin_overlap = 50\n\n# threshold and percentage\nthreshold = 'RelativeSampleThreshold'\nthreshold_pct = 0.7\n\n#Smoothing (in digits)\nKO = 0.4\n\n# lower frequency bound\nmin_freq = 0.5 # [Hz]\n\n# upper frequency bound\nmax_freq = 50 # [Hz]\n\n# how to calculate horizontals (Squared, Energy, Azimuth, Geometric)\nhorizontals_method = 'Squared' # standard 'Squared'\n\n# if 'Azimuth is given'\nazimuth = 0\n\n# in case you want run the HV rotate module\nwant_rotation = False # True, False\nrotation_steps = 10 # [degree]\n\n# Using the Cox et al. 2020 filtering\n#FREQUENCY_WINDOW_REJECTION_MINIMUM_FREQUENCY\nrej_min_freq = 0.5\n#FREQUENCY_WINDOW_REJECTION_MAXIMUM_FREQUENCY\nrej_max_freq = 50\n#FREQUENCY_WINDOW_REJECTION_STDDEV_FACTOR\nrej_stddev = 1.8\n#FREQUENCY_WINDOW_REJECTION_MAXIMUM_ITERATIONS\nrej_it = 500\n
```

with freq. rejection

Run command

```
!C:/Users/[USER]/geosypack-win64-3.4.2/bin/geopsy-hv.exe\n-hv [miniseedfile] # running the HV on the miniseed\n-param geopsy-hv-auto.params # loading the parameter file\n-o [outputfolder] # export the .hv file\n
```

Output

```
1 # GEOPSY output version 1.1\n2 # Number of windows = 190\n3 # f0 from average 0.937562\n4 # Number of windows for f0 = 190\n5 # f0 from windows 0.918577 0.832021 1.01414\n6 # f0 amplitude 7.81342\n7 # Position 0 0 0\n8 # Category Default\n
```

Exact same result as slide 4 !!
Changing the Freq Rejection params in
the param file has no influence on the
result ! So stdv stays high.