

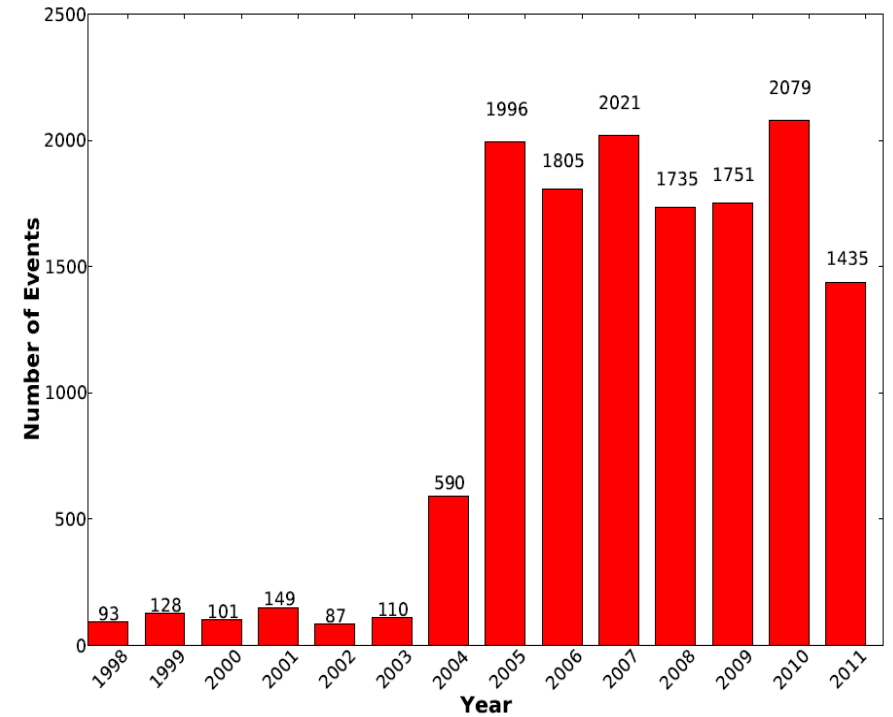
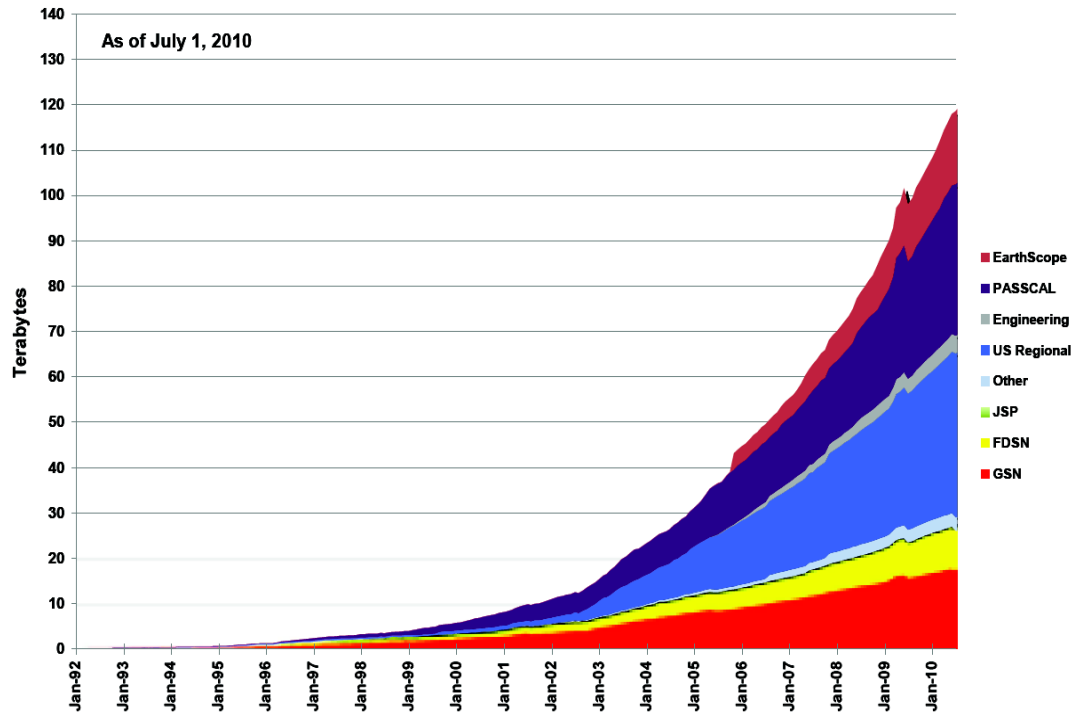
Management of Large Seismic Datasets

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Dr. Tarje Nissen Meyer

Special Thanks to: Robert Barsch

Motivation

Archive Size



$14080 \times 1000 \times 3 = \sim 40,000,000$ waveforms
= $\sim 40,000,000$ Response
= 14 TB

NDLB part I

```
-----  
NDLB_part_I  
(No Data Left Behind Part I)
```

```
Goal: Automatic tool for Management, Instrument Correction and Plotting of  
Large Seismic Datasets based on "Process-centric" method
```

```
:copyright:  
The ObsPy Development Team (devs@obspy.org)
```

```
:license:  
GNU Lesser General Public License, Version 3  
(http://www.gnu.org/copyleft/lesser.html)  
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```

```
NDLB_part_I could do the following taske for you:
```

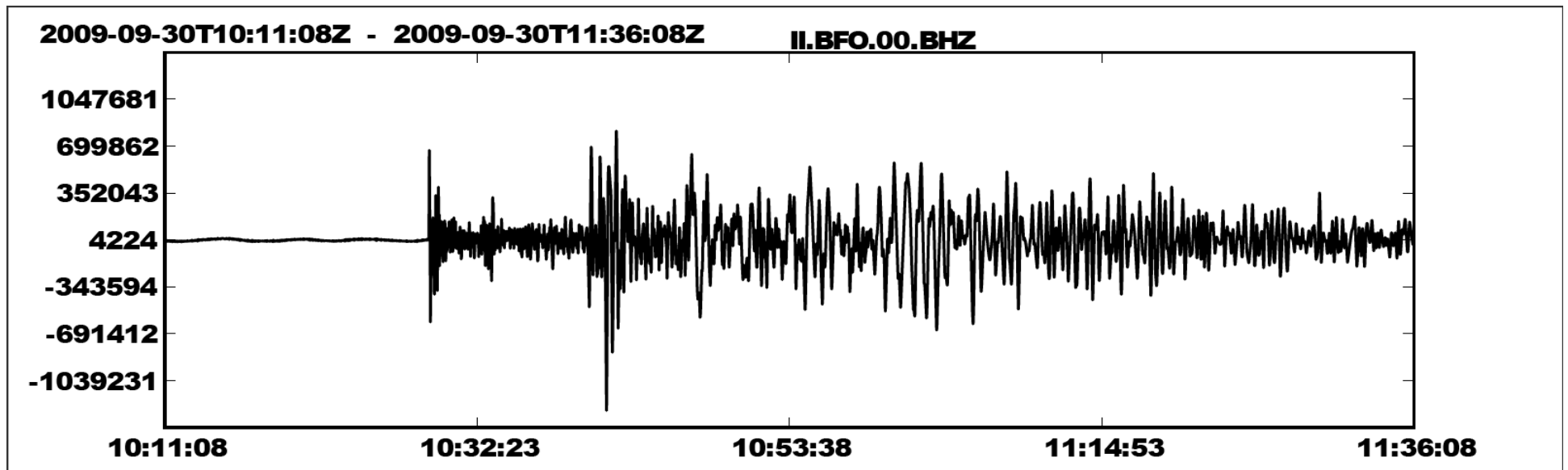
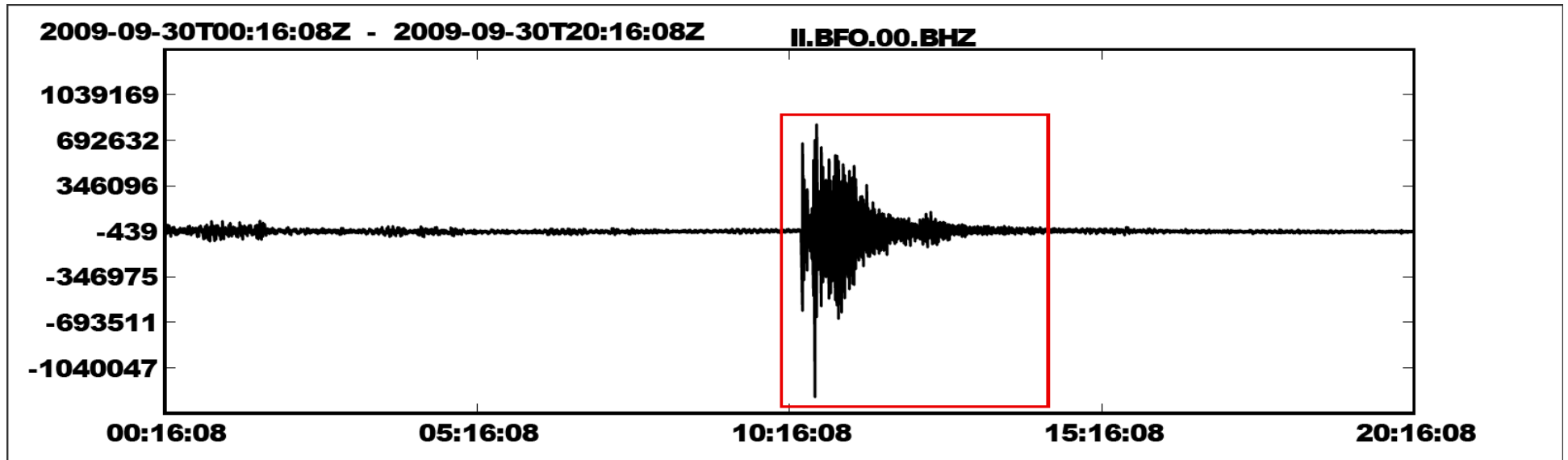
1. Save raw counts, response files, quality control (Gap, Timing Quality, Data Quality) and update the folder.
2. Update Response Folder. (This module will remove the Response folder and generate that one more time.)
3. Instrument Correction (Acceleration, Velocity or Displacement)
4. Plotting events, available stations and ray path.

```
Please choose what you want to do:█
```

1. Process-centric

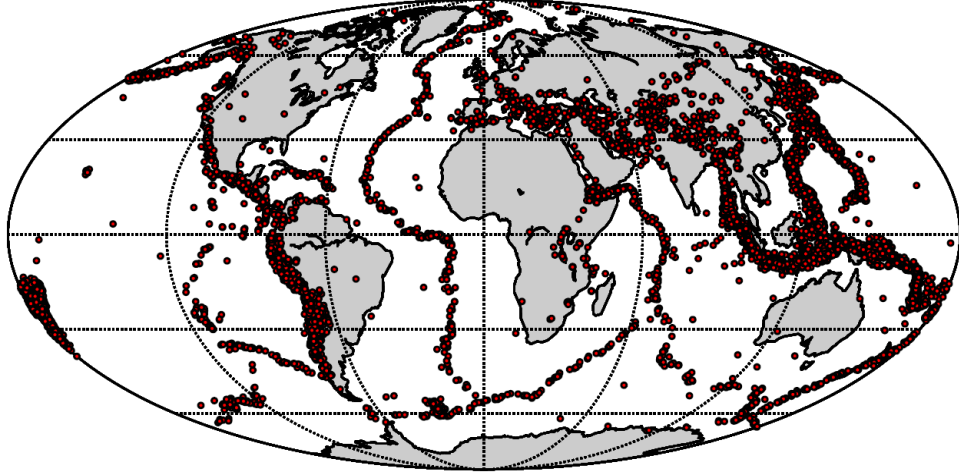
2. Data-centric

Continuous and Event-based seismograms

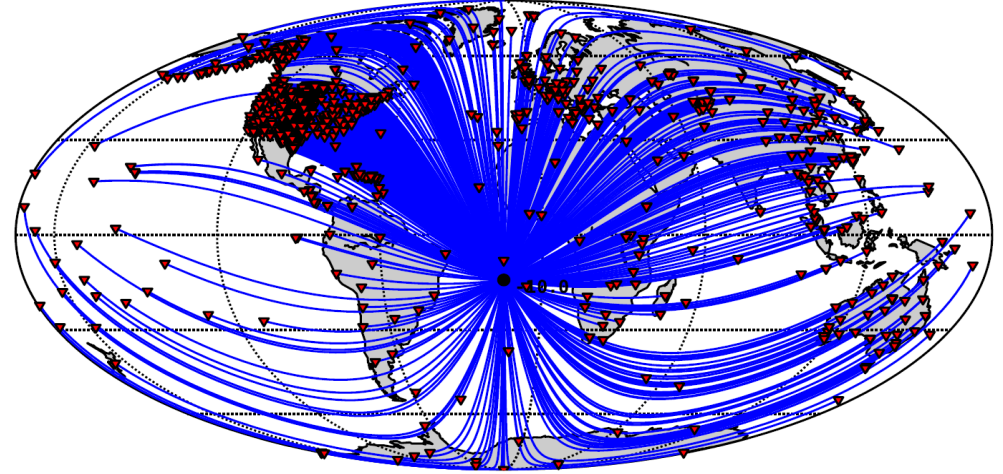


Plots

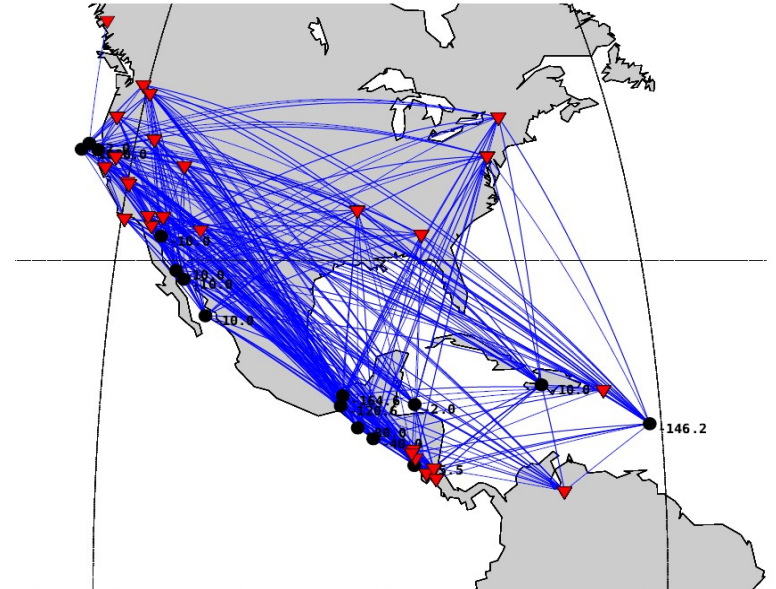
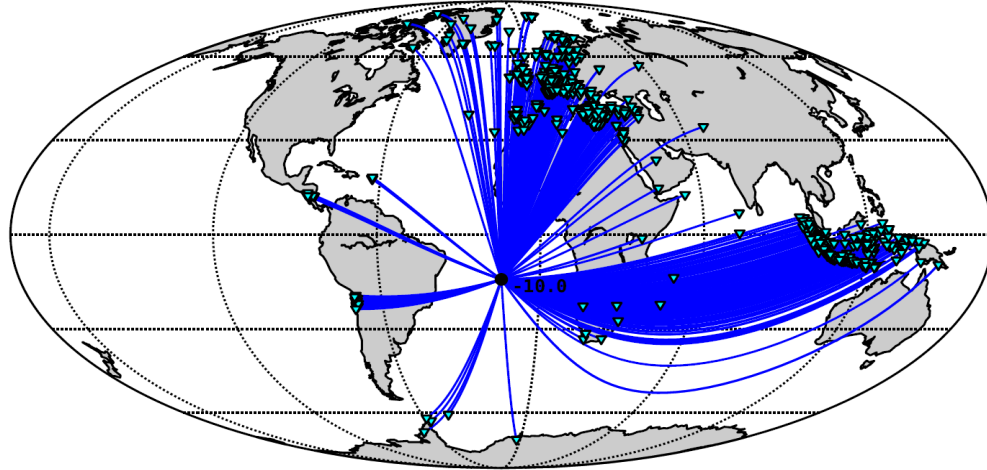
Events (1998-2011)



IRIS



Arclink



Response file

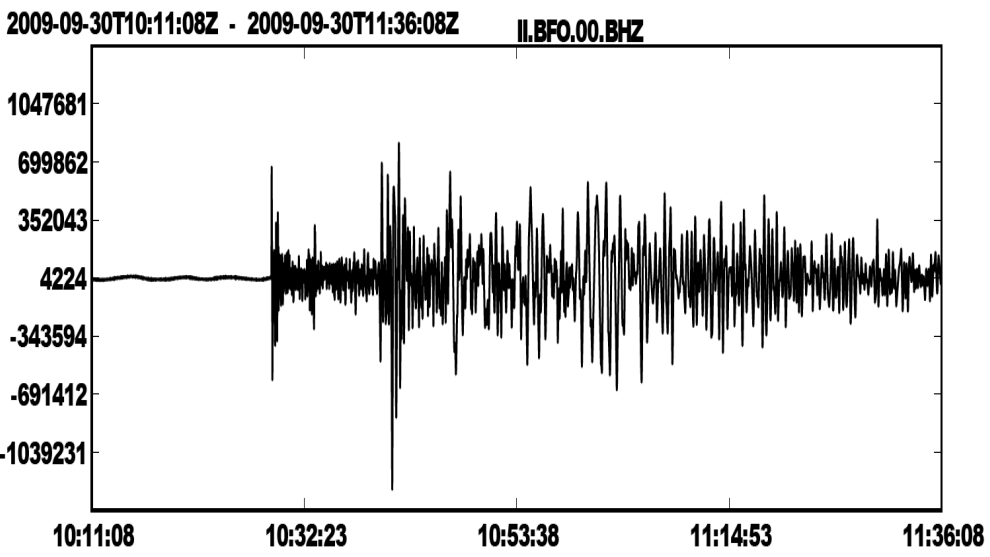
$u = \text{convolution}(\text{source}, \text{earth}, \text{instrument})$

Response:

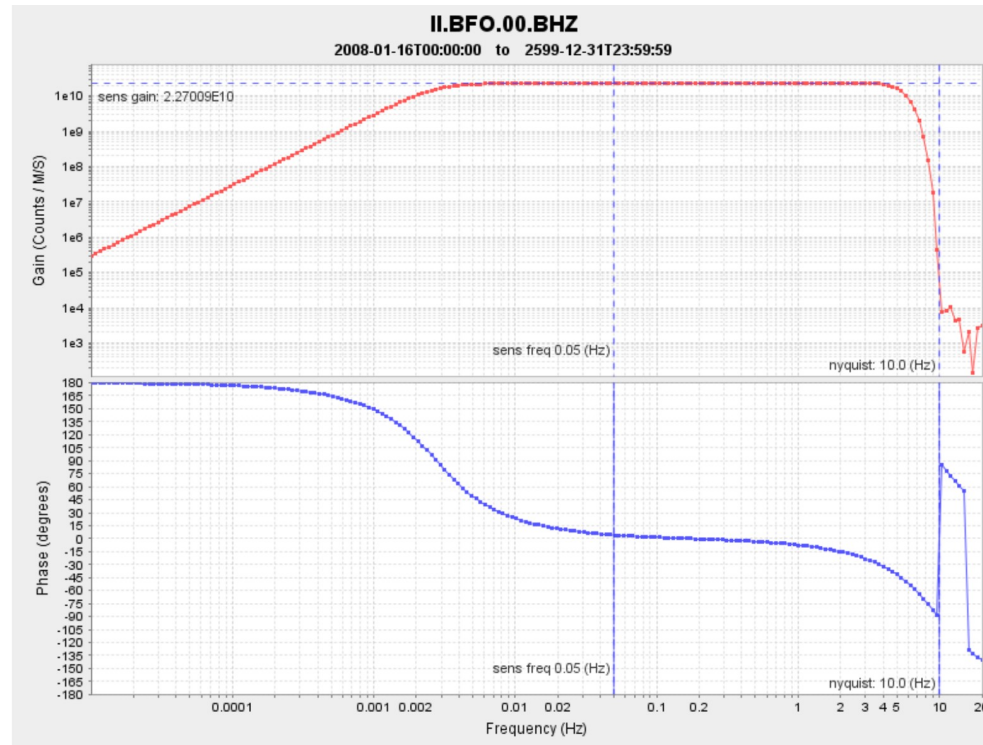
- Function of the sensor (poles and zeros+constant gain (vol to m/s))
- Filters (analog signal to digitized sample) [poles and zeros]

digitizers → series of low pass and decimation → output sampling rate

```
#####
#
B050F03 Station: BFO
B050F16 Network: II
B052F03 Location: 00
B052F04 Channel: BHZ
B052F22 Start date: 2008,016,00:00:00
B052F23 End date: 2599,365,23:59:59
#
# +-----+
# | Response (Poles and Zeros) |
# | II BFO 00 BHZ |
# | 01/16/2008 to 12/31/2599 |
# +-----+
#
B053F03 Transfer function type: B
B053F04 Stage sequence number: 1
B053F05 Response in units lookup: M/S - Velocity in Meters Per Second
B053F06 Response out units lookup: V - Volts
B053F07 A0 normalization factor: +9.61326E+01
B053F08 Normalization frequency: +5.00000E-02
B053F09 Number of zeroes: 2
B053F14 Number of poles: 4
#
# Complex zeroes:
# i real imag real_error imag_error
B053F10-13 0 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
B053F10-13 1 +0.00000E+00 +0.00000E+00 +0.00000E+00 +0.00000E+00
#
# Complex poles:
# i real imag real_error imag_error
B053F15-18 0 -6.27451E+00 +7.53309E+00 +0.00000E+00 +0.00000E+00
B053F15-18 1 -6.27451E+00 -7.53309E+00 +0.00000E+00 +0.00000E+00
B053F15-18 2 -2.00300E-03 +1.89800E-03 +0.00000E+00 +0.00000E+00
B053F15-18 3 -2.00300E-03 -1.89800E-03 +0.00000E+00 +0.00000E+00
#
# +-----+
# | Channel Sensitivity/Gain |
# | II BFO 00 BHZ |
# | 01/16/2008 to 12/31/2599 |
# +-----+
```

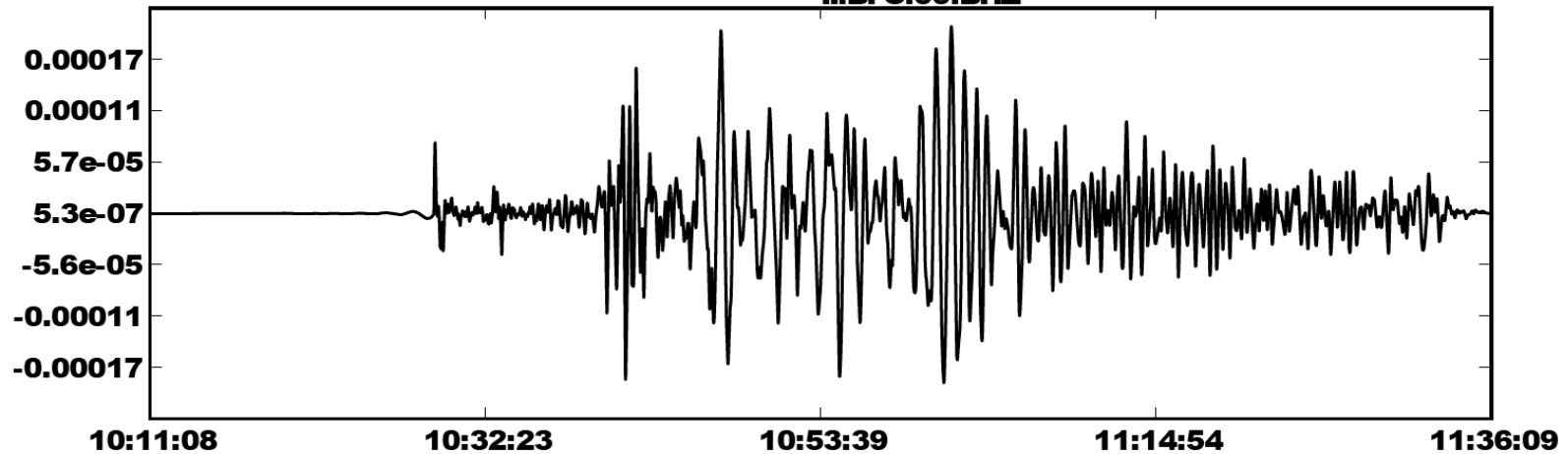


Instrument Correction

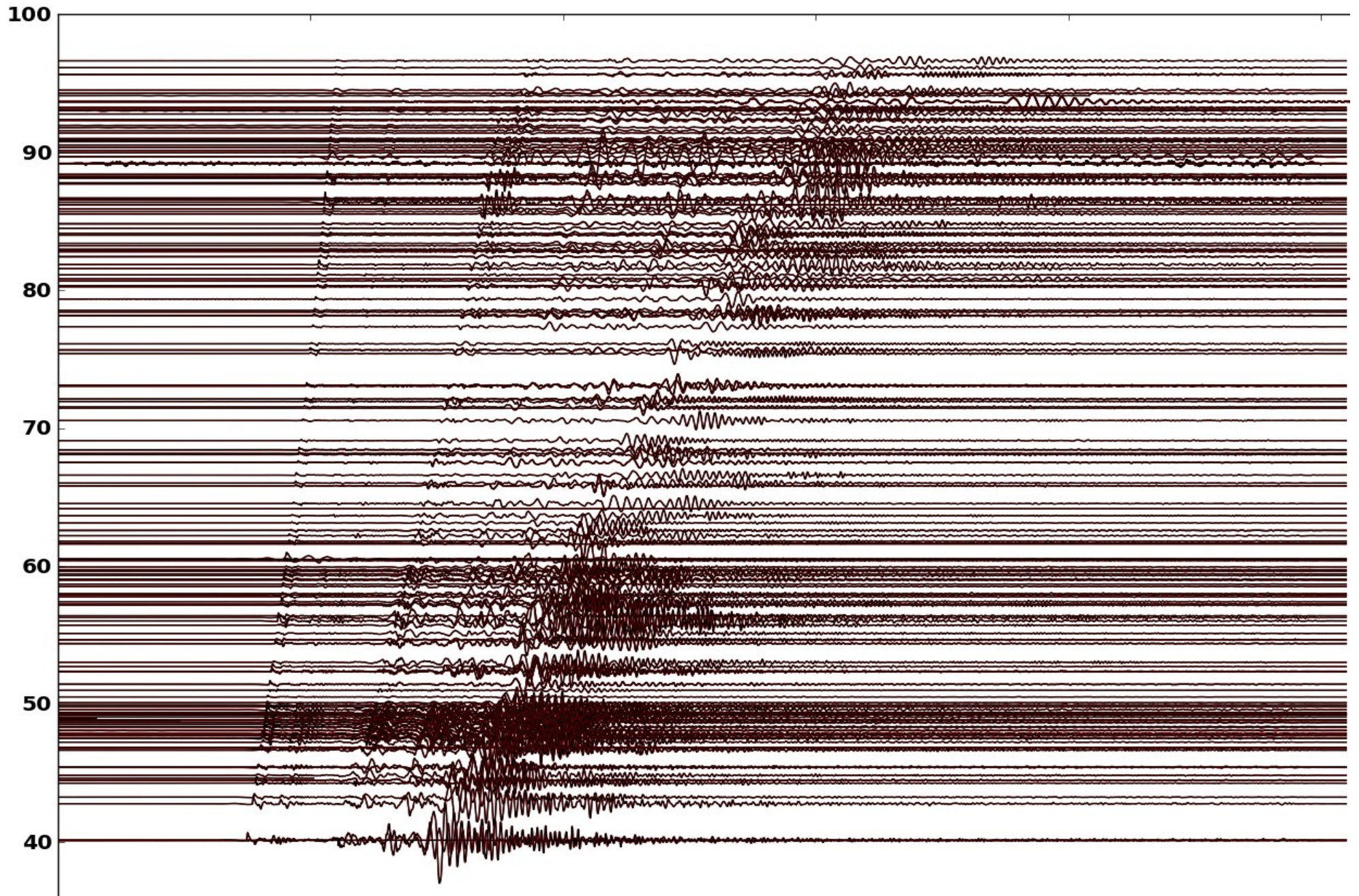


2009-09-30T10:11:08Z - 2009-09-30T11:36:09Z

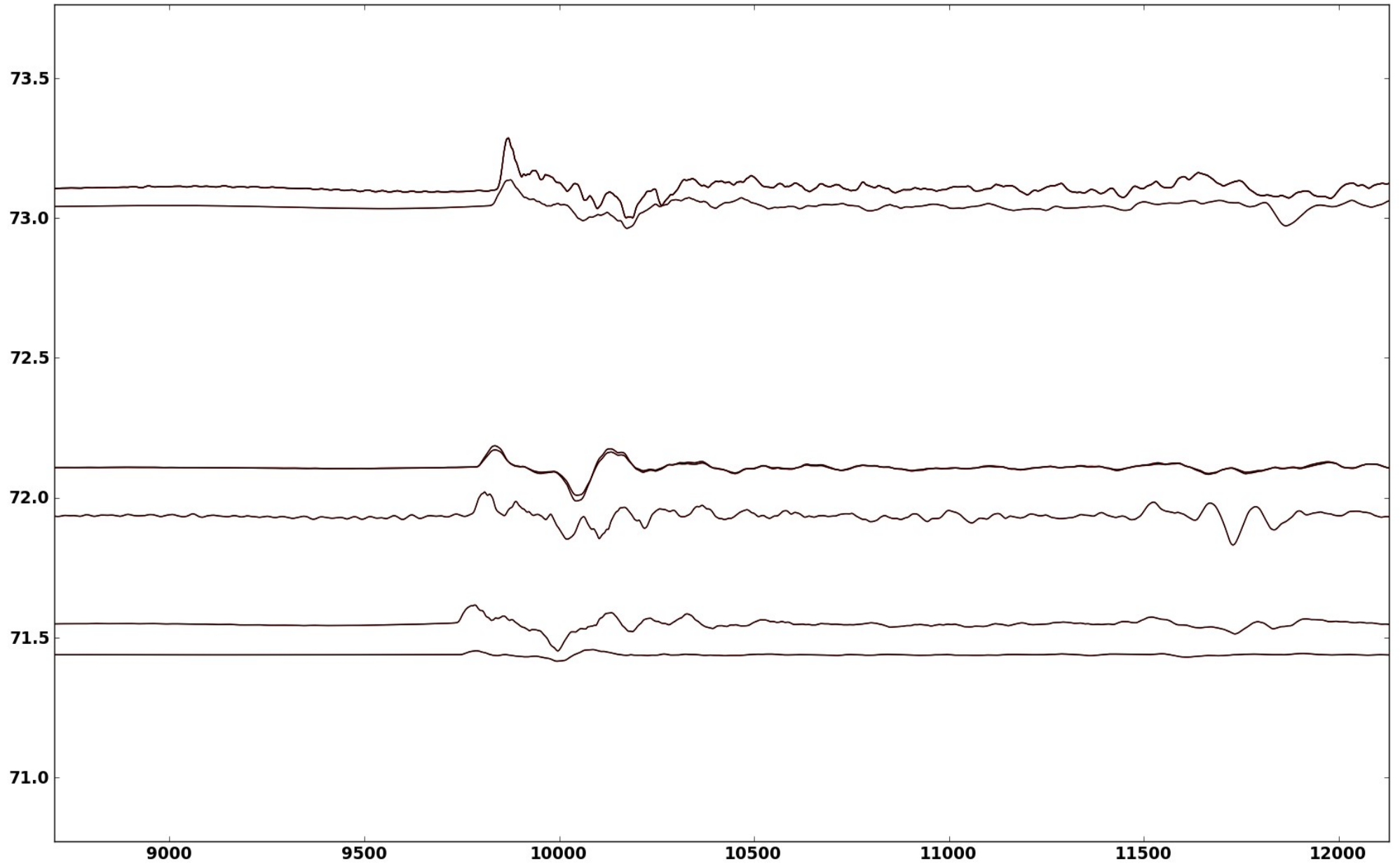
II.BFO.00.BHZ



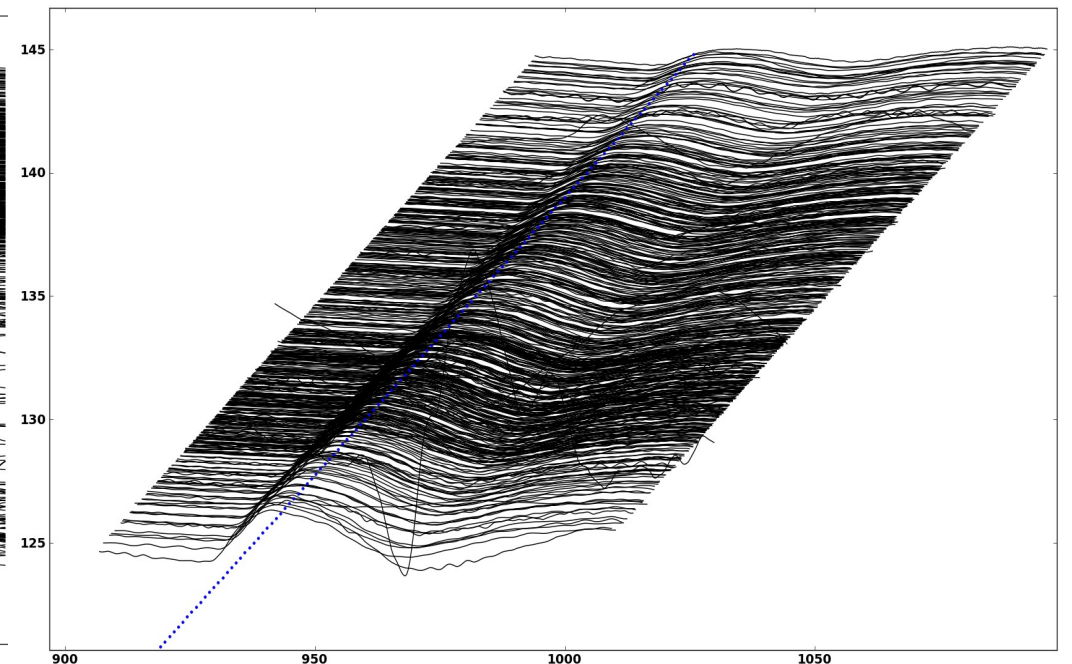
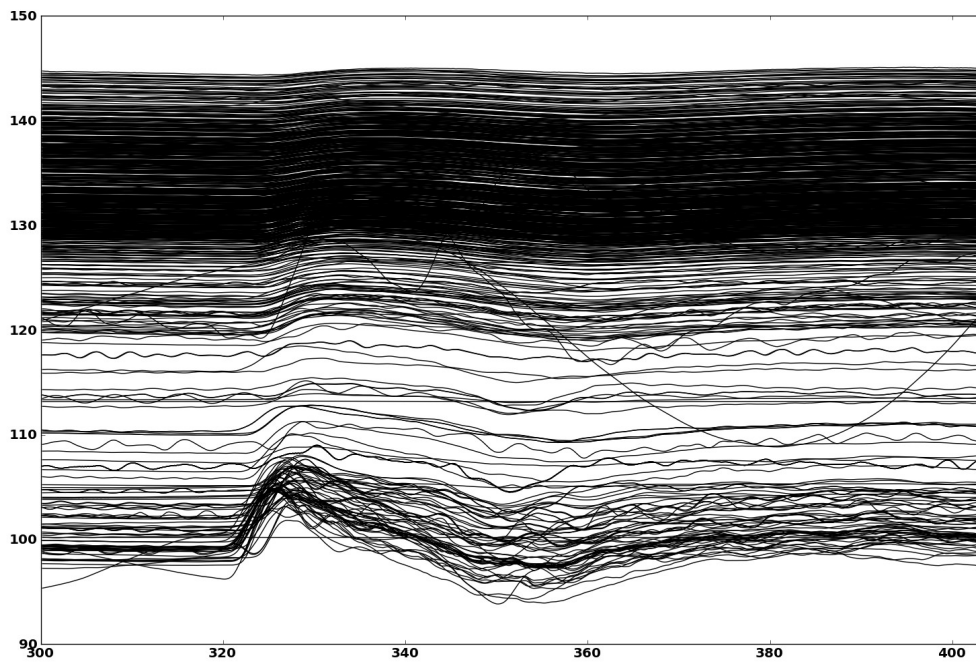
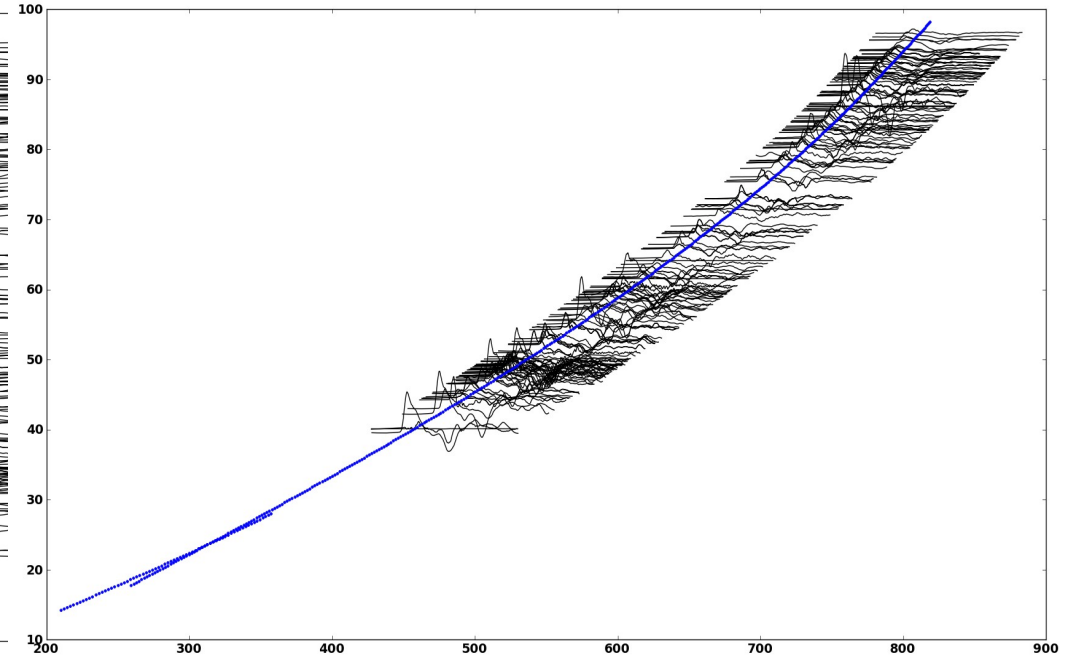
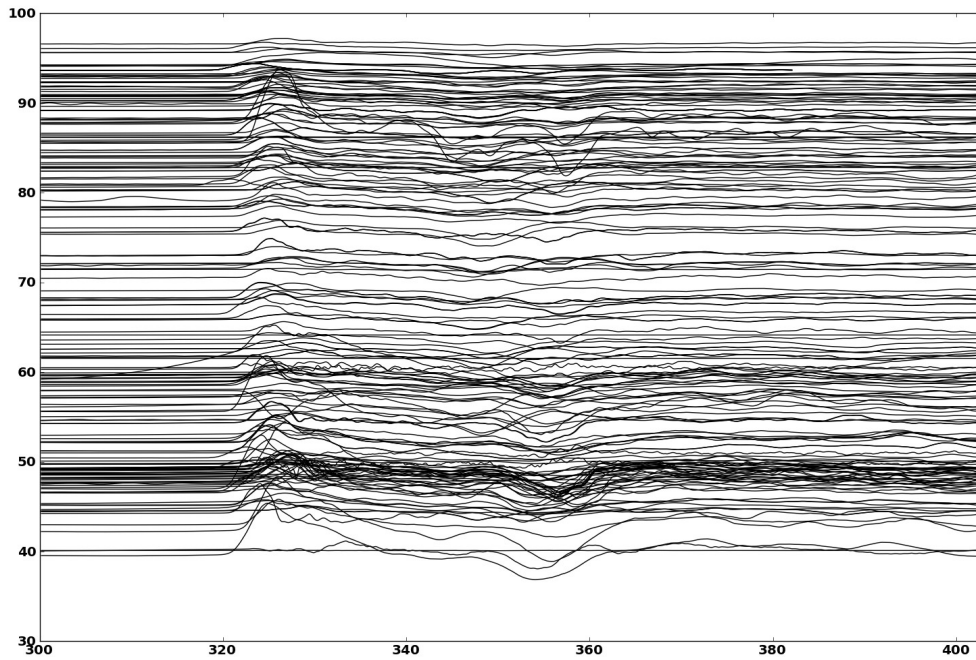
Selecting required seismograms



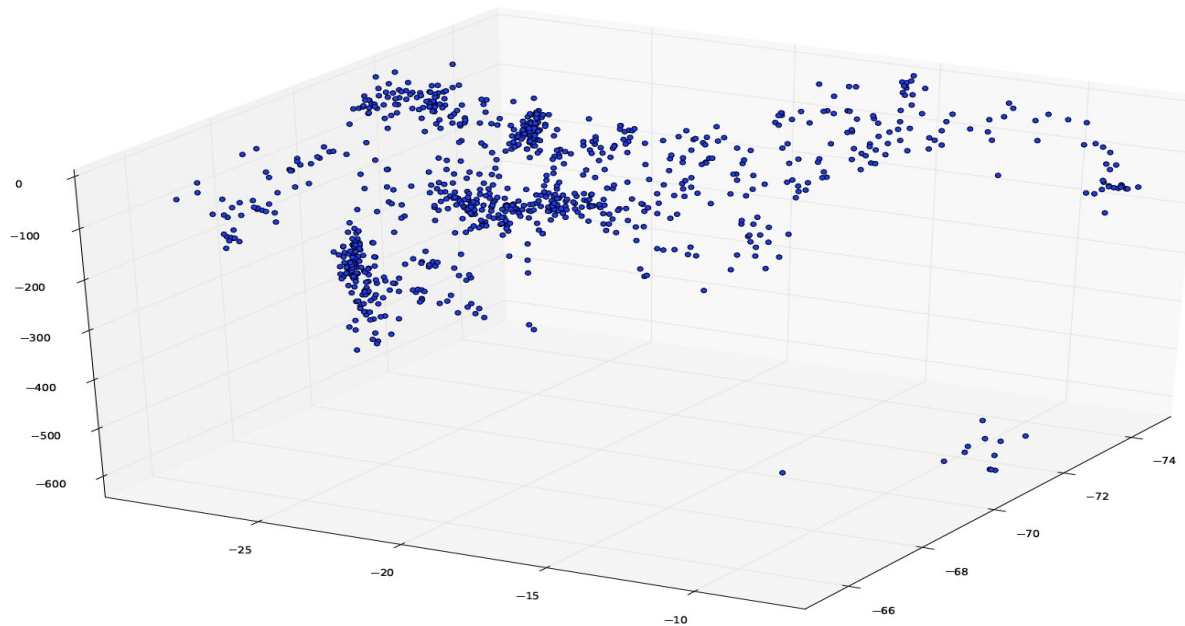
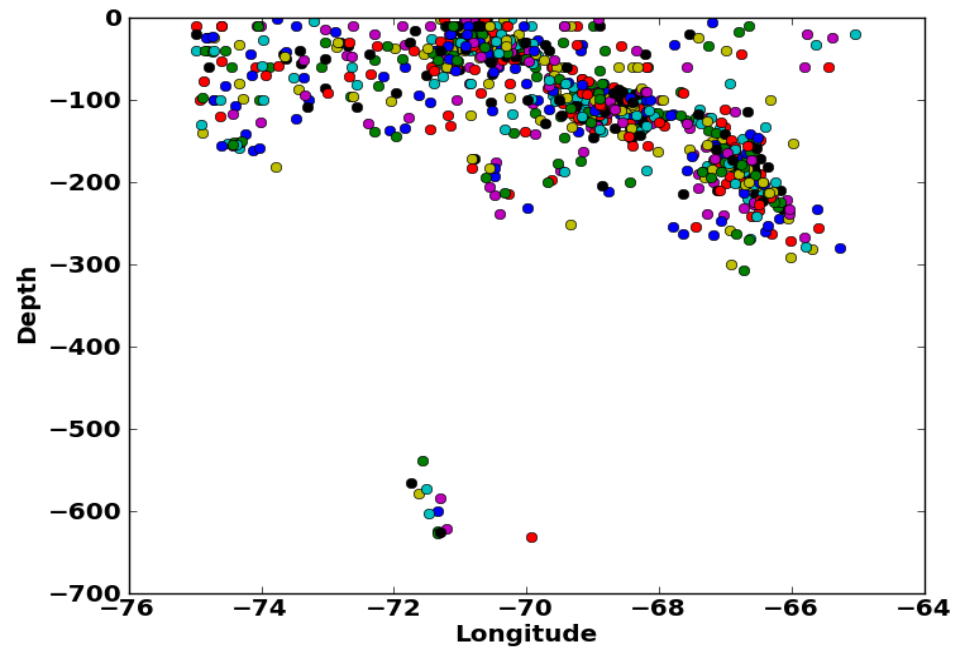
NDLB vs rdseed+SAC



Cutting TF Windows



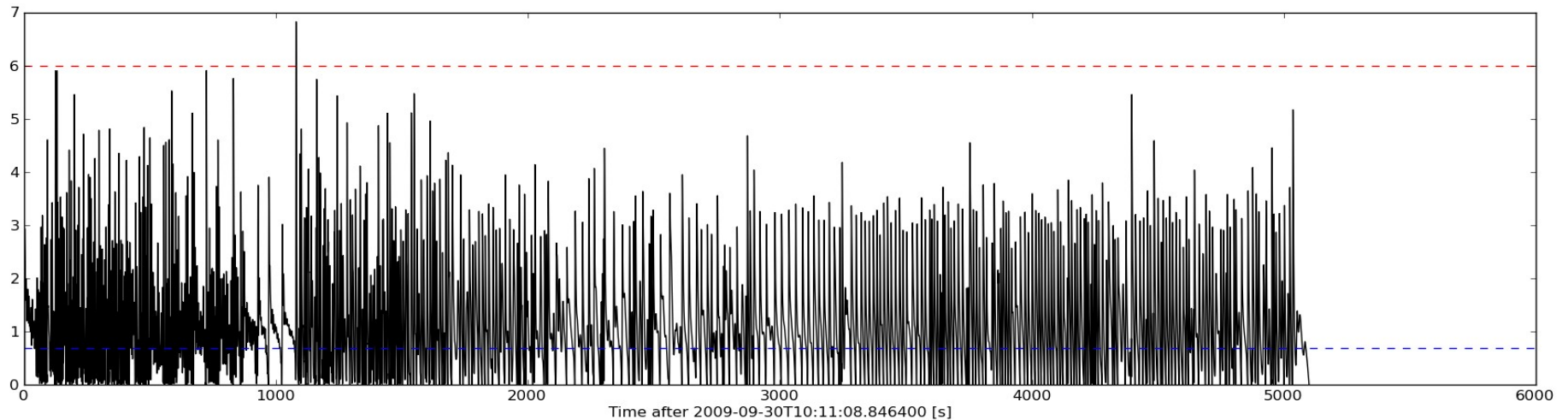
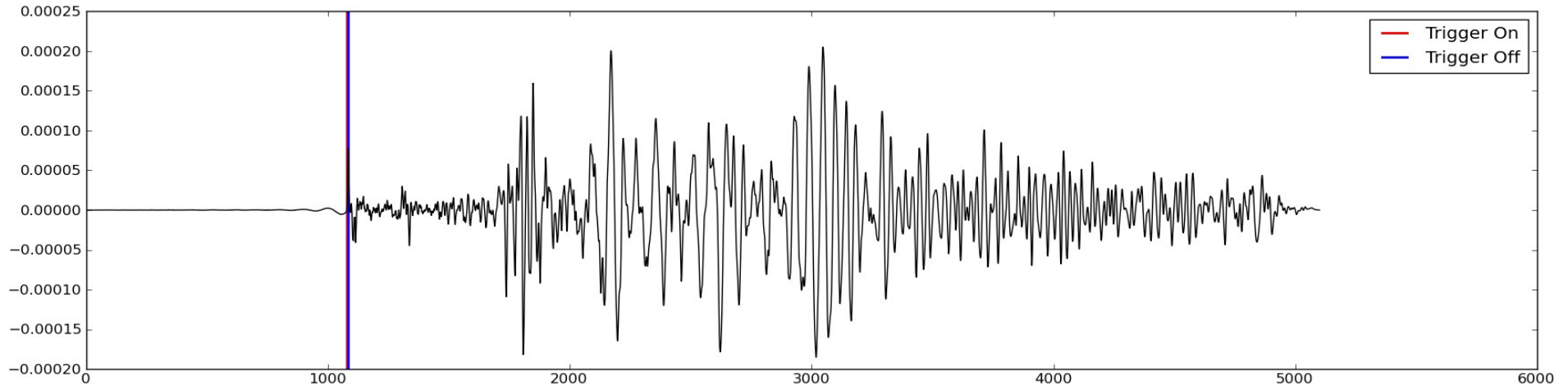
Process-centric...one example (Wadati-Benioff Zone)



Thank you!

Close Future!

1. STA/LTA (Short/Long Term Averaging)



2. Compute Synthetic Seismograms (AXISEM)

Instrument Correction

1. RTR
2. Taper

