

## Report on LLO and LHO Seismic Environment for the Past Three Years

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### Introduction

This document presents the yearly ground rms-velocity histograms and percentiles at both LLO and LHO. The ground noise level, on average, has decreased in the 0.03~3Hz band at LLO and 0.1~30Hz band at LHO for the past three years. The study serves as reference for advanced LIGO seismic isolation design requirement. Result shown here is merely the statistics of past three years of seismic data and is not intended to be used to predict future seismic environment.

### Data

Raw data recorded from the LLO Guralp and STS-2 seismometers, and the LHO Guralp seismometers was processed into seismic band-limited minute-rms data by the seismic division of LIGO real-time Data Monitoring Tool (DMT). Table 1 lists the location, direction, and band information of the DMT seismic band-limited minute-rms data used in this study.

	LLO STS-2	LLO Guralp	LHO Guralp
Station	Corner, EX, EY	Corner, EX, EY	Corner, EX, EY, MX, MY
Direction	X, Y	X, Y, Z	X, Y, Z
Band	0.03~0.1Hz, 0.1~0.2Hz, 0.2~0.35Hz, 0.35~1Hz, 1~3Hz	0.1~0.3Hz, 0.3~1Hz, 1~3Hz, 3~10Hz, 10~30Hz	0.1~0.3Hz, 0.3~1Hz, 1~3Hz, 3~10Hz, 10~30Hz

**Table 1**

The time periods inspected are,  
LLO STS-2: Oct. 01, 2004~Oct. 01, 2006 (GPS time 780624013 to 843696014).  
LLO Guralp: Oct. 01, 2003~Oct. 01, 2006 (GPS time 749001613 to 843696014).  
LHO Guralp: Oct. 01, 2003~Oct. 01, 2006 (GPS time 749001613 to 843696014).  
From these time periods, one-year ground rms-velocity histograms and percentiles are constructed.

There was no raw LLO STS-2 data From March 2004 to July 2004, during which HEPI was installed. Constructing histograms and percentiles from time period, Oct. 01,

2003 to Oct. 01, 2004, will have no sample from these months. This is the reason that only two years of LLO STS-2 data was used in this study. Table 2 lists the number of available minute-rms data points per year.

	LLO STS-2	LLO Guralp	LHO Guralp
Oct 01 2003 to Oct 01 2004	-	480480 (91.4%)	477660 (90.9%)
Oct 01 2004 to Oct 01 2005	420960 (80.1%)	403500 (76.8%)	515940 (98.2%)
Oct 01 2005 to Oct 01 2006	518340 (98.7%)	507480 (96.6%)	522660 (99.4%)

**Table 2** Number of available raw data points per year. A full-year of data would have 525600 points. Numbers in the parenthesis indicate the percentage of data available per year.

Physical locations of the data are LDAS tape archives at both sites. Specifically, under directories,

LLO STS-2: /archive/frames/dmt/LLO/LLO\_SEI\_blrms, subdirectories /L-M-780 to /L-M-843.

LLO Guralp: /archive/frames/dmt/LLO/New\_Seis\_Blrms, subdirectories /L-M-749 to /L-M-843.

LHO Guralp: /dmt/New\_Seis\_Blrms, subdirectories /H-M-749 to /H-M-843.

The exact DMT seismic channel names stored in the tap archives have changed few times during the time period inspected, even though the physical quantity they represent remained the same. Table 3, 4, and 5 summarize the channel name changes from Oct. 01, 2003 to Oct. 01, 2006 (GPS time 749001613 to 843696014). LLO Guralp channels are the only ones that have remained unchanged during this period.

GPS time	LLO STS-2
780624013 to 813376800	L1:SEI- $\{station\}$ _STS2_ $\{direction\}$ _ $\{band\}$ Hz.rms
813376800 to 843696014	L1:DMT-BRMS SEI $\{station\}$ STS2 $\{direction\}$ $\{band\}$ Hz.rms

**Table 3** Note:  $\{station\}$ =LVEA, or ETMX, or ETMY.  $\{direction\}$ =X or Y.  $\{band\}$ =0p03-0p1, or 0p1-0p2, or 0p2-0p35, or 0p35-1, or 1-3.

GPS time	LLO Guralp
749001613 to 843696014	L0:PEM- $\{station\}$ _SEIS $\{direction\}$ _ $\{band\}$ Hz.rms

**Table 4** Note:  $\{station\}$ =LVEA, or EX, or EY.  $\{direction\}$ =X or Y or Z.  $\{band\}$ = 0.1-0.3, or 0.3-1, or 1-3, or 3-10, or 10-30.

GPS time	LHO Guralp
749001613 to 812836800	H0:PEM- $\{station\}$ _SEIS $\{direction\}$ _ $\{band1\}$ Hz.rms
812836800 to 812840400	H0:DMT-BRMS_PEM- $\{station\}$ _SEIS $\{direction\}$ _ $\{band2\}$ Hz.rms
812840400 to 843696014	H0:DMT- BRMS_PEM_ $\{station\}$ _SEIS $\{direction\}$ _ $\{band2\}$ Hz.rms

**Table 5** Note:  $\{station\}$ =LVEA, or EX, or EY, or MX, or MY.  $\{direction\}$ =X or Y or Z.  $\{band1\}$ = 0.1-0.3, or 0.3-1, or 1-3, or 3-10, or 10-30.  $\{band2\}$ = 0.1\_0.3, or 0.3\_1, or 1\_3, or 3\_10, or 10\_30.

In this study, data quality suffers from two major problems. The first is intentional and un-natural disturbances near the seismometers, such as commissioning activities and heavy construction machinery moving onsite the observatories. At the time of this study, detail record of times when these events occurred was already impossible to reconstruct. This study does not exclude any data that might pertain to those times. The second is data drop-outs (or zero data points) or unrealistic high values ( $\geq 2^{30}$  counts) in the minute-rms data generated by LIGO DMT error. The percentage of raw data contaminated by data drop-outs or unrealistic high values is listed in Table 6. Time when these occurred are excluded from this study.

	LLO STS-2	LLO Guralp	LHO Guralp
Oct 01 2003 to Oct 01 2004	-	16.5%	1.3%
Oct 01 2004 to Oct 01 2005	0.6%	3.6%	0.5%
Oct 01 2005 to Oct 01 2006	0.3%	0.3%	0.6%

**Table 6**

## Method

The DMT seismic data stores the ADC output counts squared. The first step of the analysis is to take the square root of the raw data and apply the calibration factor shown in Table 7. Documentation of the calibration factor can be found in [1].

For, each channel, cumulative normalized histograms were constructed with bin size and number of bins shown in Table 7. The number of bins is required to cover 0 to 32768 ADC counts. 50th, 75th, 90th, 95th rms-velocity percentiles were then derived from the x value (or velocity) where the  $y=0.50$ ,  $y=0.75$ ,  $y=0.90$ ,  $y=0.95$  lines intersects the curves in the cumulative normalized histograms.

	LLO STS-2	LLO Guralp	LHO Guralp
Calibration factor (m/s)	4.36E-04	7.63E-03	7.60E-03
Histogram bin size (m/s)	1.00E-03	1.00E-02	1.00E-02
Number of bins	14280	25002	25002

**Table 7**

## Results

Rms-velocity percentile tables and cumulative normalized histograms for all DMT seismic channels at LLO and LHO can be found in Appendix A. Rms-velocity percentile numbers from E. Daw's study [2], whenever available, are also included in the tables for comparison. Note that in his study, the time span is April 2nd 2001 to December 10th 2002, so certain months are sampled twice, hence the comparison is not entirely fair.

## Discussion

### LLO

The LLO seismic environment has become quieter for the past two years, according to the cumulative normalized histogram profiles measured by all the STS-2 channels. Such trend can be summarized in Table 8, which lists the mean rms-velocity percentile values of all channels per year per band. Suggested here as the LLO ground noise level for the past two years is Table 9, which lists the mean rms-velocity percentile values of all channels in two years per band. Table 10 lists the noisiest channel per band in two years on average, as well as its recorded rms-velocity percentile values. The noisiest channel is selected if all four of its rms-velocity percentile values are the greatest among all channels.

The accompanying plots for Table 8 and 9 can be found in Appendix B.1 and B.2.

LLO STS-2					
Band	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.03~0.1Hz	Oct 01 2004 to Oct 01 2005	0.07	0.12	0.22	0.38
	Oct 01 2005 to Oct 01 2006	0.05	0.09	0.16	0.24
0.1~0.2Hz	Oct 01 2004 to Oct 01 2005	0.47	0.79	1.23	1.67
	Oct 01 2005 to Oct 01 2006	0.42	0.75	1.21	1.62
0.2~0.35Hz	Oct 01 2004 to Oct 01 2005	0.45	0.70	1.05	1.40
	Oct 01 2005 to Oct 01 2006	0.40	0.64	0.94	1.20
0.35~1Hz	Oct 01 2004 to Oct 01 2005	0.21	0.29	0.42	0.54
	Oct 01 2005 to Oct 01 2006	0.19	0.25	0.35	0.44
1~3Hz	Oct 01 2004 to Oct 01 2005	0.12	0.21	0.33	0.48
	Oct 01 2005 to Oct 01 2006	0.12	0.21	0.31	0.40

**Table 8** Mean rms-velocity percentile values per year per band.

LLO STS-2				
Band	Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%
0.03~0.1Hz	0.06	0.10	0.18	0.29
0.1~0.2Hz	0.44	0.77	1.22	1.64
0.2~0.35Hz	0.42	0.67	0.98	1.28
0.35~1Hz	0.20	0.27	0.38	0.49
1~3Hz	0.12	0.21	0.32	0.42

**Table 9** LLO ground noise level. Mean rms-velocity percentile values per band from Oct. 01, 2004 to Oct. 01, 2006.

LLO STS-2					
Band	Noisiest channel	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.03~0.1Hz	L1:DMT-BRMS_SEI_LVEA_STS2_X	0.06	0.11	0.20	0.32
0.1~0.2Hz	L1:DMT-BRMS_SEI_LVEA_STS2_Y	0.45	0.79	1.25	1.68
0.2~0.35Hz	L1:DMT-BRMS_SEI_LVEA_STS2_X	0.43	0.69	1.02	1.33
0.35~1Hz	L1:DMT-BRMS_SEI_EY_STS2_Y	0.22	0.30	0.42	0.54
1~3Hz	L1:DMT-BRMS_SEI_EY_STS2_Y	0.16	0.29	0.43	0.60

**Table 10** Noisiest channel per band from Oct. 01, 2004 to Oct. 01, 2006.

Numbers measured by the Guralp seismometers suggest LLO seismic environment has become quieter from 0.1-3Hz for the past three years. Table 11 and 12 list the mean rms-velocity percentile values of all horizontal channels per year per band, and the mean rms-velocity percentile values of all horizontal channels in three years per band, respectively, and Table 14 and 15 list those of all vertical channels. On average, the horizontal seismic motion is about 69% noisier in the 0.1~0.3Hz band, 46% noisier in the 0.3~1Hz band, and 9% quieter in the 1~3Hz band than the vertical motion for the past three years, as shown in Table 12 and 15.

Below 3Hz, LLO EY maintained the noisiest station for the past three years, as shown in Table 13 and 16. Above 3Hz the yearly noise trend varies from channel to channel and is best discussed individually. Note that unlike the LLO STS-2 channels, many Guralp channels recorded high percentage (of time) of unusually large motion. This may be partially due to poorer data quality as suggested in Table 6, or close-source disturbance-something not removed from the raw data in this study. Comparing Tables 9 and 12 in the 1-3Hz band one can see the noise level recorded by the STS-2 is slightly lower.

The accompanying plots for Table 11, 12, 14, and 15 can be found in Appendix B.3 and B.4.

LLO Guralp, x and y direction					
Band	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	Oct 01 2003 to Oct 01 2004	1.19	2.11	3.19	4.90
	Oct 01 2004 to Oct 01 2005	0.69	1.05	1.68	2.54
	Oct 01 2005 to Oct 01 2006	0.55	0.94	1.42	1.85
0.3~1Hz	Oct 01 2003 to Oct 01 2004	0.41	1.14	1.84	2.92
	Oct 01 2004 to Oct 01 2005	0.27	0.40	0.68	1.14
	Oct 01 2005 to Oct 01 2006	0.22	0.32	0.47	0.63
1~3Hz	Oct 01 2003 to Oct 01 2004	0.15	0.26	0.46	0.90
	Oct 01 2004 to Oct 01 2005	0.16	0.24	0.36	0.50
	Oct 01 2005 to Oct 01 2006	0.15	0.22	0.34	0.43

**Table 11** Mean rms-velocity percentile values per year per band, in horizontal directions.

LLO Guralp, x and y direction				
Band	Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%
0.1~0.3Hz	0.73	1.24	2.19	2.98
0.3~1Hz	0.28	0.44	1.07	1.58
1~3Hz	0.16	0.24	0.37	0.54

**Table 12** LLO ground noise level. Mean rms-velocity percentile values per band, in horizontal directions, from Oct. 01, 2003 to Oct. 01, 2006.

LLO Guralp, x and y direction					
Band	Noisiest channel	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	L0:PEM-EY_SEISX	0.75	1.36	3.55	9.76
0.3~1Hz	L0:PEM-EY_SEISX	0.31	0.51	1.76	5.56
1~3Hz	L0:PEM-EY_SEISX	0.19	0.35	0.67	1.06

**Table 13** Noisiest channel per band, in horizontal directions, from Oct. 01, 2003 to Oct. 01, 2006.

LLO Guralp, z direction					
Band	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	Oct 01 2003 to Oct 01 2004	0.67	1.85	2.66	4.11
	Oct 01 2004 to Oct 01 2005	0.36	0.57	1.07	1.98
	Oct 01 2005 to Oct 01 2006	0.29	0.50	0.77	0.99
0.3~1Hz	Oct 01 2003 to Oct 01 2004	0.30	1.06	1.62	2.49
	Oct 01 2004 to Oct 01 2005	0.16	0.30	0.63	1.06
	Oct 01 2005 to Oct 01 2006	0.14	0.22	0.36	0.52
1~3Hz	Oct 01 2003 to Oct 01 2004	0.15	0.28	0.44	0.65
	Oct 01 2004 to Oct 01 2005	0.16	0.26	0.43	0.64
	Oct 01 2005 to Oct 01 2006	0.16	0.26	0.40	0.52

**Table 14** Mean rms-velocity percentile values per year per band, in the z direction.

LLO Guralp, z direction				
Band	Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%
0.1~0.3Hz	0.39	0.68	1.75	2.39
0.3~1Hz	0.16	0.34	1.01	1.42
1~3Hz	0.15	0.26	0.42	0.60

**Table 15** LLO ground noise level. Mean rms-velocity percentile values per band, in the z direction, from Oct. 01, 2003 to Oct. 01, 2006.

LLO Guralp, z direction					
Band	Noisiest channel	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	L0:PEM-EY_SEISZ	0.39	0.72	1.98	4.06
0.3~1Hz	L0:PEM-EY_SEISZ	0.18	0.37	1.18	2.34
1~3Hz	L0:PEM-EY_SEISZ	0.21	0.33	0.51	0.77

**Table 16** Noisiest channel per band, in the z direction, from Oct. 01, 2003 to Oct. 01, 2006.

## LHO

For the 0.1~0.3Hz and 0.3~1Hz bands, there was a slight decrease in ground rms-velocity above the 50th percentile level, observed in nearly all channels from Oct. 01, 2004 to Oct. 01, 2005, otherwise the noise level remained the same for the past three years. The exceptions are EX\_SEIS{Y,Z}\_{0.1\_0.3,0.3\_1}Hz channels, whose changes were more distinct. Above 1Hz, the ground gradually got quieter for the past three years, as observed in all channels except EX\_SEISZ\_{1\_3,3\_10}Hz channels. Table 17, 18, and 19 list the mean rms-velocity percentile values of all horizontal channels per year per band, the mean rms-velocity percentile values of all horizontal channels in three years per band, and the noisiest channel per band in the past three years, respectively, and Table 20, 21, and 22 list those of all vertical channels. On average, the horizontal seismic motion is about 21% quieter in the 0.1~0.3Hz band, 20% noisier in the 0.3~1Hz band, and 67% noisier in the 1~3Hz band than the vertical motion for the past three years, as shown in Table 18 and 21.

The accompanying plots for Table 17, 18, 20, and 21 can be found in Appendix B.5 and B.6.

LHO Guralp, x and y direction					
Band	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	Oct 01 2003 to Oct 01 2004	0.16	0.31	0.45	0.58
	Oct 01 2004 to Oct 01 2005	0.19	0.30	0.41	0.50
	Oct 01 2005 to Oct 01 2006	0.18	0.32	0.50	0.64
0.3~1Hz	Oct 01 2003 to Oct 01 2004	0.06	0.08	0.11	0.13
	Oct 01 2004 to Oct 01 2005	0.05	0.07	0.09	0.11
	Oct 01 2005 to Oct 01 2006	0.06	0.08	0.10	0.12
1~3Hz	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.08	0.10
	Oct 01 2004 to Oct 01 2005	0.04	0.05	0.07	0.09
	Oct 01 2005 to Oct 01 2006	0.04	0.05	0.06	0.07
3~10Hz	Oct 01 2003 to Oct 01 2004	0.15	0.21	0.27	0.31
	Oct 01 2004 to Oct 01 2005	0.14	0.16	0.22	0.27
	Oct 01 2005 to Oct 01 2006	0.12	0.16	0.21	0.26
10~30Hz	Oct 01 2003 to Oct 01 2004	0.20	0.25	0.32	0.37
	Oct 01 2004 to Oct 01 2005	0.16	0.20	0.24	0.26
	Oct 01 2005 to Oct 01 2006	0.15	0.19	0.22	0.25

**Table 17** Mean rms-velocity percentile values per year per band, in horizontal directions.



LHO Guralp, x and y direction				
Band	Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%
0.1~0.3Hz	0.18	0.31	0.46	0.58
0.3~1Hz	0.06	0.08	0.10	0.12
1~3Hz	0.04	0.05	0.07	0.09
3~10Hz	0.12	0.15	0.20	0.28
10~30Hz	0.14	0.19	0.22	0.25

**Table 18** LHO ground noise level. Mean rms-velocity percentile values per band, in horizontal directions, from Oct. 01, 2003 to Oct. 01, 2006.

LHO Guralp, x and y direction					
Band	Noisiest channel	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	H0:DMT-BRMS PEM EX SEISY	0.21	0.37	0.56	0.72
0.3~1Hz	H0:DMT-BRMS PEM EX SEISX	0.08	0.10	0.13	0.16
1~3Hz	H0:DMT-BRMS PEM LVEA SEISX	0.05	0.06	0.08	0.10
3~10Hz	-----				
10~30Hz	H0:DMT-BRMS PEM MX SEISX	0.22	0.27	0.37	0.40

**Table 19** Noisiest channel per band, in horizontal directions, from Oct. 01, 2003 to Oct. 01, 2006.

LHO Guralp, z direction					
Band	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	Oct 01 2003 to Oct 01 2004	0.22	0.41	0.61	0.79
	Oct 01 2004 to Oct 01 2005	0.22	0.36	0.51	0.62
	Oct 01 2005 to Oct 01 2006	0.21	0.39	0.62	0.80
0.3~1Hz	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.07	0.08
	Oct 01 2004 to Oct 01 2005	0.04	0.06	0.07	0.09
	Oct 01 2005 to Oct 01 2006	0.04	0.06	0.08	0.10
1~3Hz	Oct 01 2003 to Oct 01 2004	0.03	0.03	0.05	0.06
	Oct 01 2004 to Oct 01 2005	0.03	0.03	0.05	0.06
	Oct 01 2005 to Oct 01 2006	0.03	0.03	0.04	0.05
3~10Hz	Oct 01 2003 to Oct 01 2004	0.15	0.19	0.24	0.28
	Oct 01 2004 to Oct 01 2005	0.12	0.16	0.21	0.27
	Oct 01 2005 to Oct 01 2006	0.11	0.15	0.19	0.25
10~30Hz	Oct 01 2003 to Oct 01 2004	0.22	0.34	0.41	0.44
	Oct 01 2004 to Oct 01 2005	0.20	0.28	0.39	0.42
	Oct 01 2005 to Oct 01 2006	0.18	0.22	0.30	0.34

**Table 20** Mean rms-velocity percentile values per year per band, in the z direction.

LHO Guralp, z direction				
Band	Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%
0.1~0.3Hz	0.21	0.37	0.56	0.71
0.3~1Hz	0.04	0.06	0.08	0.10
1~3Hz	0.03	0.03	0.05	0.06
3~10Hz	0.13	0.18	0.24	0.32
10~30Hz	0.20	0.34	0.41	0.43

**Table 21** LHO ground noise level. Mean rms-velocity percentile values per band, in the z direction, from Oct 01 2003 to Oct 01 2006.

LHO Guralp, z direction					
Band	Noisiest channel	Velocity percentile ( $\mu\text{m/s}$ )			
		50%	75%	90%	95%
0.1~0.3Hz	H0:DMT-BRMS_PEM_MX_SEISZ	0.22	0.41	0.62	0.79
0.3~1Hz	H0:DMT-BRMS_PEM_EX_SEISZ	0.06	0.08	0.10	0.12
1~3Hz	H0:DMT-BRMS_PEM_EX_SEISZ	0.03	0.04	0.06	0.07
3~10Hz	-----				
10~30Hz	H0:DMT-BRMS_PEM_LVEA_SEISZ	0.36	0.40	0.43	0.46

**Table 22** Noisiest channel per band, in the z direction, from Oct. 01, 2003 to Oct. 01, 2006.

### Comparing the two sites

Extracted from Table 12, 15, 18, and 21, Table 23 compares the mean rms-velocity percentile values per band for the past three years at both sites. Table 24 compares the mean rms-velocity, which is the average of all the data of all channels per band, for the past three years at both sites. In the horizontal direction, LLO is noisier by a factor of 5 in the 0.1~0.3Hz band, noisier by a factor of 9 in the 0.3~1Hz band, and noisier by a factor of 4 in the 1~3Hz band than LHO. In the vertical direction, LLO is noisier by a factor of 2.4 in the 0.1~0.3Hz band, noisier by a factor of 7.4 in the 0.3~1Hz band, and noisier by a factor of 7.7 in the 1~3Hz band than LHO.

In the 0.1~0.3Hz band, the LLO horizontal seismic motion is about 69% noisier than vertical, whereas at LHO the horizontal is 21% quieter than the vertical. Similar result was also reported in E. Daw's study.

Band	LLO Guralp, x and y direction				LHO Guralp, x and y direction			
	Velocity percentile ( $\mu\text{m/s}$ )				Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%	50%	75%	90%	95%
0.1~0.3Hz	0.73	1.24	2.19	2.98	0.18	0.31	0.46	0.58
0.3~1Hz	0.28	0.44	1.07	1.58	0.06	0.08	0.10	0.12
1~3Hz	0.16	0.24	0.37	0.54	0.04	0.05	0.07	0.09

Band	LLO Guralp, z direction				LHO Guralp, z direction			
	Velocity percentile ( $\mu\text{m/s}$ )				Velocity percentile ( $\mu\text{m/s}$ )			
	50%	75%	90%	95%	50%	75%	90%	95%
0.1~0.3Hz	0.39	0.68	1.75	2.39	0.21	0.37	0.56	0.71
0.3~1Hz	0.16	0.34	1.01	1.42	0.04	0.06	0.08	0.10
1~3Hz	0.15	0.26	0.42	0.60	0.03	0.03	0.05	0.06

**Table 23** Mean rms-velocity percentile values per band at both sites, Oct. 01 2003 to Oct. 01 2006.

Mean rms-velocity ( $\mu\text{m/s}$ )				
Band	LLO Guralp		LHO Guralp	
	Horizontal	Vertical	Horizontal	Vertical
0.1~0.3Hz	1.18	0.70	0.23	0.29
0.3~1Hz	0.54	0.37	0.06	0.05
1~3Hz	0.21	0.23	0.05	0.03

**Table 24** Mean rms-velocity values per band at both sites, Oct. 01 2003 to Oct. 01 2006.

## Reference

[1] Calibration for LLO STS-2 and Guralp seismometers:

[http://ilog.ligo-la.caltech.edu/ilog/pub/ilog.cgi?group=detector&task=view&dateto view=12/23/2004&anchor\\_to\\_scroll\\_to=2004:12:23:21:30:46-giaime](http://ilog.ligo-la.caltech.edu/ilog/pub/ilog.cgi?group=detector&task=view&dateto view=12/23/2004&anchor_to_scroll_to=2004:12:23:21:30:46-giaime)

Calibration for LHO Guralp seismometers:

<http://apex.ligo-wa.caltech.edu/~roberts/RobertsPEMguide/SciMonCampPEM.html>

[2] Daw E J et al, 2004, Long-term study of the seismic environment at LIGO, Class. Quantum Grav. 21 2255-2273.

## **Appendix**

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A.1 LLO yearly ground rms-velocity percentile and cumulative normalized histograms, measured by STS-2 seismometers.

<b>STS 0.03-0.1Hz</b>							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2004 to Oct 01 2005	0.07	0.13	0.25	0.39
			Oct 01 2005 to Oct 01 2006	0.05	0.09	0.17	0.26
			Oct 01 2004 to Oct 01 2006	0.06	0.11	0.20	0.32
		Y	Oct 01 2004 to Oct 01 2005	0.06	0.11	0.22	0.37
			Oct 01 2005 to Oct 01 2006	0.05	0.08	0.14	0.22
			Oct 01 2004 to Oct 01 2006	0.05	0.09	0.17	0.28
	X end	X	Oct 01 2004 to Oct 01 2005	0.06	0.11	0.20	0.34
			Oct 01 2005 to Oct 01 2006	0.05	0.09	0.15	0.22
			Oct 01 2004 to Oct 01 2006	0.06	0.10	0.17	0.27
	Y end	Y	Oct 01 2004 to Oct 01 2005	0.07	0.12	0.23	0.39
			Oct 01 2005 to Oct 01 2006	0.05	0.09	0.17	0.25
			Oct 01 2004 to Oct 01 2006	0.06	0.10	0.19	0.31

<b>STS 0.1-0.2Hz</b>							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2004 to Oct 01 2005	0.47	0.78	1.21	1.68
			Oct 01 2005 to Oct 01 2006	0.42	0.75	1.22	1.63
			Oct 01 2004 to Oct 01 2006	0.44	0.76	1.21	1.65
		Y	Oct 01 2004 to Oct 01 2005	0.48	0.81	1.26	1.70
			Oct 01 2005 to Oct 01 2006	0.42	0.77	1.23	1.67
			Oct 01 2004 to Oct 01 2006	0.45	0.79	1.25	1.68
	X end	X	Oct 01 2004 to Oct 01 2005	0.46	0.76	1.18	1.62
			Oct 01 2005 to Oct 01 2006	0.42	0.74	1.18	1.58
			Oct 01 2004 to Oct 01 2006	0.44	0.75	1.18	1.60
	Y end	Y	Oct 01 2004 to Oct 01 2005	0.48	0.81	1.25	1.65
			Oct 01 2005 to Oct 01 2006	0.42	0.76	1.20	1.60
			Oct 01 2004 to Oct 01 2006	0.45	0.78	1.22	1.62

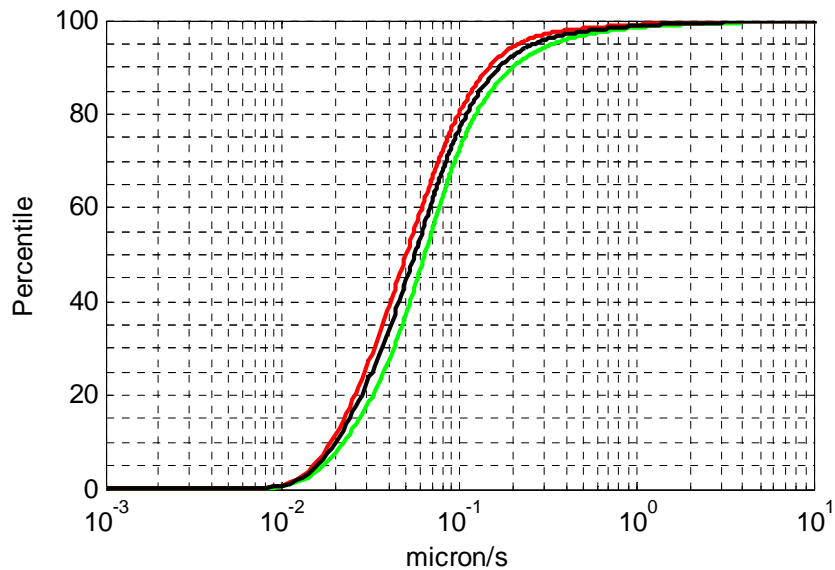
<b>STS 0.2-0.35Hz</b>							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2004 to Oct 01 2005	0.46	0.73	1.10	1.47
			Oct 01 2005 to Oct 01 2006	0.41	0.65	0.95	1.22
			Oct 01 2004 to Oct 01 2006	0.43	0.69	1.02	1.33
		Y	Oct 01 2004 to Oct 01 2005	0.44	0.68	1.00	1.35
			Oct 01 2005 to Oct 01 2006	0.39	0.63	0.92	1.18
			Oct 01 2004 to Oct 01 2006	0.41	0.65	0.95	1.24
	X end	X	Oct 01 2004 to Oct 01 2005	0.45	0.71	1.07	1.41
			Oct 01 2005 to Oct 01 2006	0.40	0.64	0.93	1.19
			Oct 01 2004 to Oct 01 2006	0.42	0.67	0.99	1.28
	Y end	Y	Oct 01 2004 to Oct 01 2005	0.45	0.68	1.01	1.38
			Oct 01 2005 to Oct 01 2006	0.40	0.64	0.94	1.21
			Oct 01 2004 to Oct 01 2006	0.42	0.66	0.97	1.27

<b>STS 0.35-1Hz</b>							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2004 to Oct 01 2005	0.21	0.29	0.42	0.53
			Oct 01 2005 to Oct 01 2006	0.18	0.25	0.34	0.44
			Oct 01 2004 to Oct 01 2006	0.19	0.26	0.38	0.48
		Y	Oct 01 2004 to Oct 01 2005	0.20	0.27	0.39	0.50
			Oct 01 2005 to Oct 01 2006	0.18	0.24	0.33	0.42
			Oct 01 2004 to Oct 01 2006	0.19	0.25	0.36	0.46
	X end	X	Oct 01 2004 to Oct 01 2005	0.20	0.27	0.39	0.50
			Oct 01 2005 to Oct 01 2006	0.18	0.24	0.33	0.41
			Oct 01 2004 to Oct 01 2006	0.19	0.25	0.36	0.46
	Y end	Y	Oct 01 2004 to Oct 01 2005	0.23	0.32	0.46	0.59
			Oct 01 2005 to Oct 01 2006	0.21	0.28	0.39	0.49
			Oct 01 2004 to Oct 01 2006	0.22	0.30	0.42	0.54

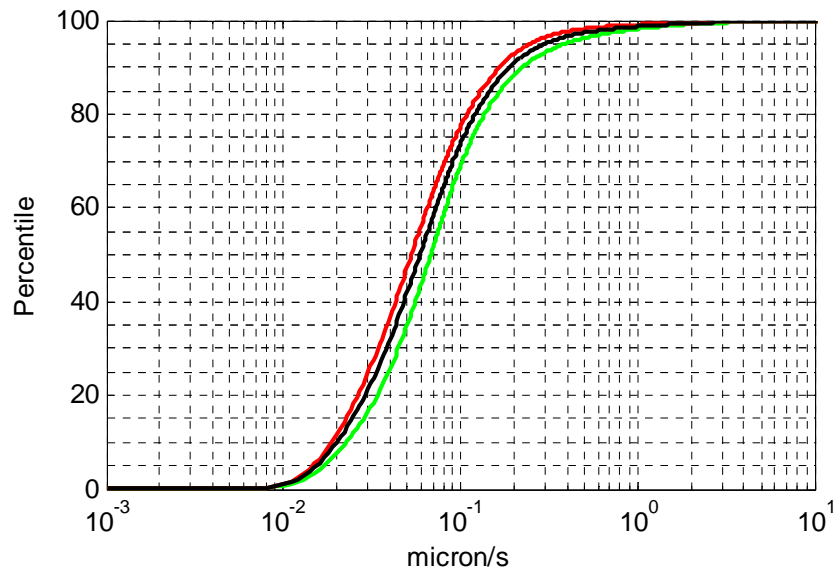
**STS 1-3Hz**

Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2004 to Oct 01 2005	0.10	0.16	0.24	0.36
			Oct 01 2005 to Oct 01 2006	0.10	0.16	0.24	0.30
			Oct 01 2004 to Oct 01 2006	0.10	0.16	0.24	0.31
		Y	Oct 01 2004 to Oct 01 2005	0.10	0.16	0.23	0.38
			Oct 01 2005 to Oct 01 2006	0.10	0.17	0.24	0.31
			Oct 01 2004 to Oct 01 2006	0.10	0.16	0.24	0.33
	X end	X	Oct 01 2004 to Oct 01 2005	0.14	0.23	0.32	0.41
			Oct 01 2005 to Oct 01 2006	0.14	0.23	0.32	0.39
			Oct 01 2004 to Oct 01 2006	0.14	0.23	0.32	0.40
	Y end	Y	Oct 01 2004 to Oct 01 2005	0.16	0.29	0.45	0.60
			Oct 01 2005 to Oct 01 2006	0.16	0.29	0.41	0.60
			Oct 01 2004 to Oct 01 2006	0.16	0.29	0.43	0.60

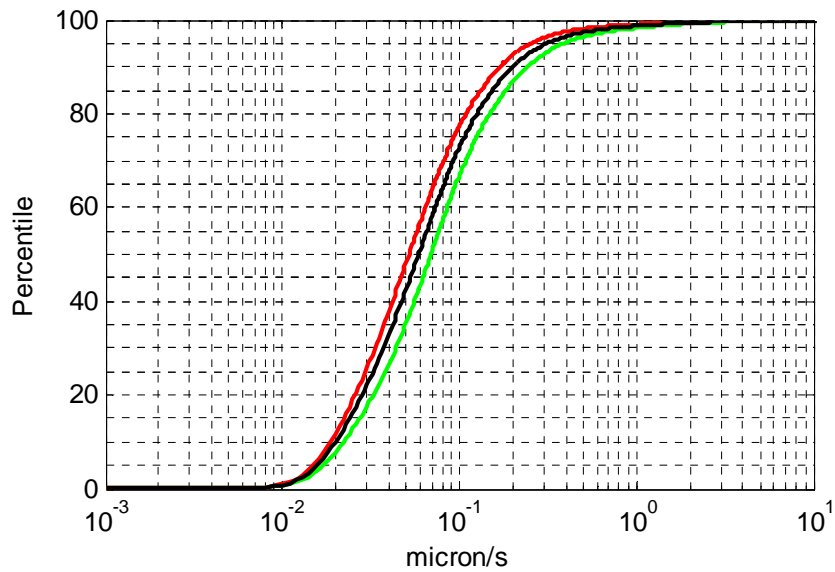
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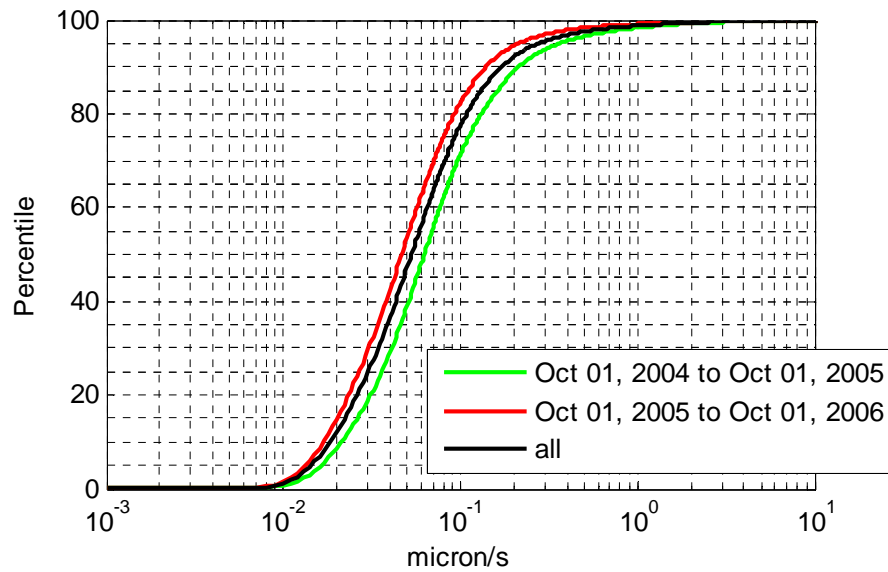
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Comer Station X 0.03 to 0.1 Hz

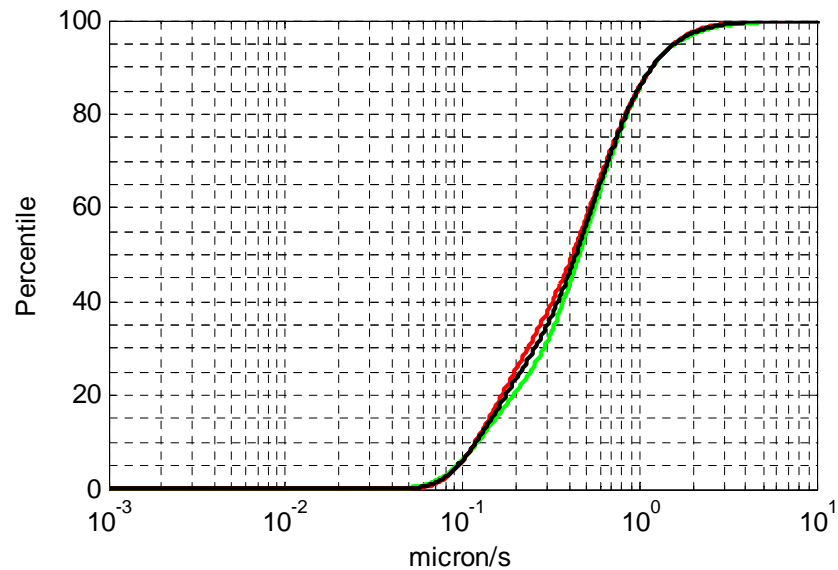


Comer Station Y 0.03 to 0.1 Hz

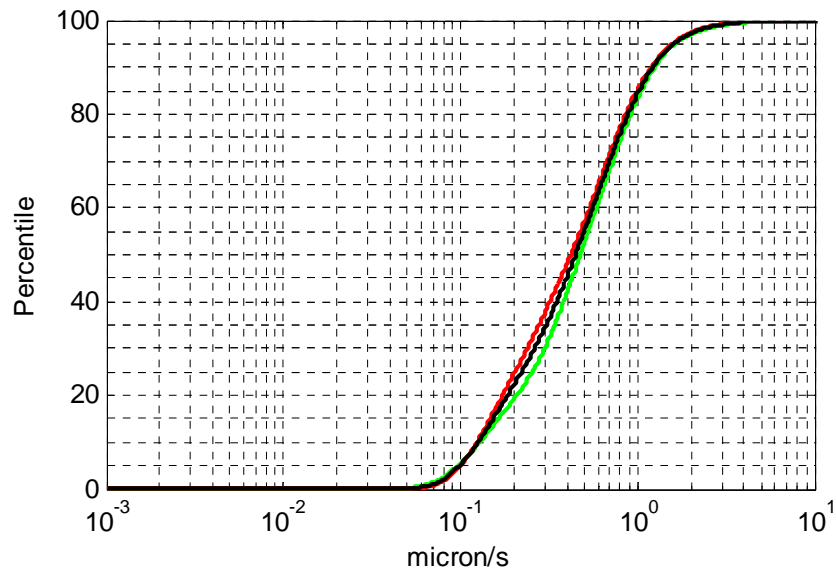




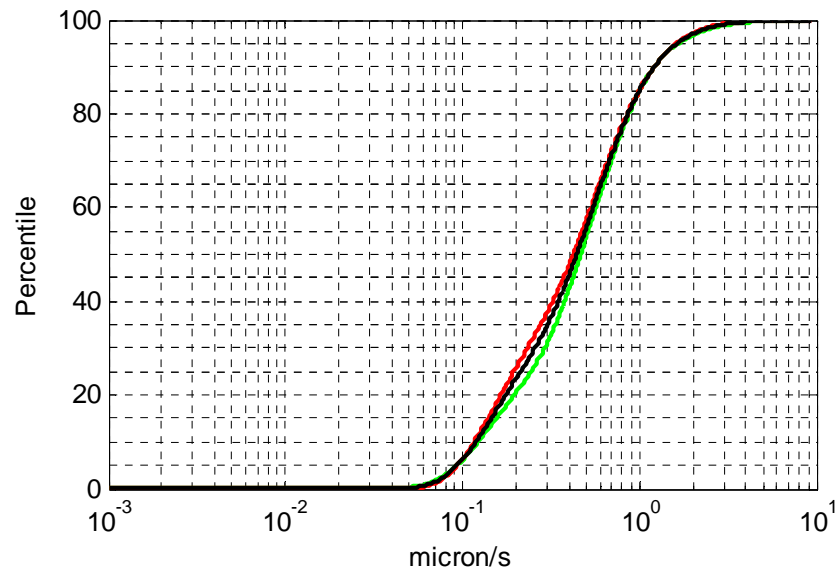
EX Station X 0.1 to 0.2 Hz



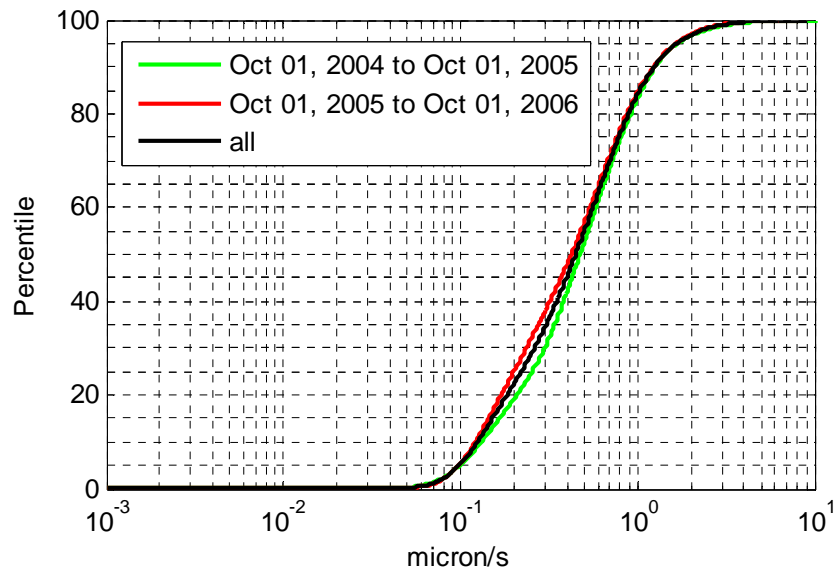
EY Station Y 0.1 to 0.2 Hz



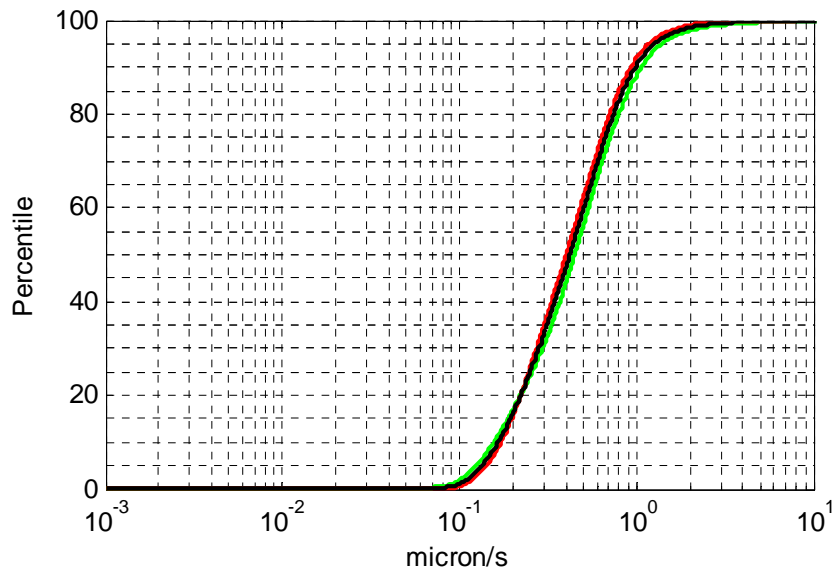
Comer Station X 0.1 to 0.2 Hz



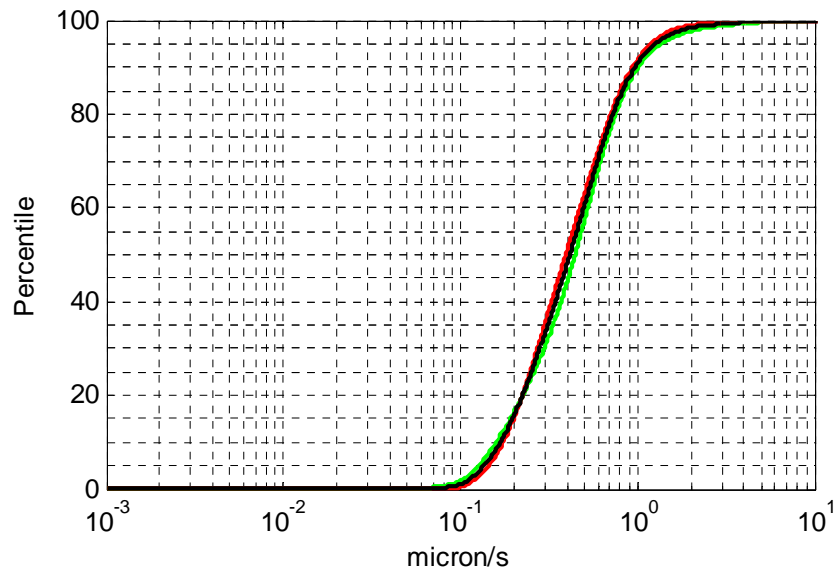
Comer Station Y 0.1 to 0.2 Hz



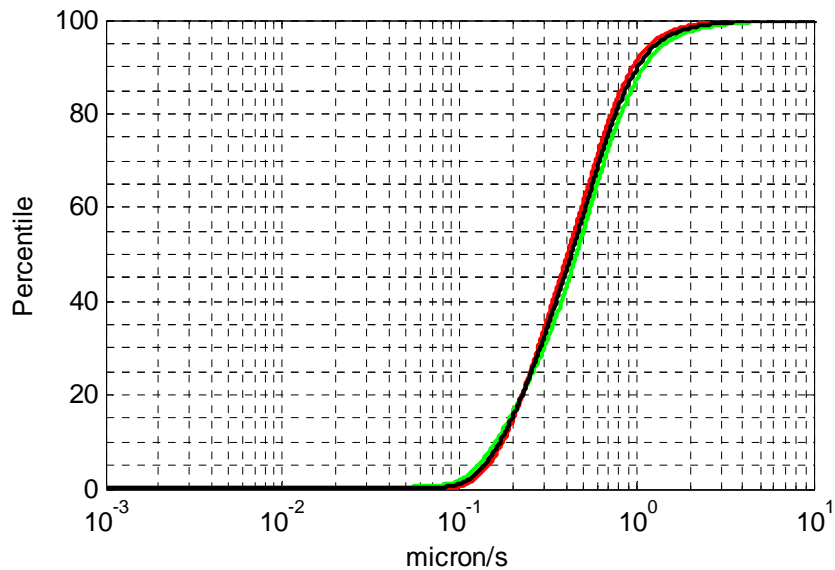
EX Station X 0.2 to 0.35 Hz



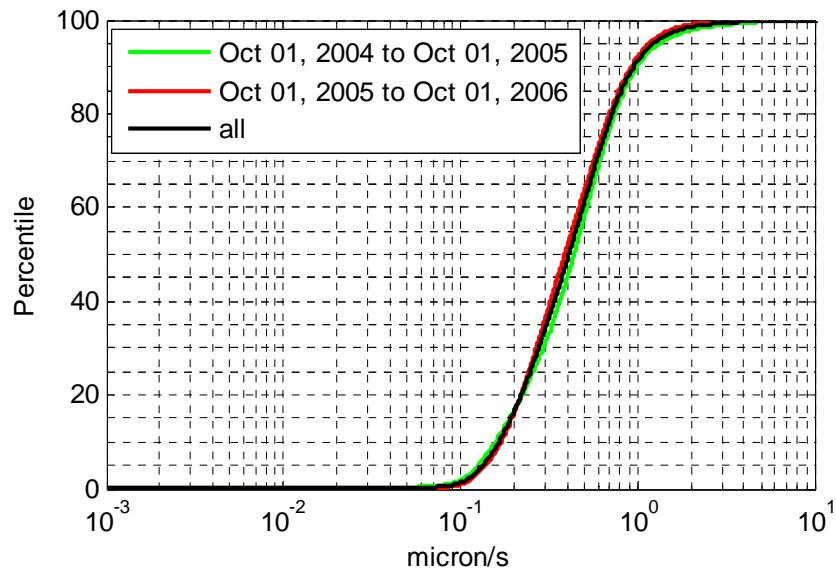
EY Station Y 0.2 to 0.35 Hz



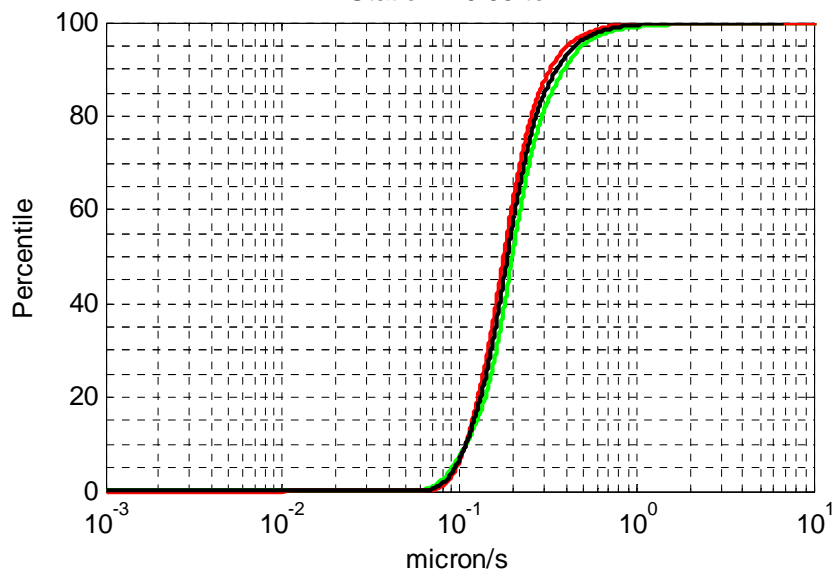
Comer Station X 0.2 to 0.35 Hz



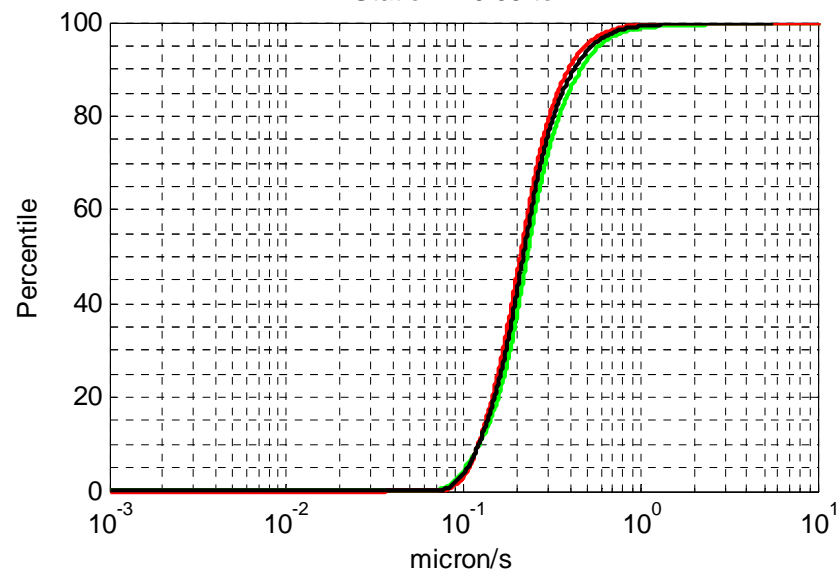
Comer Station Y 0.2 to 0.35 Hz



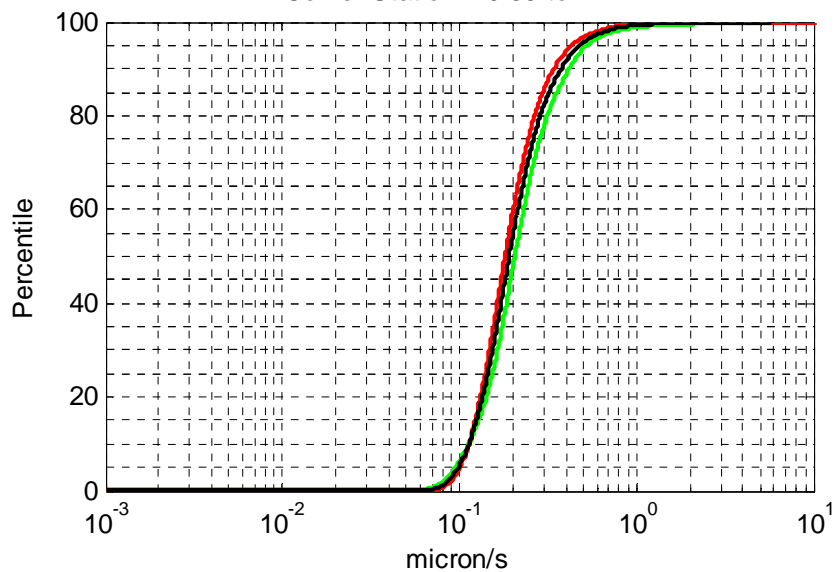
EX Station X 0.35 to 1 Hz



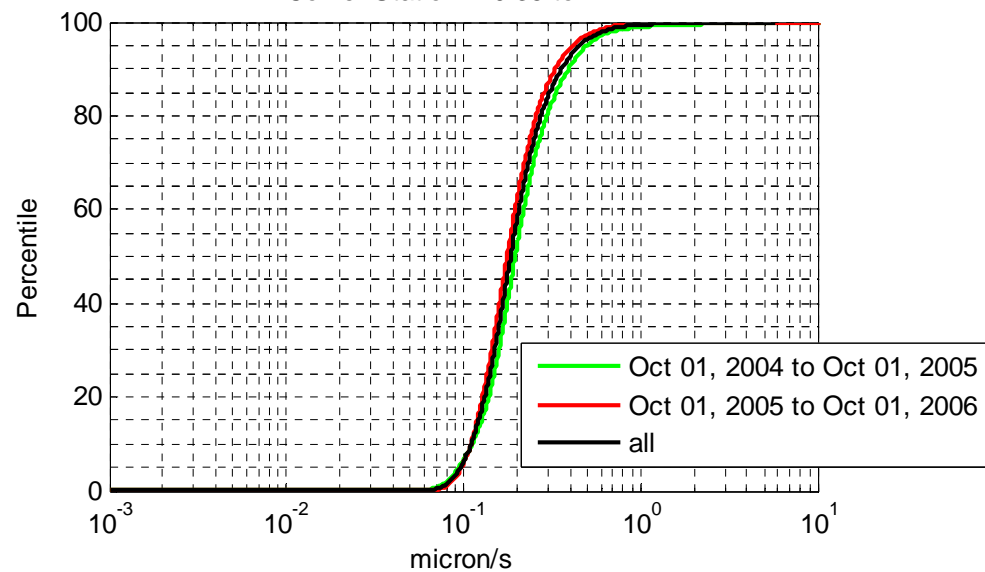
EY Station Y 0.35 to 1 Hz



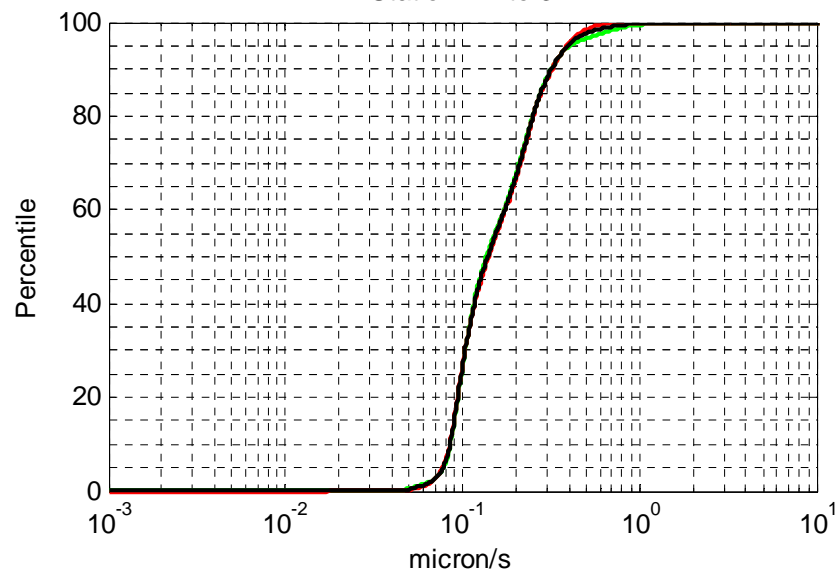
Corner Station X 0.35 to 1 Hz



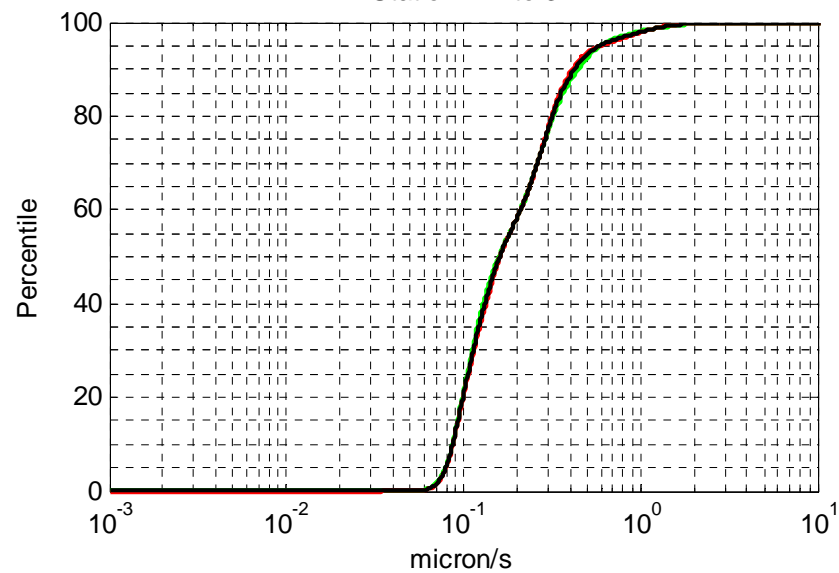
Corner Station Y 0.35 to 1 Hz



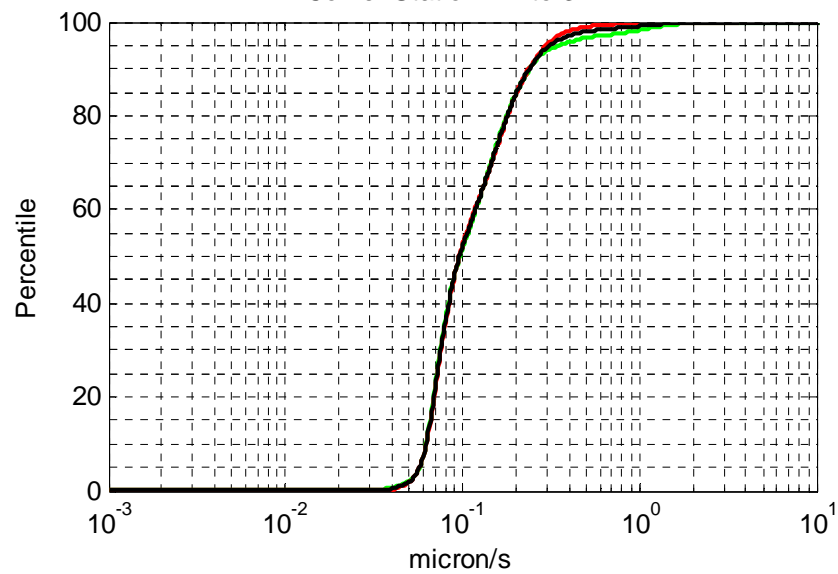
EX Station X 1 to 3 Hz



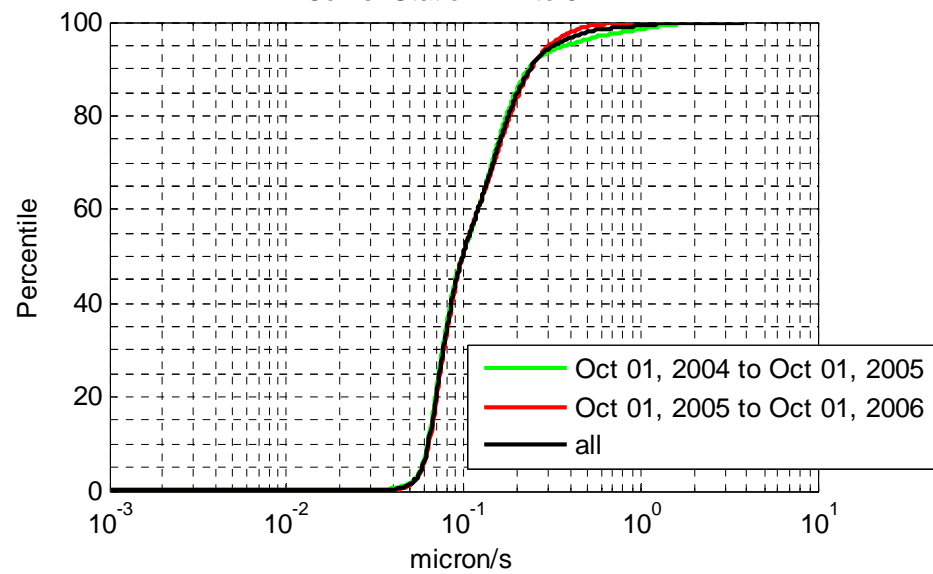
EY Station Y 1 to 3 Hz



Comer Station X 1 to 3 Hz



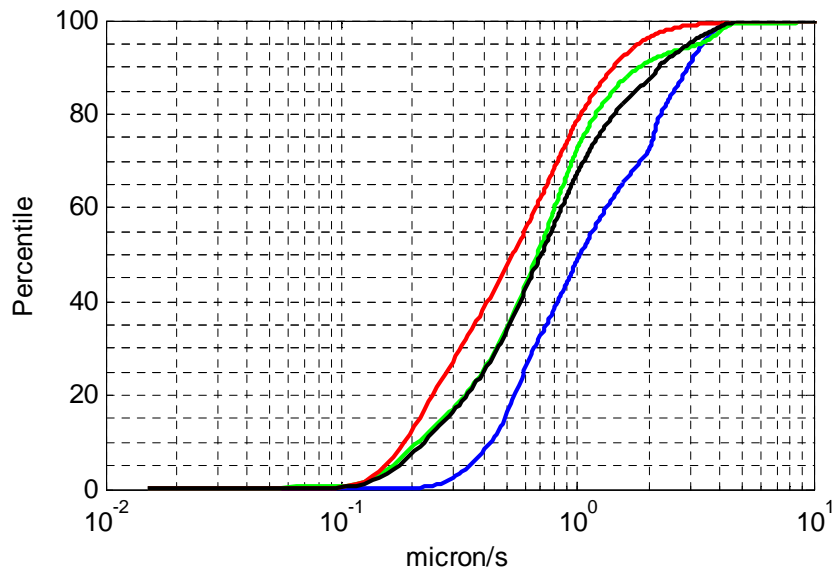
Comer Station Y 1 to 3 Hz



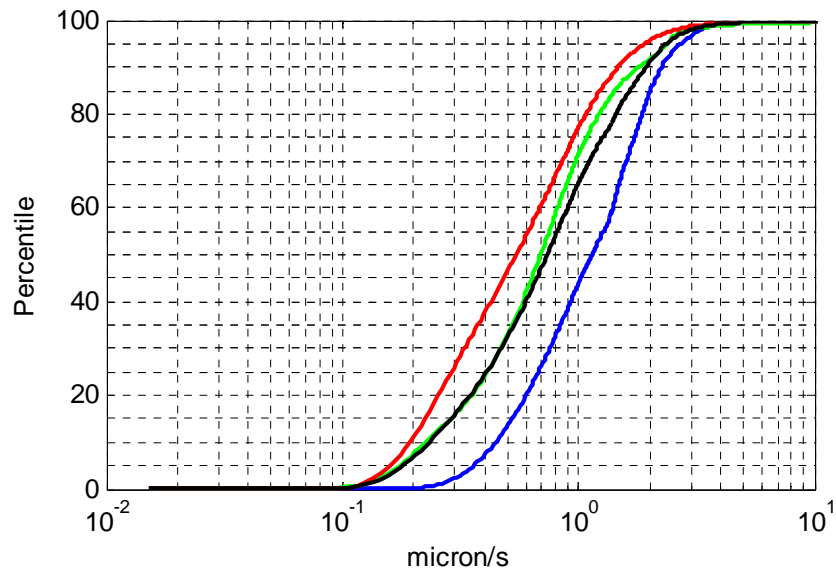
A.2 LLO yearly ground rms-velocity percentile and cumulative normalized histograms, measured by Guralp seismometers.

Guralp 0.1-0.3Hz							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2003 to Oct 01 2004	1.03	2.10	2.95	3.40
			Oct 01 2004 to Oct 01 2005	0.69	1.06	1.85	3.36
			Oct 01 2005 to Oct 01 2006	0.54	0.93	1.42	1.84
			Oct 01 2003 to Oct 01 2006	0.71	1.21	2.22	3.01
			E.Daw's number	0.49	-	1.20	1.70
		Y	Oct 01 2003 to Oct 01 2004	1.15	1.74	2.26	2.75
			Oct 01 2004 to Oct 01 2005	0.70	1.09	1.83	2.38
			Oct 01 2005 to Oct 01 2006	0.55	0.97	1.48	1.93
			Oct 01 2003 to Oct 01 2006	0.75	1.27	1.93	2.38
			E.Daw's number	0.53	-	1.30	1.70
		Z	Oct 01 2003 to Oct 01 2004	0.56	1.39	2.37	2.69
			Oct 01 2004 to Oct 01 2005	0.36	0.57	1.10	2.42
			Oct 01 2005 to Oct 01 2006	0.29	0.50	0.78	1.00
			Oct 01 2003 to Oct 01 2006	0.38	0.65	1.50	2.33
			E.Daw's number	0.27	-	0.69	0.91
	EX	X	Oct 01 2003 to Oct 01 2004	1.23	2.42	2.88	3.14
			Oct 01 2004 to Oct 01 2005	0.68	0.98	1.41	1.86
			Oct 01 2005 to Oct 01 2006	0.54	0.90	1.36	1.77
			Oct 01 2003 to Oct 01 2006	0.73	1.20	2.37	2.79
			E.Daw's number	0.50	-	1.20	1.70
		Y	Oct 01 2003 to Oct 01 2004	1.14	1.79	2.11	2.35
			Oct 01 2004 to Oct 01 2005	0.65	0.98	1.42	1.86
			Oct 01 2005 to Oct 01 2006	0.55	0.95	1.45	1.87
			Oct 01 2003 to Oct 01 2006	0.74	1.19	1.85	2.14
			E.Daw's number	0.51	-	1.30	1.70
		Z	Oct 01 2003 to Oct 01 2004	0.71	1.90	2.20	2.33
			Oct 01 2004 to Oct 01 2005	0.36	0.56	0.98	1.61
			Oct 01 2005 to Oct 01 2006	0.29	0.50	0.77	0.99
			Oct 01 2003 to Oct 01 2006	0.39	0.70	1.74	2.07
			E.Daw's number	0.25	-	0.66	0.89
EY	X	Oct 01 2003 to Oct 01 2004	1.38	3.96	16.26	24.94	
		Oct 01 2004 to Oct 01 2005	0.73	1.13	2.20	7.18	
		Oct 01 2005 to Oct 01 2006	0.56	0.94	1.43	1.85	
		Oct 01 2003 to Oct 01 2006	0.75	1.36	3.55	9.76	
		E.Daw's number	0.53	-	1.30	1.70	
	Y	Oct 01 2003 to Oct 01 2004	1.37	2.63	4.10	5.25	
		Oct 01 2004 to Oct 01 2005	0.69	1.07	1.83	2.81	
		Oct 01 2005 to Oct 01 2006	0.53	0.93	1.41	1.81	
		Oct 01 2003 to Oct 01 2006	0.74	1.27	2.52	3.49	
		E.Daw's number	0.50	-	1.30	1.60	
	Z	Oct 01 2003 to Oct 01 2004	0.86	2.32	4.76	5.57	
		Oct 01 2004 to Oct 01 2005	0.36	0.57	1.17	3.04	
		Oct 01 2005 to Oct 01 2006	0.28	0.49	0.75	0.97	
		Oct 01 2003 to Oct 01 2006	0.39	0.72	1.98	4.06	
		E.Daw's number	0.25	-	0.66	0.89	

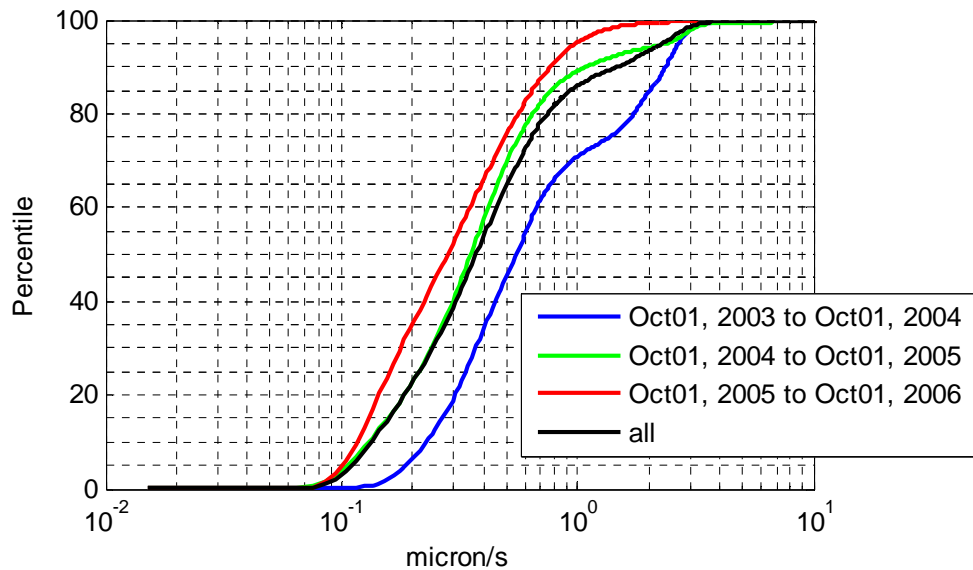
Comer Station X 0.1 to 0.3 Hz



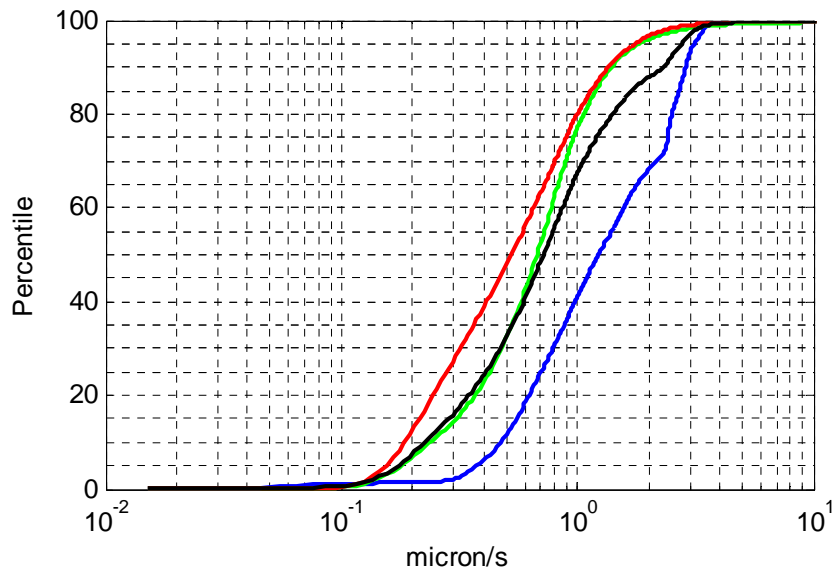
Comer Station Y 0.1 to 0.3 Hz



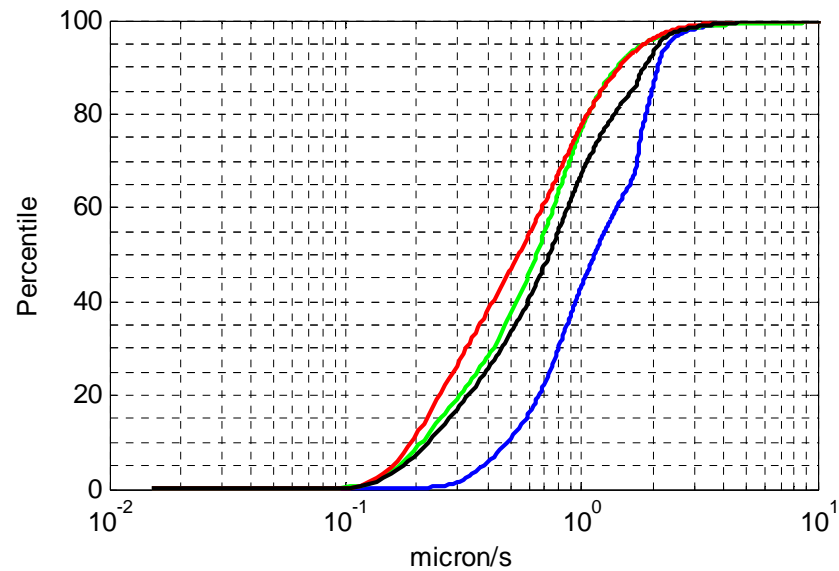
Comer Station Z 0.1 to 0.3 Hz



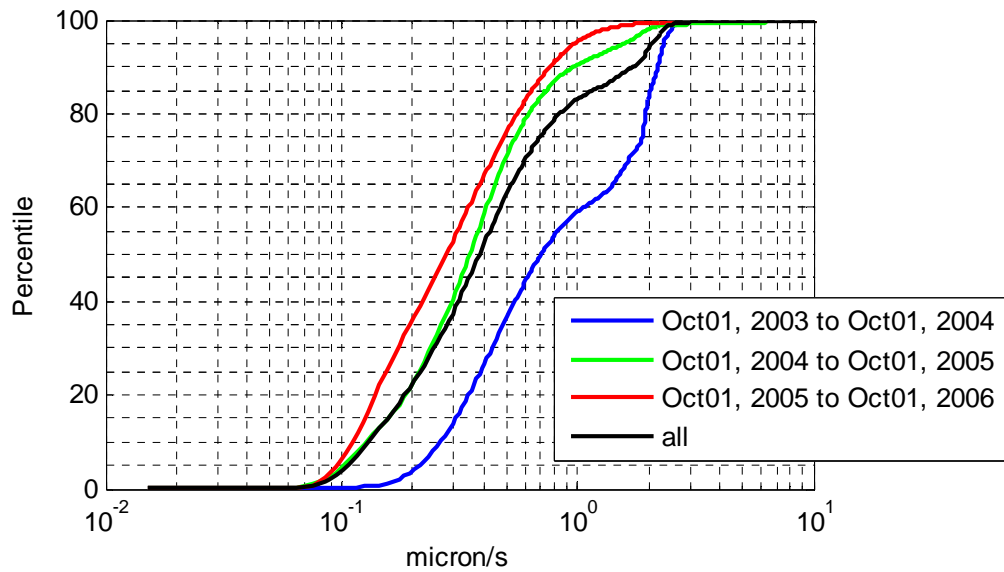
EX Station X 0.1 to 0.3 Hz



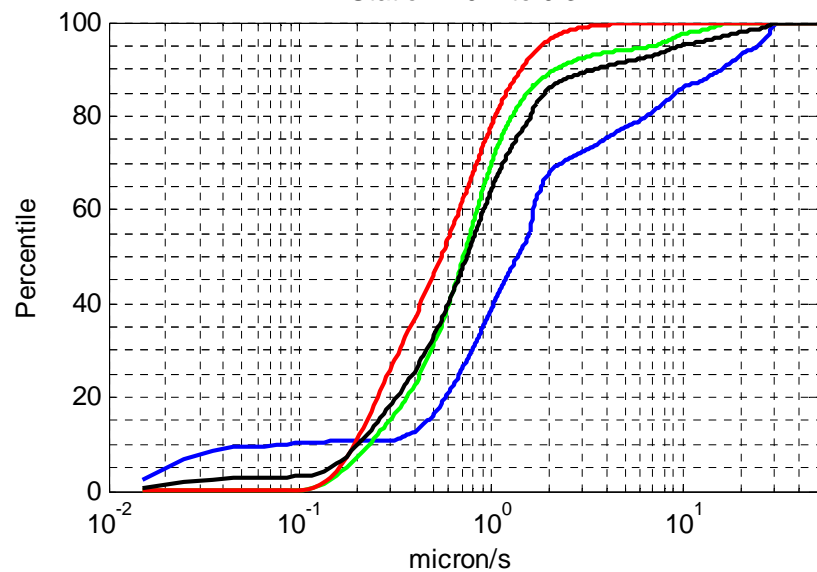
EX Station Y 0.1 to 0.3 Hz



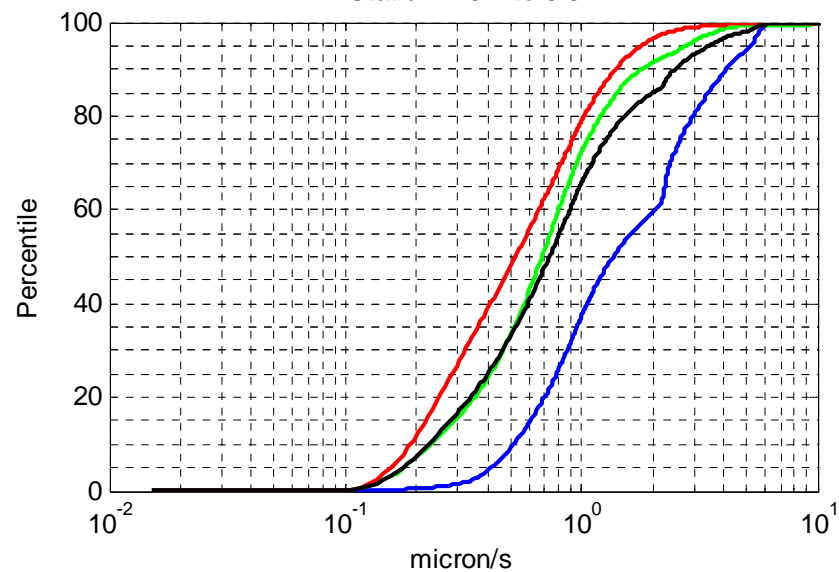
EX Station Z 0.1 to 0.3 Hz



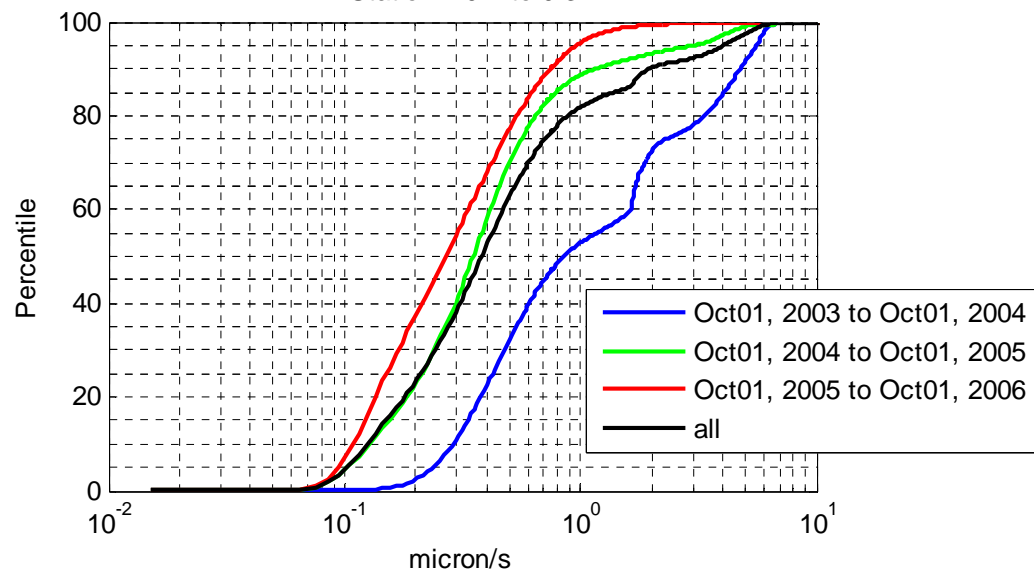
EY Station X 0.1 to 0.3 Hz



EY Station Y 0.1 to 0.3 Hz



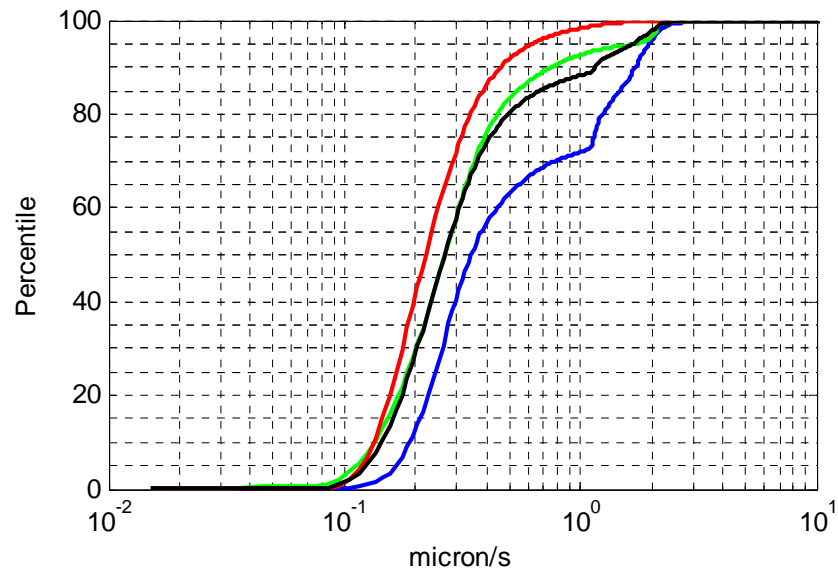
EY Station Z 0.1 to 0.3 Hz



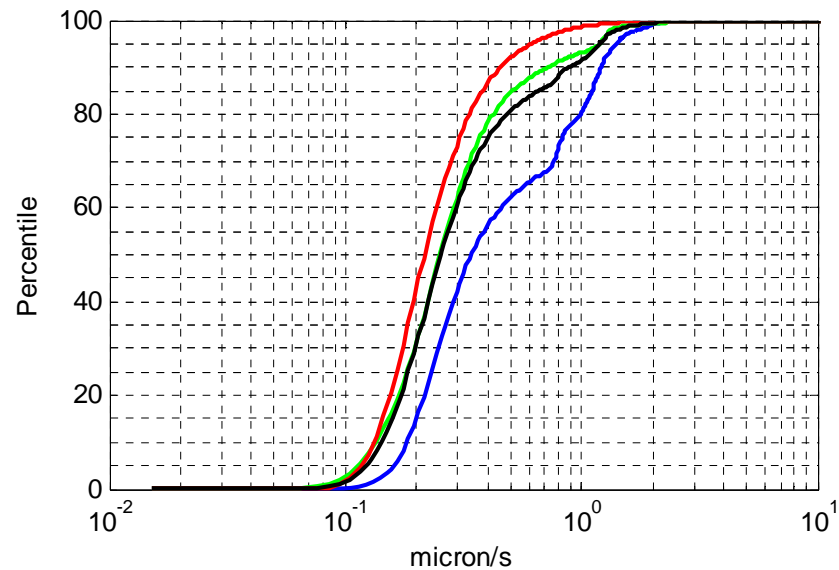


Guralp 0.3-1Hz							
Site	Station	Axis	Time span	Velocity percentile (micron/s)			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2003 to Oct 01 2004	0.36	1.15	1.72	1.97
			Oct 01 2004 to Oct 01 2005	0.28	0.40	0.76	1.76
			Oct 01 2005 to Oct 01 2006	0.22	0.32	0.47	0.63
			Oct 01 2003 to Oct 01 2006	0.28	0.42	1.16	1.68
			E.Daw's number	0.23	-	0.45	0.63
		Y	Oct 01 2003 to Oct 01 2004	0.35	0.84	1.21	1.42
			Oct 01 2004 to Oct 01 2005	0.26	0.38	0.73	1.19
			Oct 01 2005 to Oct 01 2006	0.22	0.31	0.46	0.62
			Oct 01 2003 to Oct 01 2006	0.26	0.41	0.90	1.20
			E.Daw's number	0.22	-	0.45	0.63
		Z	Oct 01 2003 to Oct 01 2004	0.25	0.84	1.40	1.59
			Oct 01 2004 to Oct 01 2005	0.16	0.30	0.66	1.36
			Oct 01 2005 to Oct 01 2006	0.14	0.22	0.37	0.54
			Oct 01 2003 to Oct 01 2006	0.16	0.32	0.89	1.37
			E.Daw's number	0.14	-	0.38	0.56
	EX	X	Oct 01 2003 to Oct 01 2004	0.40	1.32	1.74	1.85
			Oct 01 2004 to Oct 01 2005	0.25	0.36	0.55	0.72
			Oct 01 2005 to Oct 01 2006	0.22	0.30	0.43	0.58
			Oct 01 2003 to Oct 01 2006	0.26	0.41	1.12	1.53
			E.Daw's number	0.22	-	0.45	0.65
		Y	Oct 01 2003 to Oct 01 2004	0.39	0.95	1.17	1.31
			Oct 01 2004 to Oct 01 2005	0.27	0.38	0.55	0.76
			Oct 01 2005 to Oct 01 2006	0.22	0.31	0.45	0.60
			Oct 01 2003 to Oct 01 2006	0.26	0.41	0.94	1.11
			E.Daw's number	0.21	-	0.44	0.63
		Z	Oct 01 2003 to Oct 01 2004	0.29	1.06	1.29	1.43
			Oct 01 2004 to Oct 01 2005	0.16	0.30	0.59	0.91
			Oct 01 2005 to Oct 01 2006	0.13	0.21	0.34	0.49
			Oct 01 2003 to Oct 01 2006	0.16	0.33	1.03	1.17
			E.Daw's number	0.13	-	0.36	0.57
	EY	X	Oct 01 2003 to Oct 01 2004	0.51	2.58	9.10	13.86
			Oct 01 2004 to Oct 01 2005	0.30	0.46	0.87	2.46
			Oct 01 2005 to Oct 01 2006	0.26	0.36	0.52	0.69
			Oct 01 2003 to Oct 01 2006	0.31	0.51	1.76	5.56
			E.Daw's number	0.25	-	0.59	0.83
		Y	Oct 01 2003 to Oct 01 2004	0.50	1.51	2.43	3.02
Oct 01 2004 to Oct 01 2005			0.28	0.42	0.77	1.39	
Oct 01 2005 to Oct 01 2006			0.25	0.34	0.50	0.67	
Oct 01 2003 to Oct 01 2006			0.29	0.47	1.25	1.90	
E.Daw's number			0.25	-	0.70	1.40	
Z		Oct 01 2003 to Oct 01 2004	0.44	1.52	2.78	3.21	
		Oct 01 2004 to Oct 01 2005	0.16	0.32	0.66	1.55	
		Oct 01 2005 to Oct 01 2006	0.15	0.22	0.37	0.54	
		Oct 01 2003 to Oct 01 2006	0.18	0.37	1.18	2.34	
		E.Daw's number	0.15	-	0.41	0.61	

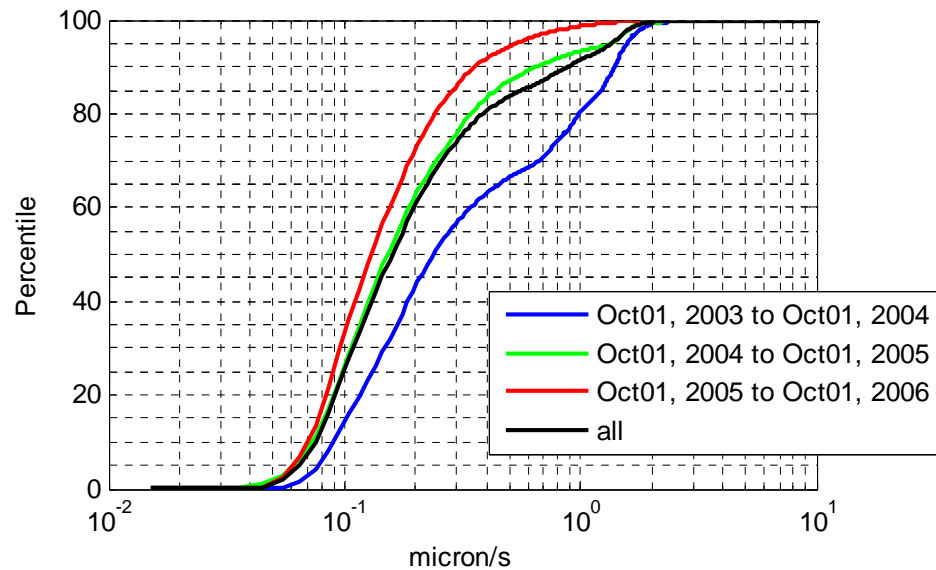
Corner Station X 0.3 to 1 Hz



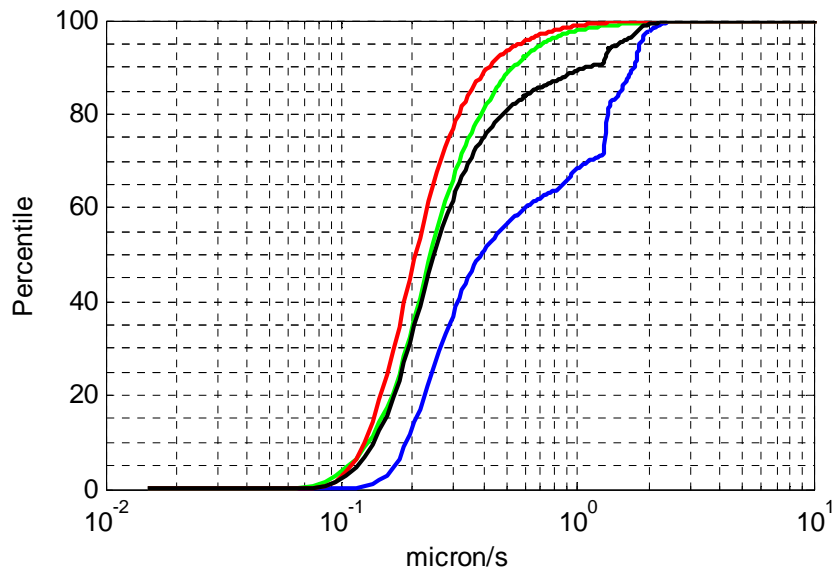
Corner Station Y 0.3 to 1 Hz



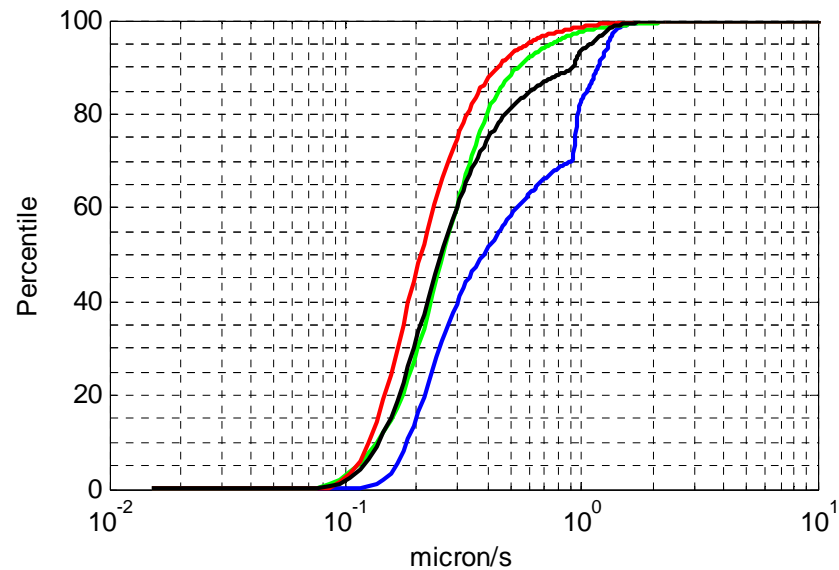
Corner Station Z 0.3 to 1 Hz



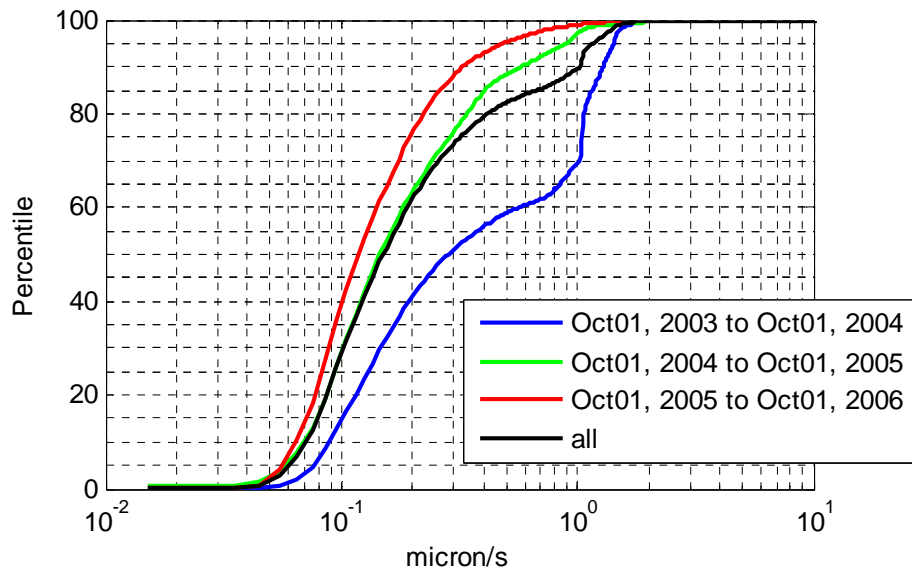
EX Station X 0.3 to 1 Hz



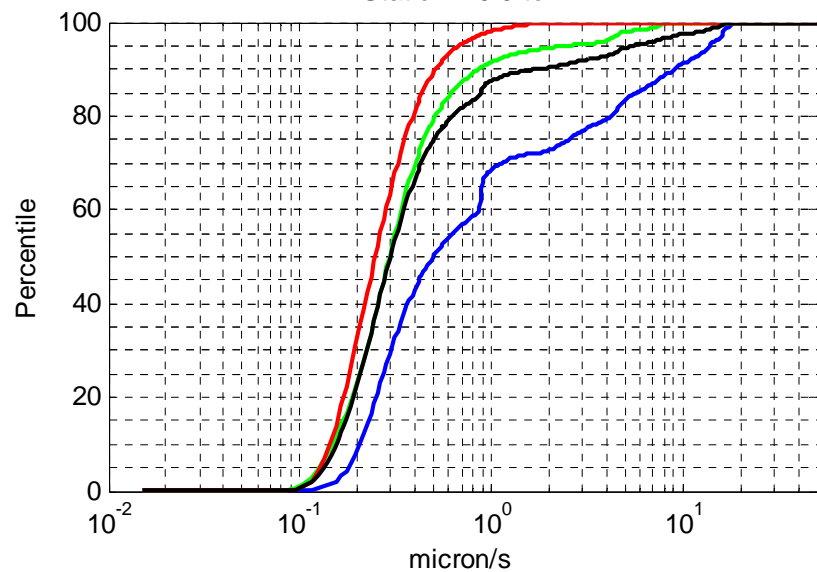
EX Station Y 0.3 to 1 Hz



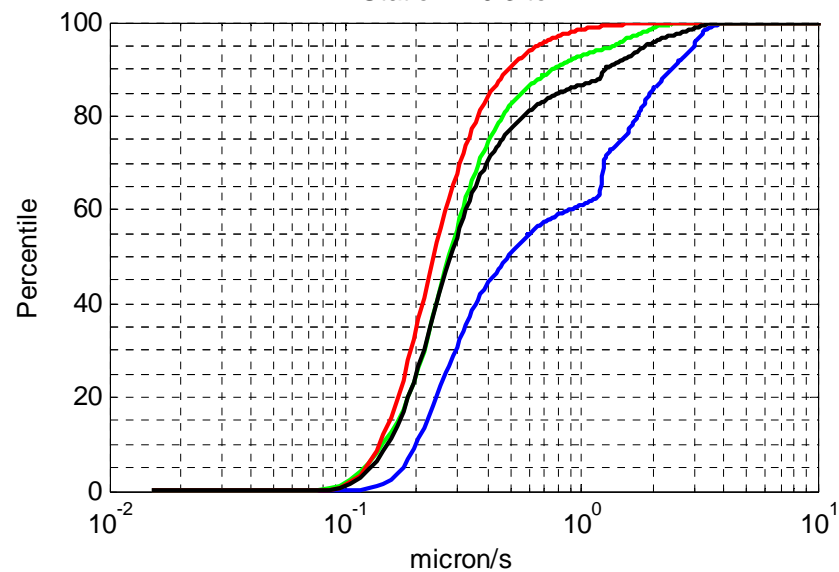
EX Station Z 0.3 to 1 Hz



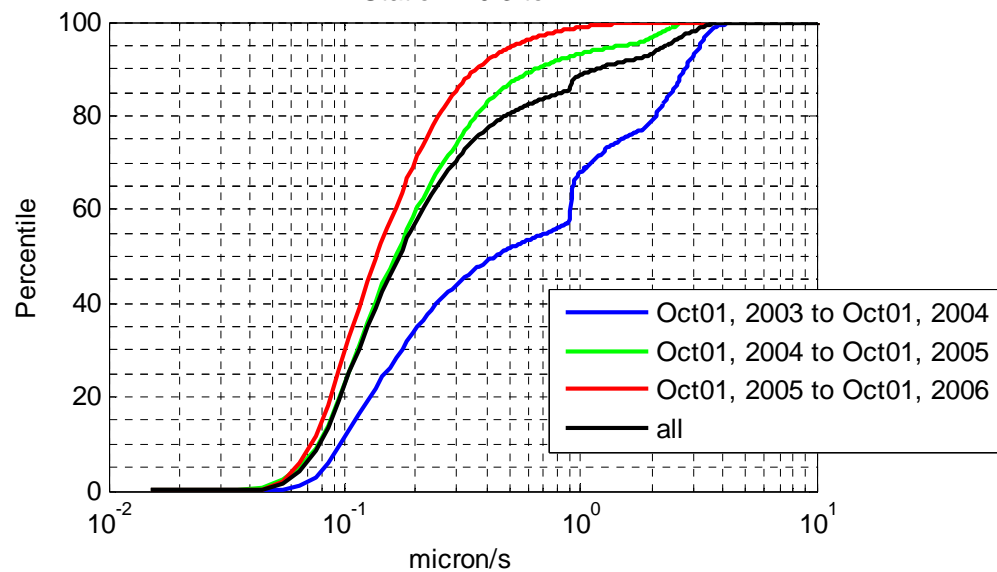
EY Station X 0.3 to 1 Hz



EY Station Y 0.3 to 1 Hz

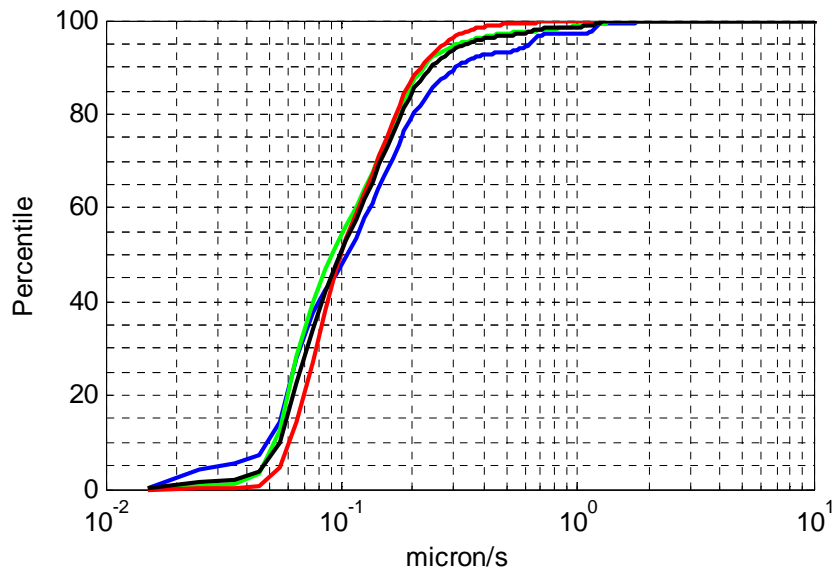


EY Station Z 0.3 to 1 Hz

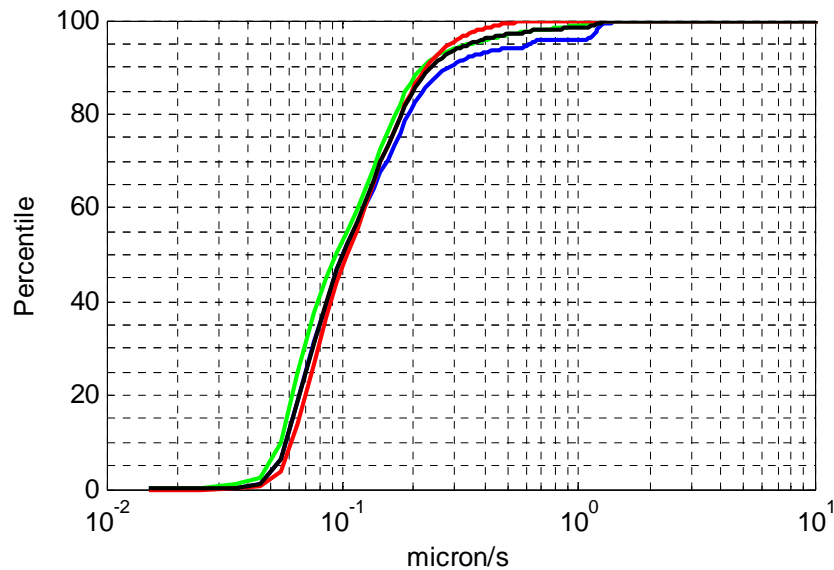


Guralp 1_3Hz							
Site	Station	Axis	Time span	Velocity percentile (micron/s)			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2003 to Oct 01 2004	0.12	0.19	0.32	0.64
			Oct 01 2004 to Oct 01 2005	0.10	0.16	0.22	0.33
			Oct 01 2005 to Oct 01 2006	0.11	0.16	0.22	0.28
			Oct 01 2003 to Oct 01 2006	0.11	0.16	0.25	0.35
			E.Daw's number	0.09	-	0.32	0.40
		Y	Oct 01 2003 to Oct 01 2004	0.11	0.18	0.29	0.64
			Oct 01 2004 to Oct 01 2005	0.10	0.16	0.22	0.36
			Oct 01 2005 to Oct 01 2006	0.11	0.16	0.24	0.30
			Oct 01 2003 to Oct 01 2006	0.11	0.16	0.25	0.36
			E.Daw's number	0.09	-	0.30	0.38
		Z	Oct 01 2003 to Oct 01 2004	0.14	0.25	0.49	0.71
			Oct 01 2004 to Oct 01 2005	0.13	0.21	0.35	0.61
			Oct 01 2005 to Oct 01 2006	0.13	0.22	0.35	0.47
			Oct 01 2003 to Oct 01 2006	0.13	0.22	0.39	0.58
			E.Daw's number	0.12	-	0.56	0.75
	EX	X	Oct 01 2003 to Oct 01 2004	0.14	0.25	0.33	0.40
			Oct 01 2004 to Oct 01 2005	0.20	0.26	0.35	0.45
			Oct 01 2005 to Oct 01 2006	0.18	0.22	0.33	0.39
			Oct 01 2003 to Oct 01 2006	0.18	0.25	0.33	0.41
			E.Daw's number	0.12	-	0.34	0.47
		Y	Oct 01 2003 to Oct 01 2004	0.19	0.25	0.35	0.40
			Oct 01 2004 to Oct 01 2005	0.15	0.24	0.34	0.57
			Oct 01 2005 to Oct 01 2006	0.20	0.26	0.34	0.41
			Oct 01 2003 to Oct 01 2006	0.19	0.25	0.34	0.42
			E.Daw's number	0.21	-	0.40	0.53
		Z	Oct 01 2003 to Oct 01 2004	0.12	0.22	0.33	0.41
			Oct 01 2004 to Oct 01 2005	0.14	0.22	0.37	0.61
			Oct 01 2005 to Oct 01 2006	0.13	0.22	0.33	0.43
			Oct 01 2003 to Oct 01 2006	0.13	0.22	0.34	0.46
			E.Daw's number	0.13	-	0.39	0.55
	EY	X	Oct 01 2003 to Oct 01 2004	0.25	0.66	1.29	1.55
			Oct 01 2004 to Oct 01 2005	0.19	0.30	0.47	0.63
			Oct 01 2005 to Oct 01 2006	0.16	0.30	0.49	0.59
			Oct 01 2003 to Oct 01 2006	0.19	0.35	0.67	1.06
			E.Daw's number	0.16	-	0.65	1.10
		Y	Oct 01 2003 to Oct 01 2004	0.16	0.29	0.42	0.62
Oct 01 2004 to Oct 01 2005			0.16	0.28	0.41	0.53	
Oct 01 2005 to Oct 01 2006			0.16	0.27	0.38	0.55	
Oct 01 2003 to Oct 01 2006			0.16	0.28	0.40	0.55	
E.Daw's number			0.16	-	0.75	1.70	
Z		Oct 01 2003 to Oct 01 2004	0.22	0.34	0.54	0.93	
		Oct 01 2004 to Oct 01 2005	0.20	0.33	0.52	0.72	
		Oct 01 2005 to Oct 01 2006	0.20	0.33	0.49	0.75	
		Oct 01 2003 to Oct 01 2006	0.21	0.33	0.51	0.77	
		E.Daw's number	0.20	-	0.72	1.10	

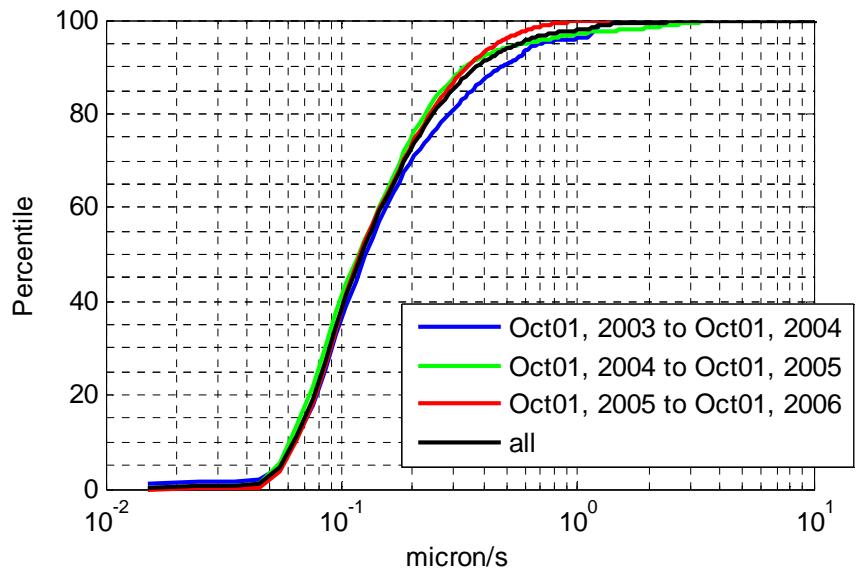
Comer Station X 1 to 3 Hz



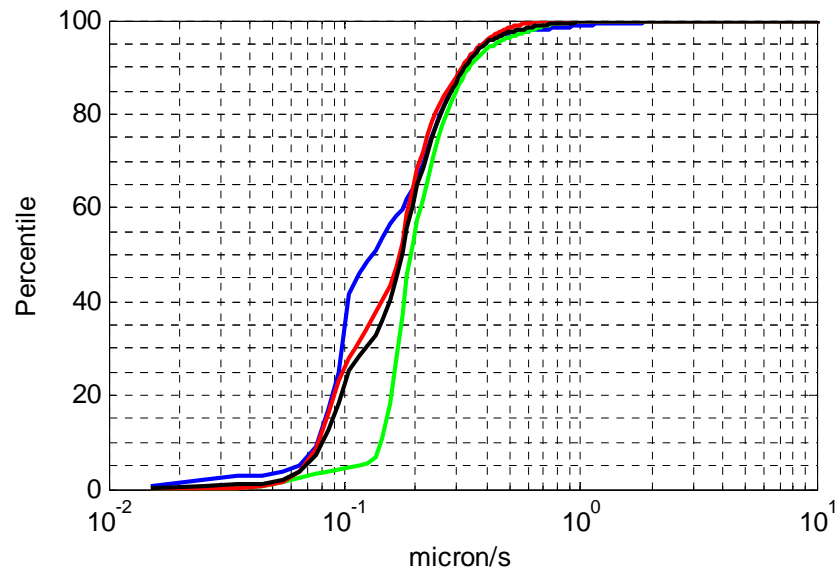
Comer Station Y 1 to 3 Hz



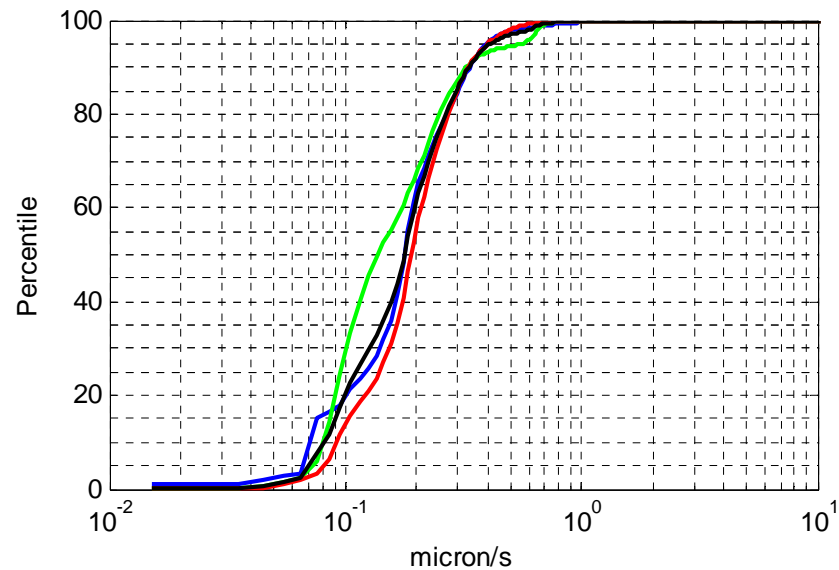
Comer Station Z 1 to 3 Hz



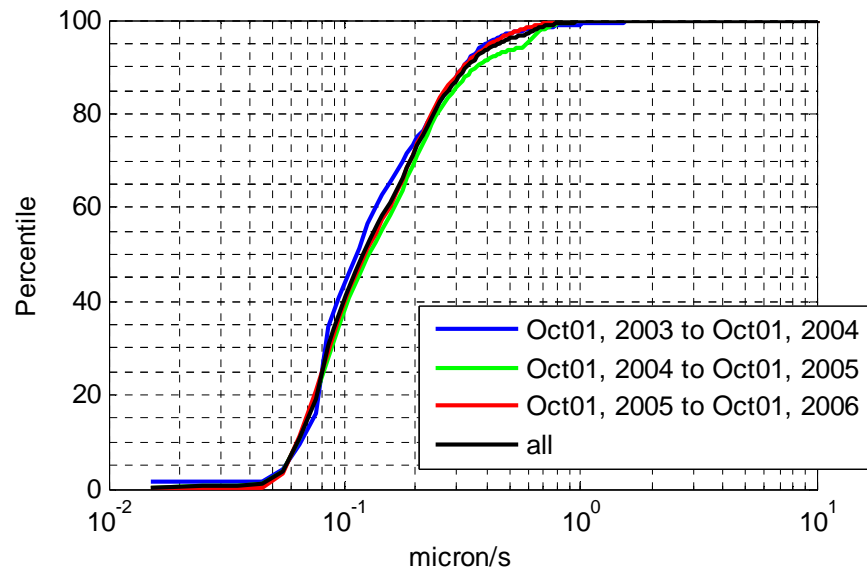
EX Station X 1 to 3 Hz



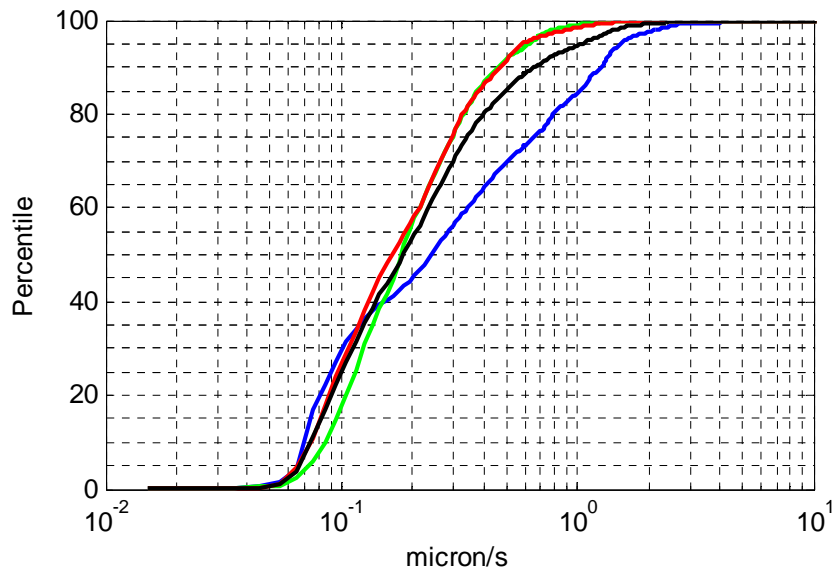
EX Station Y 1 to 3 Hz



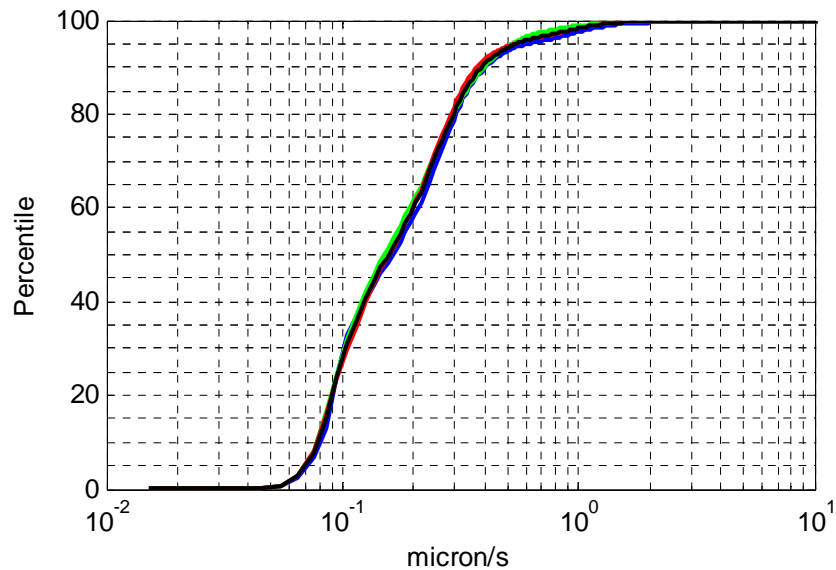
EX Station Z 1 to 3 Hz



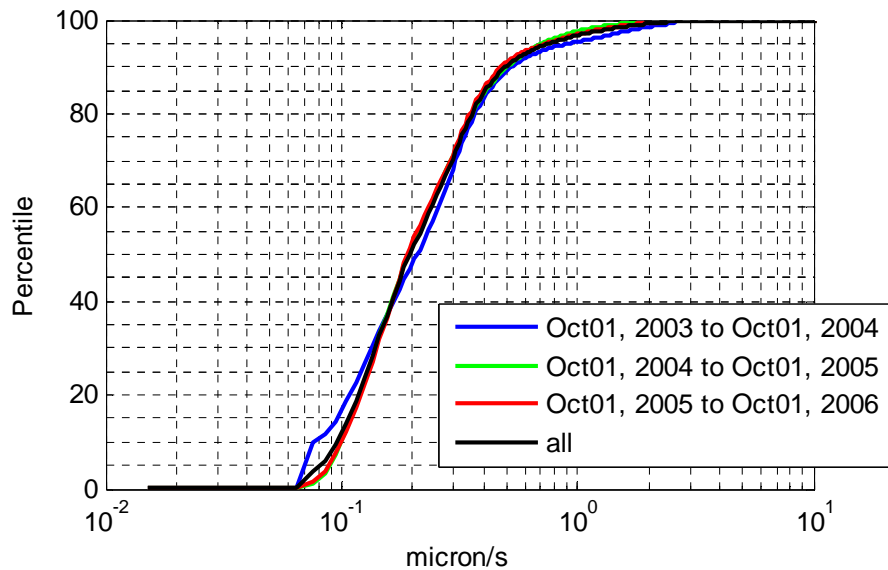
EY Station X 1 to 3 Hz



EY Station Y 1 to 3 Hz



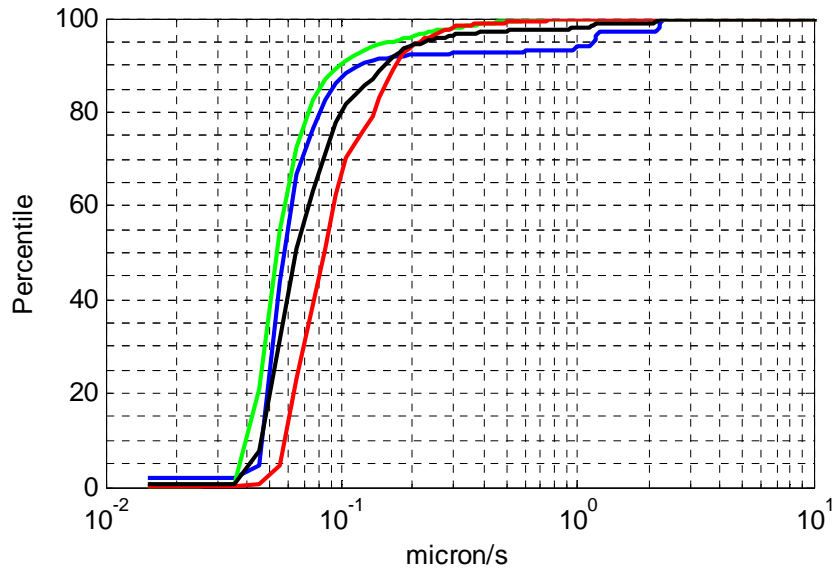
EY Station Z 1 to 3 Hz



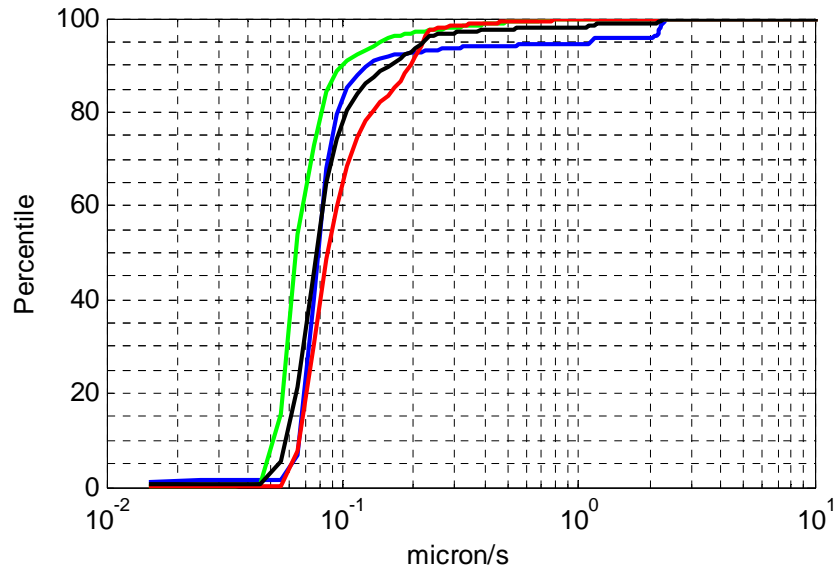


Guralp 3-10Hz							
Site	Station	Axis	Time span	Velocity percentile (micron/s)			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2003 to Oct 01 2004	0.07	0.08	0.13	1.17
			Oct 01 2004 to Oct 01 2005	0.06	0.08	0.11	0.16
			Oct 01 2005 to Oct 01 2006	0.09	0.13	0.18	0.22
			Oct 01 2003 to Oct 01 2006	0.07	0.10	0.16	0.24
			E.Daw's number	0.06	-	0.11	0.16
		Y	Oct 01 2003 to Oct 01 2004	0.09	0.10	0.14	1.15
			Oct 01 2004 to Oct 01 2005	0.07	0.09	0.11	0.15
			Oct 01 2005 to Oct 01 2006	0.10	0.13	0.21	0.22
			Oct 01 2003 to Oct 01 2006	0.09	0.11	0.16	0.22
			E.Daw's number	0.08	-	0.13	0.20
		Z	Oct 01 2003 to Oct 01 2004	0.26	0.29	0.39	1.10
			Oct 01 2004 to Oct 01 2005	0.22	0.25	0.30	0.39
			Oct 01 2005 to Oct 01 2006	0.22	0.25	0.31	0.48
			Oct 01 2003 to Oct 01 2006	0.24	0.27	0.33	0.54
			E.Daw's number	0.25	-	0.38	0.61
	EX	X	Oct 01 2003 to Oct 01 2004	0.18	0.22	0.27	0.31
			Oct 01 2004 to Oct 01 2005	0.24	0.27	0.29	0.32
			Oct 01 2005 to Oct 01 2006	0.14	0.16	0.22	0.26
			Oct 01 2003 to Oct 01 2006	0.16	0.24	0.28	0.30
			E.Daw's number	0.15	-	0.24	0.33
		Y	Oct 01 2003 to Oct 01 2004	0.28	0.31	0.34	0.37
			Oct 01 2004 to Oct 01 2005	0.16	0.22	0.26	0.36
			Oct 01 2005 to Oct 01 2006	0.16	0.19	0.22	0.28
			Oct 01 2003 to Oct 01 2006	0.18	0.25	0.31	0.34
			E.Daw's number	0.22	-	0.30	0.39
		Z	Oct 01 2003 to Oct 01 2004	0.30	0.35	0.40	0.46
			Oct 01 2004 to Oct 01 2005	0.24	0.28	0.34	0.46
			Oct 01 2005 to Oct 01 2006	0.15	0.18	0.24	0.31
			Oct 01 2003 to Oct 01 2006	0.22	0.29	0.36	0.41
			E.Daw's number	0.25	-	0.38	0.46
	EY	X	Oct 01 2003 to Oct 01 2004	0.10	0.18	0.47	0.84
			Oct 01 2004 to Oct 01 2005	0.16	0.24	0.32	0.45
			Oct 01 2005 to Oct 01 2006	0.10	0.19	0.53	0.83
			Oct 01 2003 to Oct 01 2006	0.12	0.21	0.42	0.75
			E.Daw's number	0.10	-	0.34	0.52
		Y	Oct 01 2003 to Oct 01 2004	0.10	0.15	0.24	0.35
Oct 01 2004 to Oct 01 2005			0.11	0.13	0.19	0.27	
Oct 01 2005 to Oct 01 2006			0.11	0.15	0.30	0.38	
Oct 01 2003 to Oct 01 2006			0.11	0.14	0.24	0.36	
E.Daw's number			0.10	-	0.28	0.45	
Z		Oct 01 2003 to Oct 01 2004	0.15	0.21	0.36	0.54	
		Oct 01 2004 to Oct 01 2005	0.15	0.19	0.30	0.43	
		Oct 01 2005 to Oct 01 2006	0.15	0.20	0.31	0.48	
		Oct 01 2003 to Oct 01 2006	0.15	0.20	0.32	0.48	
		E.Daw's number	0.15	-	0.39	0.56	

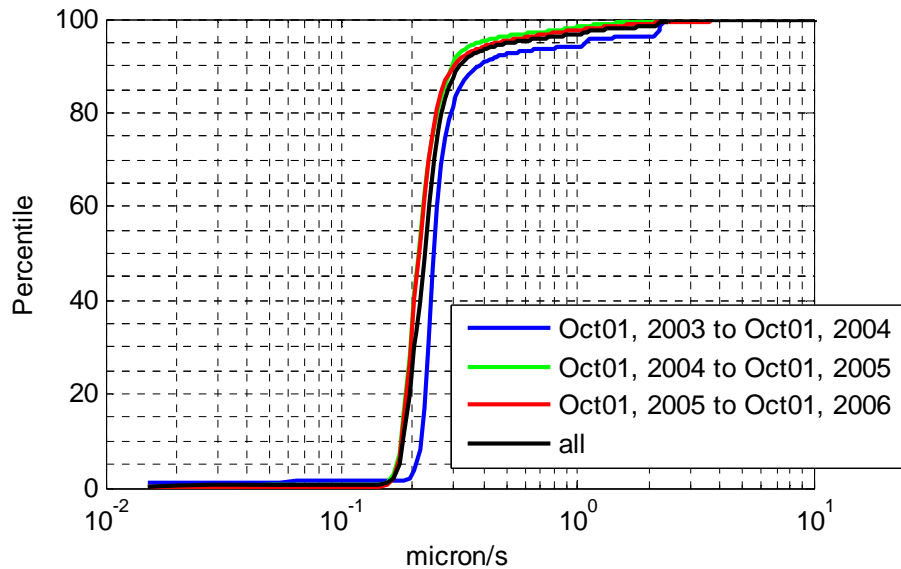
Corner Station X 3 to 10 Hz



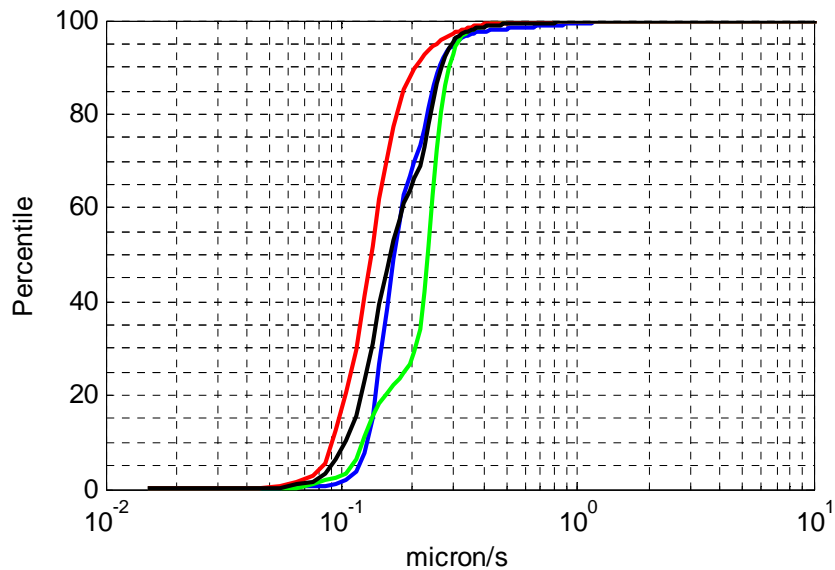
Corner Station Y 3 to 10 Hz



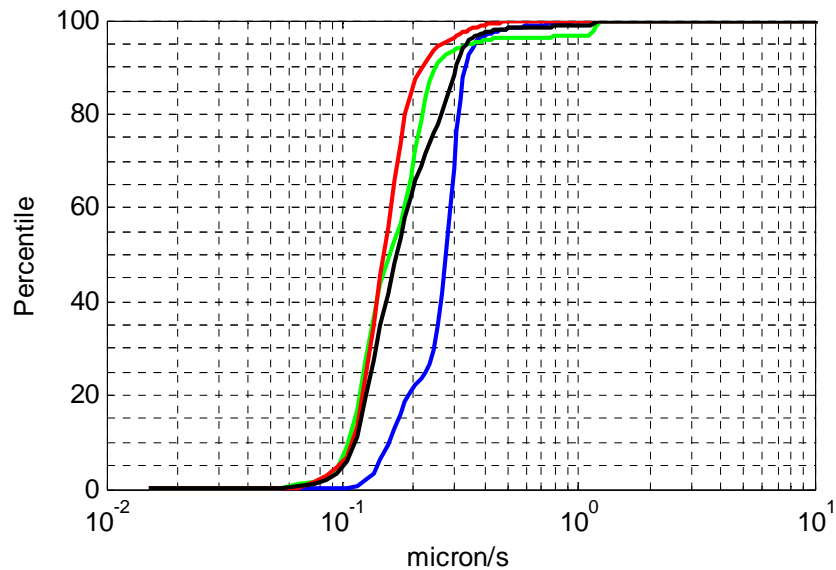
Corner Station Z 3 to 10 Hz



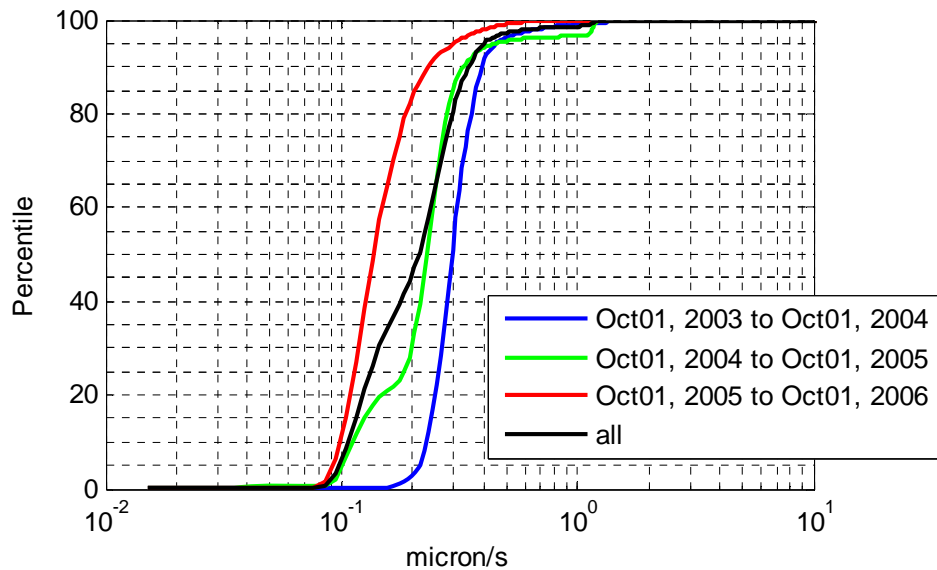
EX Station X 3 to 10 Hz



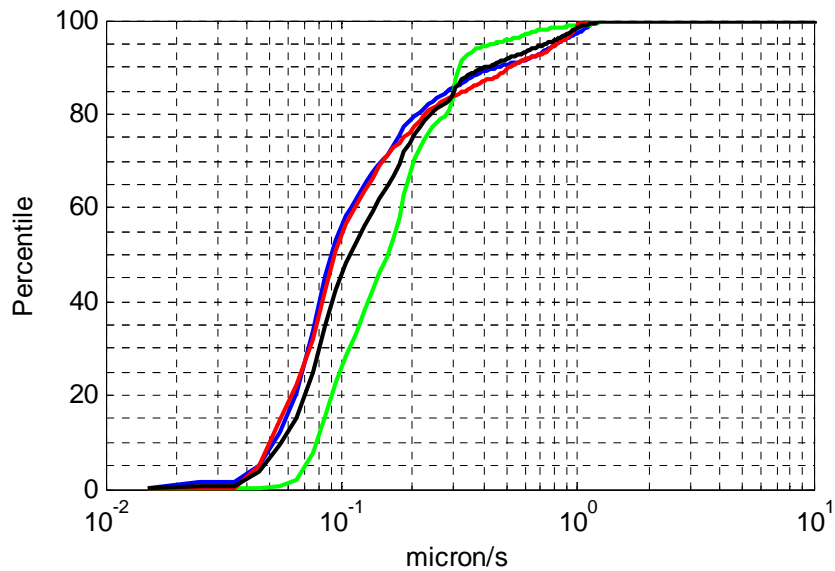
EX Station Y 3 to 10 Hz



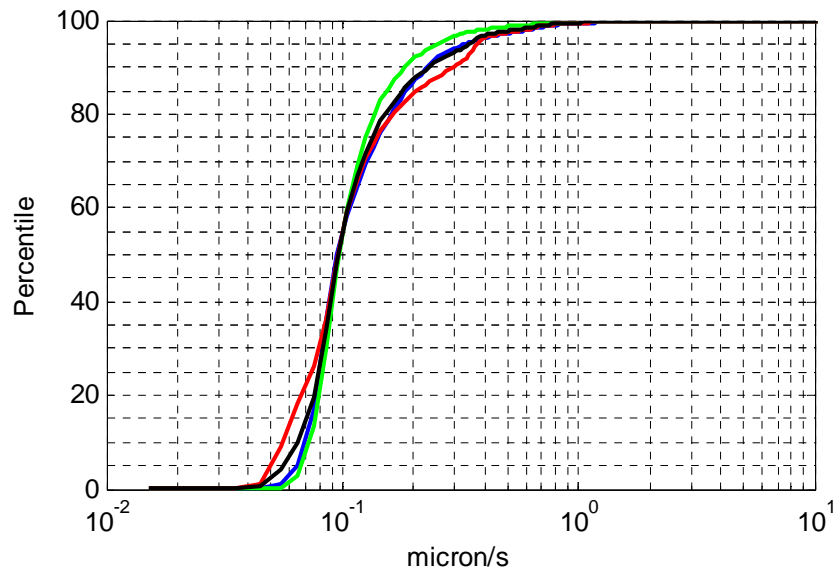
EX Station Z 3 to 10 Hz



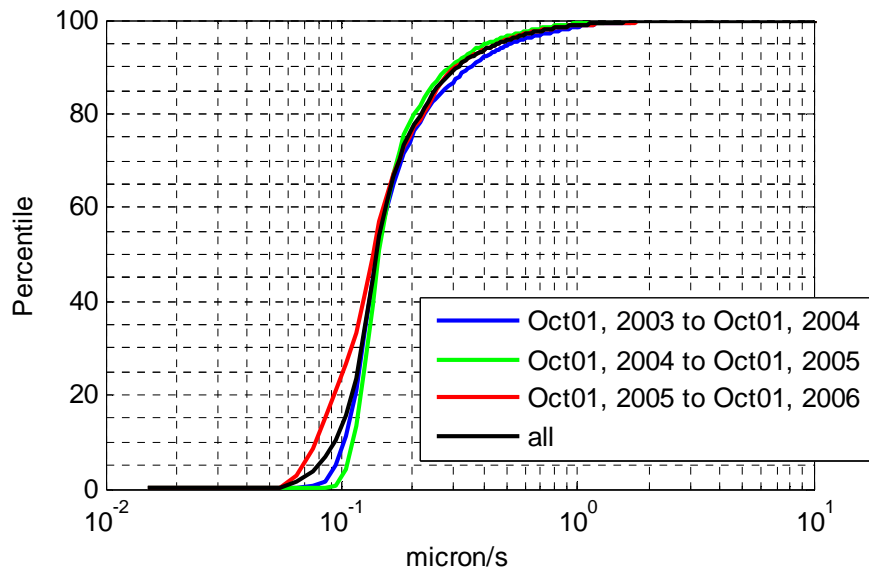
EY Station X 3 to 10 Hz



EY Station Y 3 to 10 Hz

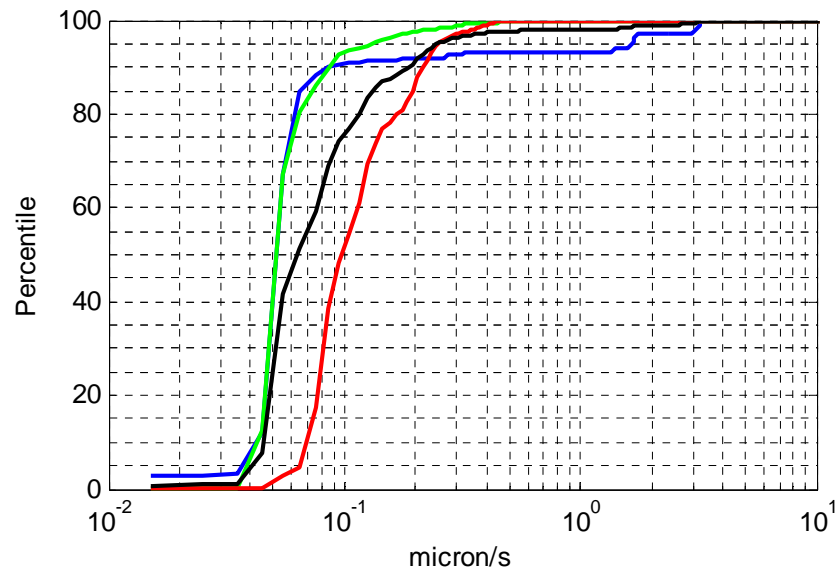


EY Station Z 3 to 10 Hz

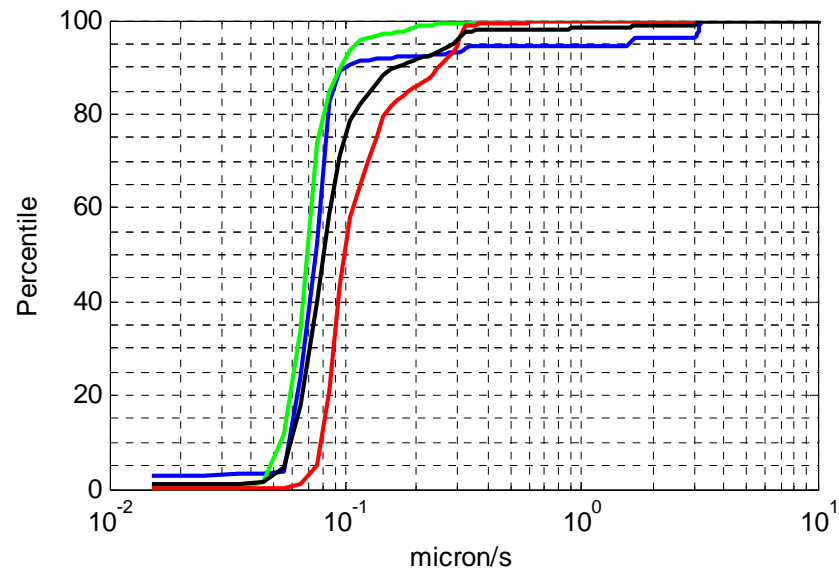


Guralp 10_30Hz							
Site	Station	Axis	Time span	Velocity percentile (micron/s)			
				50%	75%	90%	95%
LLO	Corner	X	Oct 01 2003 to Oct 01 2004	0.06	0.07	0.10	1.67
			Oct 01 2004 to Oct 01 2005	0.06	0.07	0.10	0.14
			Oct 01 2005 to Oct 01 2006	0.11	0.15	0.22	0.26
			Oct 01 2003 to Oct 01 2006	0.07	0.11	0.20	0.26
		Y	Oct 01 2003 to Oct 01 2004	0.08	0.09	0.11	1.62
			Oct 01 2004 to Oct 01 2005	0.08	0.09	0.11	0.12
			Oct 01 2005 to Oct 01 2006	0.11	0.14	0.26	0.31
			Oct 01 2003 to Oct 01 2006	0.09	0.11	0.16	0.29
		Z	Oct 01 2003 to Oct 01 2004	0.28	0.30	0.37	1.52
			Oct 01 2004 to Oct 01 2005	0.26	0.28	0.33	0.37
			Oct 01 2005 to Oct 01 2006	0.27	0.30	0.34	0.38
			Oct 01 2003 to Oct 01 2006	0.27	0.29	0.34	0.41
	EX	X	Oct 01 2003 to Oct 01 2004	0.15	0.16	0.25	0.27
			Oct 01 2004 to Oct 01 2005	0.22	0.26	0.30	0.33
			Oct 01 2005 to Oct 01 2006	0.08	0.10	0.11	0.12
			Oct 01 2003 to Oct 01 2006	0.11	0.20	0.26	0.29
		Y	Oct 01 2003 to Oct 01 2004	0.25	0.28	0.30	0.32
			Oct 01 2004 to Oct 01 2005	0.11	0.18	0.22	0.25
			Oct 01 2005 to Oct 01 2006	0.09	0.10	0.11	0.12
			Oct 01 2003 to Oct 01 2006	0.10	0.19	0.27	0.29
		Z	Oct 01 2003 to Oct 01 2004	0.35	0.44	0.49	0.52
			Oct 01 2004 to Oct 01 2005	0.24	0.46	0.53	0.56
			Oct 01 2005 to Oct 01 2006	0.15	0.16	0.19	0.21
			Oct 01 2003 to Oct 01 2006	0.19	0.36	0.48	0.52
	EY	X	Oct 01 2003 to Oct 01 2004	0.10	0.21	0.67	1.16
			Oct 01 2004 to Oct 01 2005	0.16	0.27	0.43	0.45
			Oct 01 2005 to Oct 01 2006	0.09	0.13	0.56	1.10
			Oct 01 2003 to Oct 01 2006	0.11	0.22	0.45	0.99
		Y	Oct 01 2003 to Oct 01 2004	0.09	0.12	0.18	0.22
			Oct 01 2004 to Oct 01 2005	0.11	0.12	0.14	0.16
			Oct 01 2005 to Oct 01 2006	0.09	0.12	0.22	0.46
			Oct 01 2003 to Oct 01 2006	0.10	0.12	0.16	0.29
Z		Oct 01 2003 to Oct 01 2004	0.15	0.18	0.30	0.47	
		Oct 01 2004 to Oct 01 2005	0.16	0.18	0.20	0.22	
		Oct 01 2005 to Oct 01 2006	0.12	0.18	0.22	0.33	
		Oct 01 2003 to Oct 01 2006	0.15	0.18	0.22	0.33	

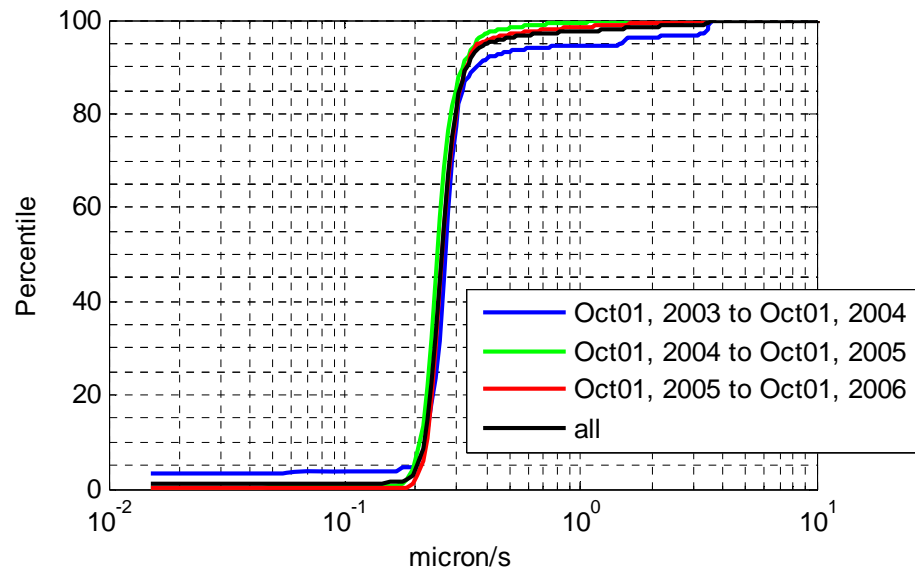
Comer Station X 10 to 30 Hz



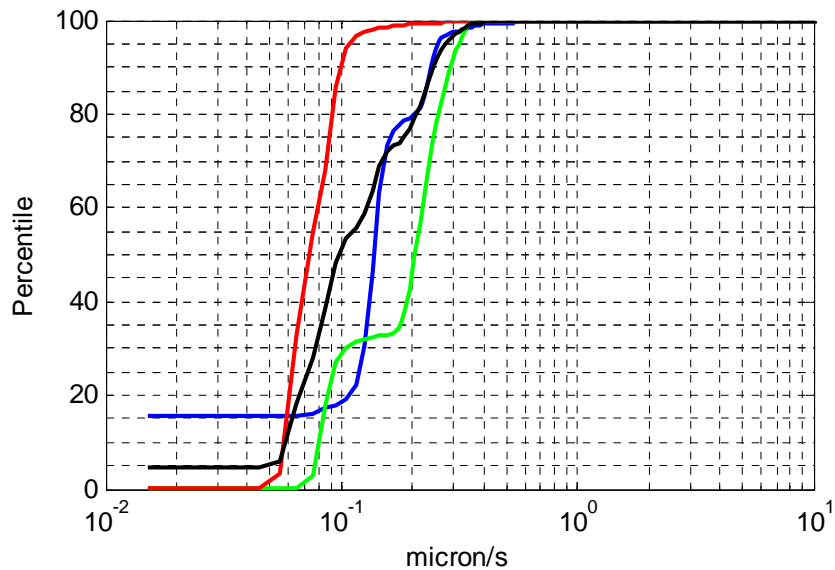
Comer Station Y 10 to 30 Hz



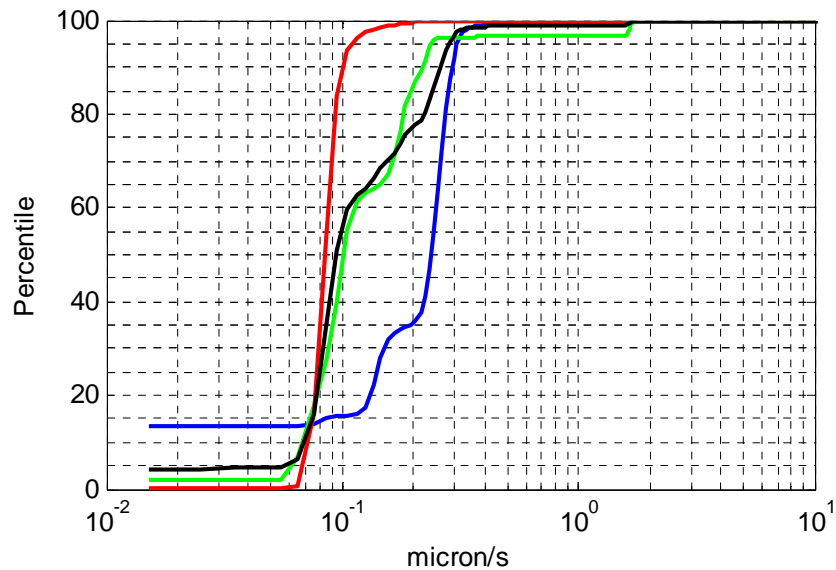
Comer Station Z 10 to 30 Hz



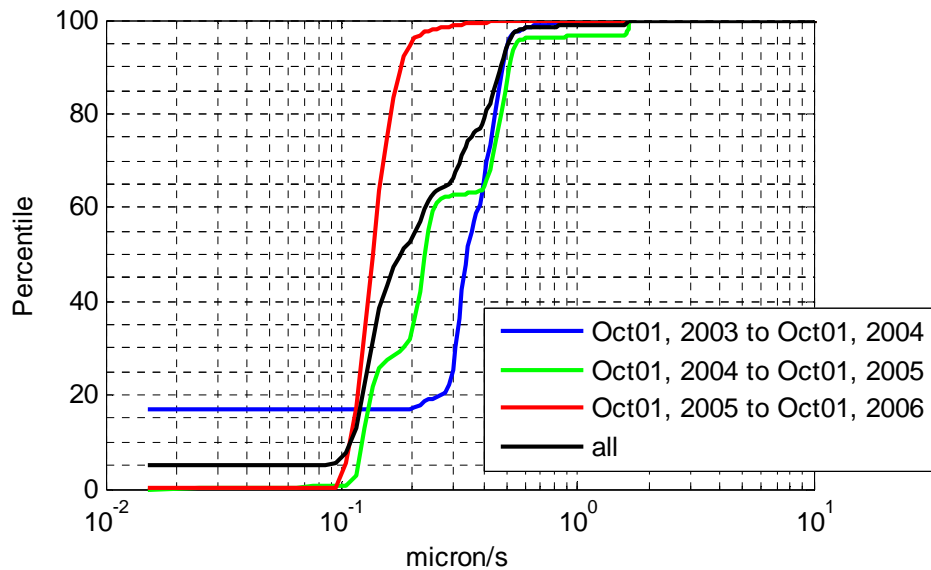
EX Station X 10 to 30 Hz



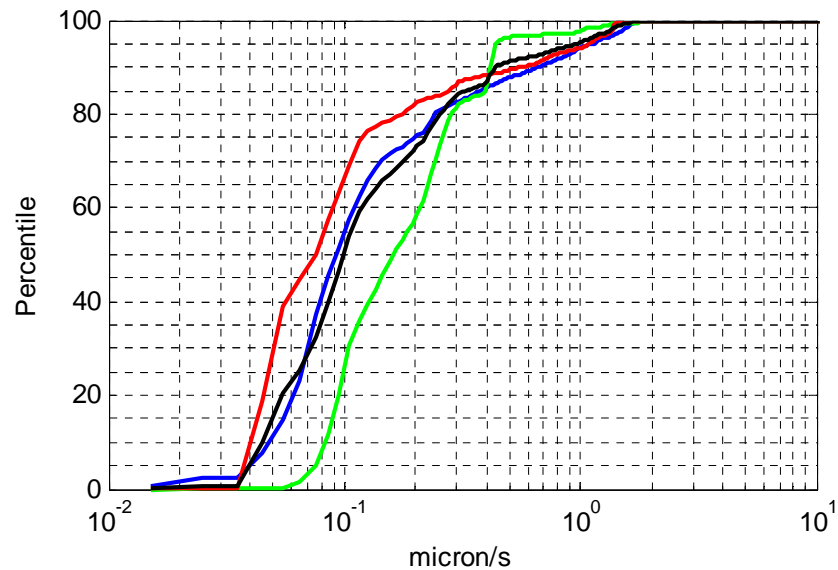
EX Station Y 10 to 30 Hz



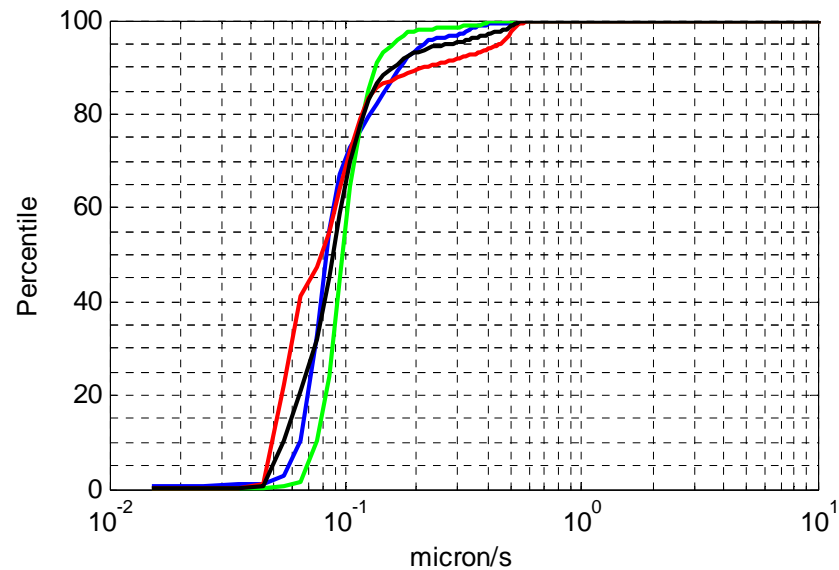
EX Station Z 10 to 30 Hz



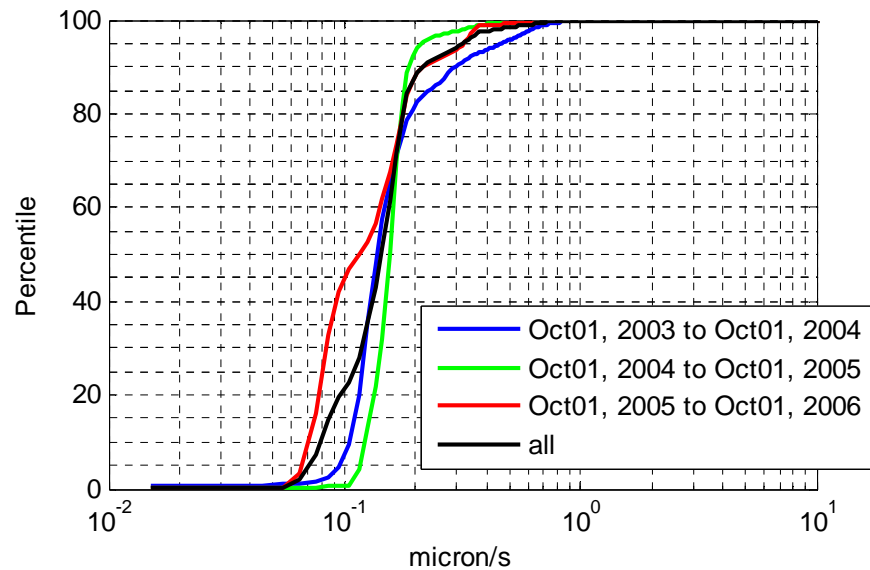
EY Station X 10 to 30 Hz



EY Station Y 10 to 30 Hz



EY Station Z 10 to 30 Hz

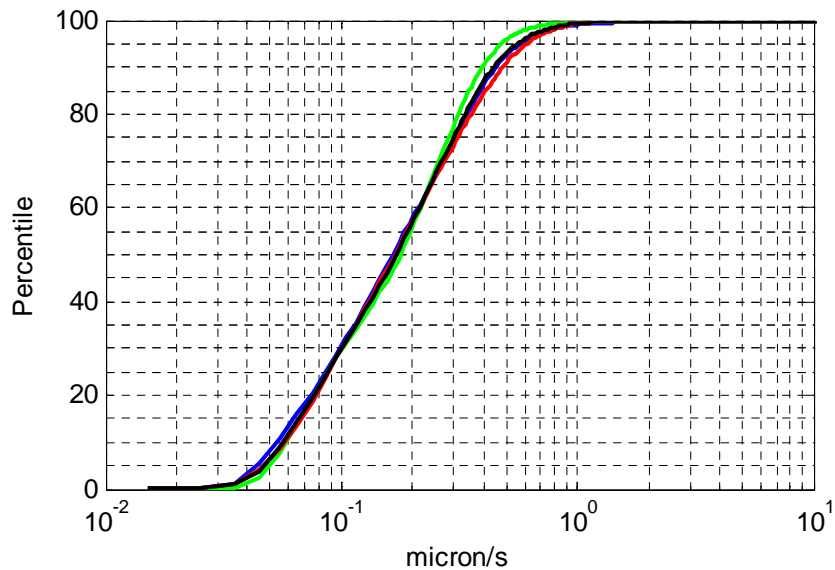




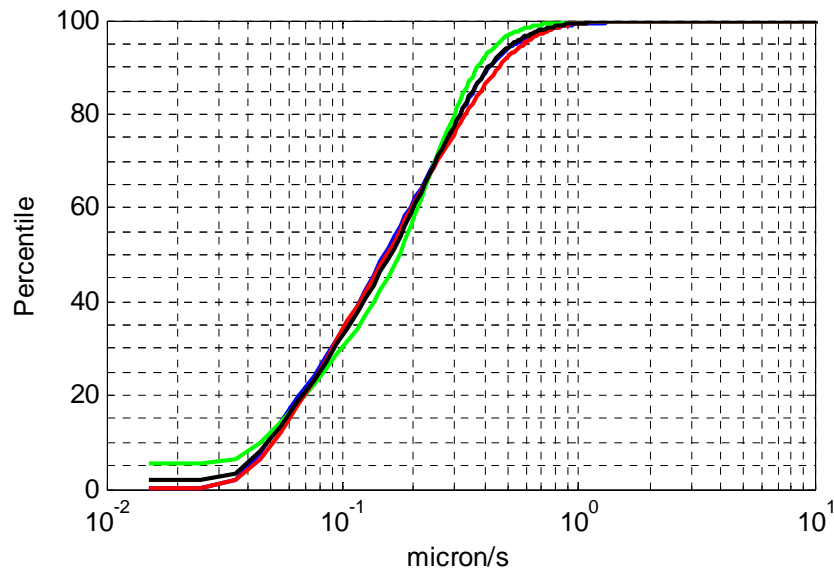
A.3 LHO yearly ground rms-velocity percentile and cumulative normalized histograms, measured by Guralp seismometers.

Guralp 0.1-0.3Hz							
Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LHO	Corner	X	Oct 01 2003 to Oct 01 2004	0.16	0.32	0.46	0.58
			Oct 01 2004 to Oct 01 2005	0.19	0.29	0.41	0.49
			Oct 01 2005 to Oct 01 2006	0.18	0.32	0.49	0.62
			Oct 01 2003 to Oct 01 2006	0.18	0.31	0.45	0.57
			E.Daw's number	0.13	-	0.45	0.60
		Y	Oct 01 2003 to Oct 01 2004	0.16	0.29	0.43	0.55
			Oct 01 2004 to Oct 01 2005	0.18	0.28	0.38	0.46
			Oct 01 2005 to Oct 01 2006	0.16	0.30	0.47	0.60
			Oct 01 2003 to Oct 01 2006	0.16	0.29	0.43	0.54
			E.Daw's number	0.12	-	0.43	0.58
		Z	Oct 01 2003 to Oct 01 2004	0.21	0.39	0.59	0.76
			Oct 01 2004 to Oct 01 2005	0.22	0.36	0.51	0.63
			Oct 01 2005 to Oct 01 2006	0.22	0.40	0.64	0.82
			Oct 01 2003 to Oct 01 2006	0.22	0.38	0.58	0.74
			E.Daw's number	0.16	-	0.58	0.78
	EX	X	Oct 01 2003 to Oct 01 2004	0.18	0.33	0.49	0.63
			Oct 01 2004 to Oct 01 2005	0.20	0.31	0.43	0.52
			Oct 01 2005 to Oct 01 2006	0.19	0.34	0.52	0.66
			Oct 01 2003 to Oct 01 2006	0.19	0.33	0.48	0.60
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.19	0.32	0.46	0.60
			Oct 01 2004 to Oct 01 2005	0.22	0.38	0.54	0.66
			Oct 01 2005 to Oct 01 2006	0.22	0.42	0.67	0.86
			Oct 01 2003 to Oct 01 2006	0.21	0.37	0.56	0.72
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.22	0.40	0.62	0.81
			Oct 01 2004 to Oct 01 2005	0.20	0.29	0.40	0.48
			Oct 01 2005 to Oct 01 2006	0.19	0.32	0.49	0.62
			Oct 01 2003 to Oct 01 2006	0.20	0.33	0.50	0.64
			E.Daw's number	-	-	-	-
	EY	X	Oct 01 2003 to Oct 01 2004	0.16	0.31	0.45	0.56
			Oct 01 2004 to Oct 01 2005	0.19	0.29	0.40	0.48
			Oct 01 2005 to Oct 01 2006	0.16	0.30	0.46	0.58
			Oct 01 2003 to Oct 01 2006	0.18	0.30	0.43	0.54
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.15	0.28	0.42	0.53
			Oct 01 2004 to Oct 01 2005	0.16	0.26	0.36	0.43
			Oct 01 2005 to Oct 01 2006	0.16	0.29	0.45	0.57
			Oct 01 2003 to Oct 01 2006	0.16	0.27	0.41	0.51
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.22	0.41	0.61	0.78
			Oct 01 2004 to Oct 01 2005	0.22	0.38	0.53	0.64
			Oct 01 2005 to Oct 01 2006	0.21	0.40	0.64	0.81
			Oct 01 2003 to Oct 01 2006	0.22	0.39	0.59	0.74
			E.Daw's number	-	-	-	-
	MX	X	Oct 01 2003 to Oct 01 2004	0.18	0.33	0.48	0.60
			Oct 01 2004 to Oct 01 2005	0.19	0.30	0.41	0.49
			Oct 01 2005 to Oct 01 2006	0.19	0.33	0.50	0.63
Oct 01 2003 to Oct 01 2006			0.19	0.32	0.46	0.57	
E.Daw's number			0.15	-	0.47	0.66	
Y		Oct 01 2003 to Oct 01 2004	0.16	0.31	0.45	0.57	
		Oct 01 2004 to Oct 01 2005	0.18	0.29	0.39	0.47	
		Oct 01 2005 to Oct 01 2006	0.18	0.32	0.50	0.63	
		Oct 01 2003 to Oct 01 2006	0.16	0.30	0.45	0.56	
		E.Daw's number	0.13	-	0.46	0.64	
Z		Oct 01 2003 to Oct 01 2004	0.22	0.42	0.64	0.82	
		Oct 01 2004 to Oct 01 2005	0.24	0.39	0.54	0.66	
		Oct 01 2005 to Oct 01 2006	0.22	0.42	0.68	0.87	
		Oct 01 2003 to Oct 01 2006	0.22	0.41	0.62	0.79	
		E.Daw's number	0.17	-	0.64	0.90	
MY	X	Oct 01 2003 to Oct 01 2004	0.19	0.32	0.47	0.59	
		Oct 01 2004 to Oct 01 2005	0.20	0.30	0.42	0.50	
		Oct 01 2005 to Oct 01 2006	0.20	0.33	0.50	0.63	
		Oct 01 2003 to Oct 01 2006	0.19	0.32	0.46	0.57	
		E.Daw's number	0.15	-	0.49	0.67	
	Y	Oct 01 2003 to Oct 01 2004	0.16	0.30	0.43	0.55	
		Oct 01 2004 to Oct 01 2005	0.16	0.27	0.38	0.46	
		Oct 01 2005 to Oct 01 2006	0.16	0.29	0.47	0.59	
		Oct 01 2003 to Oct 01 2006	0.16	0.29	0.42	0.54	
		E.Daw's number	0.13	-	0.45	0.63	
	Z	Oct 01 2003 to Oct 01 2004	0.21	0.40	0.60	0.77	
		Oct 01 2004 to Oct 01 2005	0.22	0.37	0.53	0.64	
		Oct 01 2005 to Oct 01 2006	0.22	0.41	0.66	0.85	
		Oct 01 2003 to Oct 01 2006	0.22	0.39	0.59	0.76	
		E.Daw's number	0.13	-	0.45	0.63	

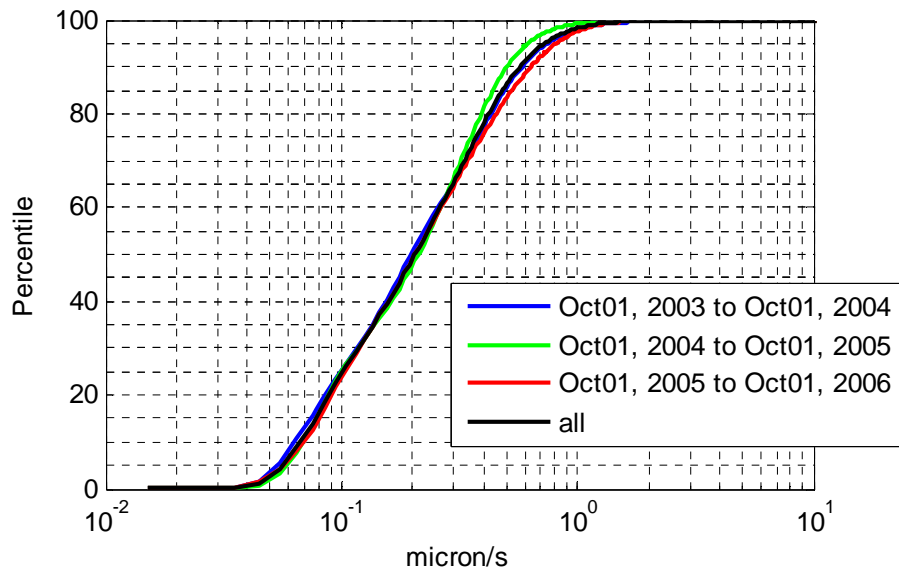
Comer Station X 0.1 to 0.3 Hz



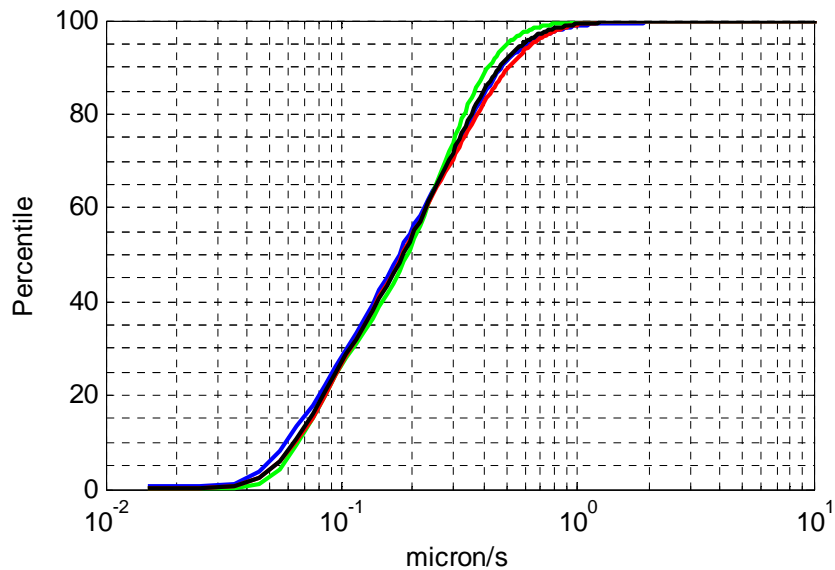
Comer Station Y 0.1 to 0.3 Hz



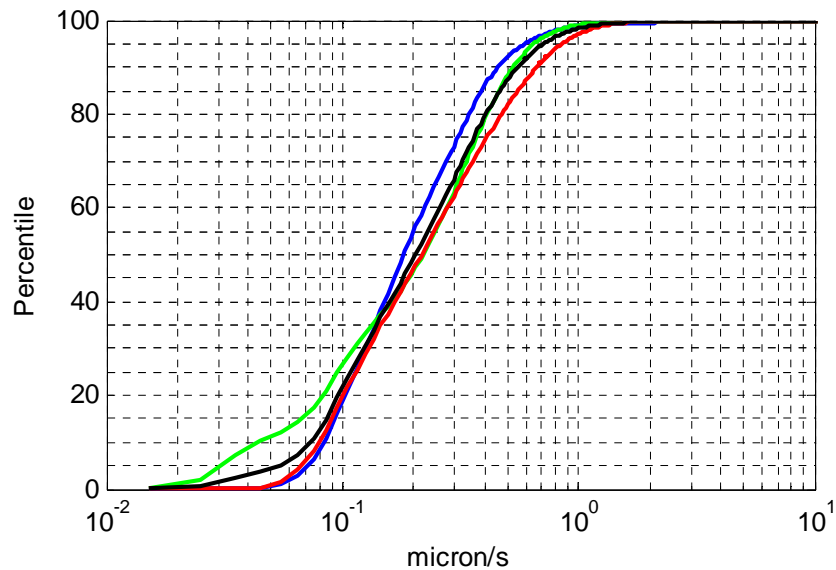
Comer Station Z 0.1 to 0.3 Hz



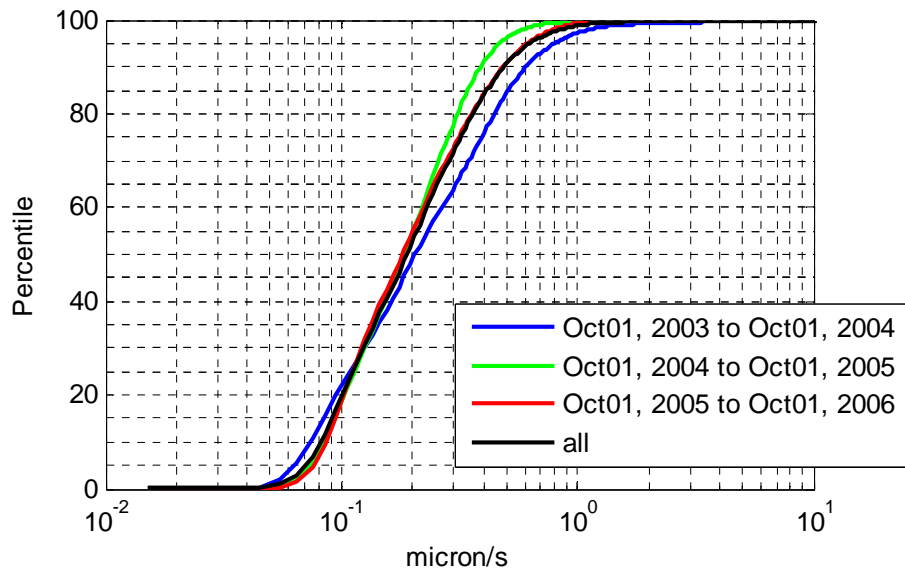
EX Station X 0.1 to 0.3 Hz



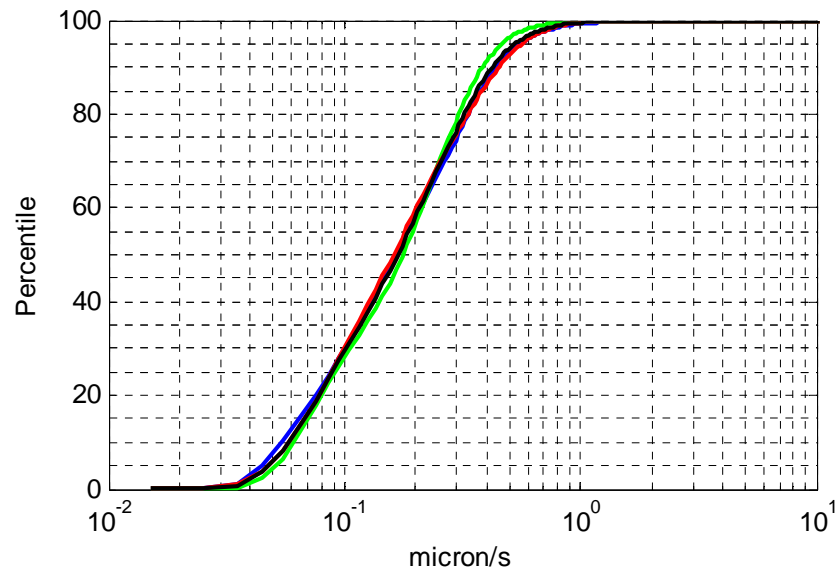
EX Station Y 0.1 to 0.3 Hz



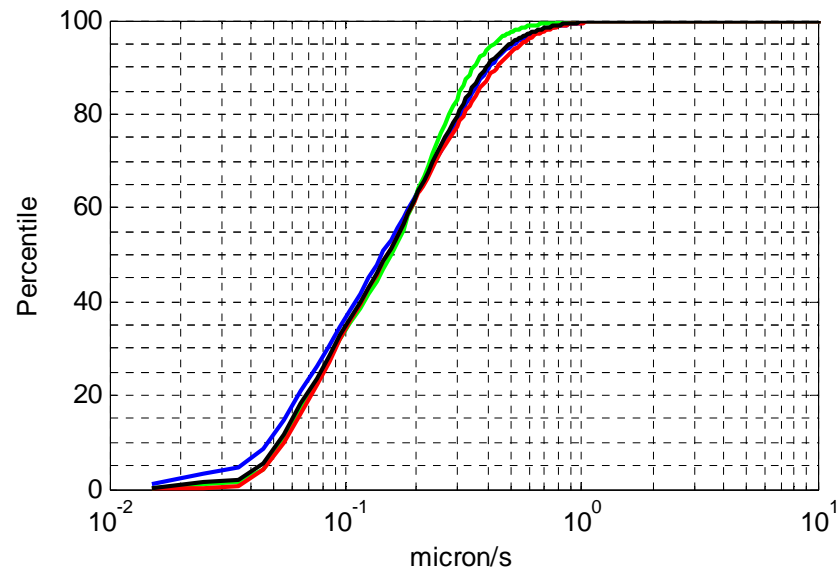
EX Station Z 0.1 to 0.3 Hz



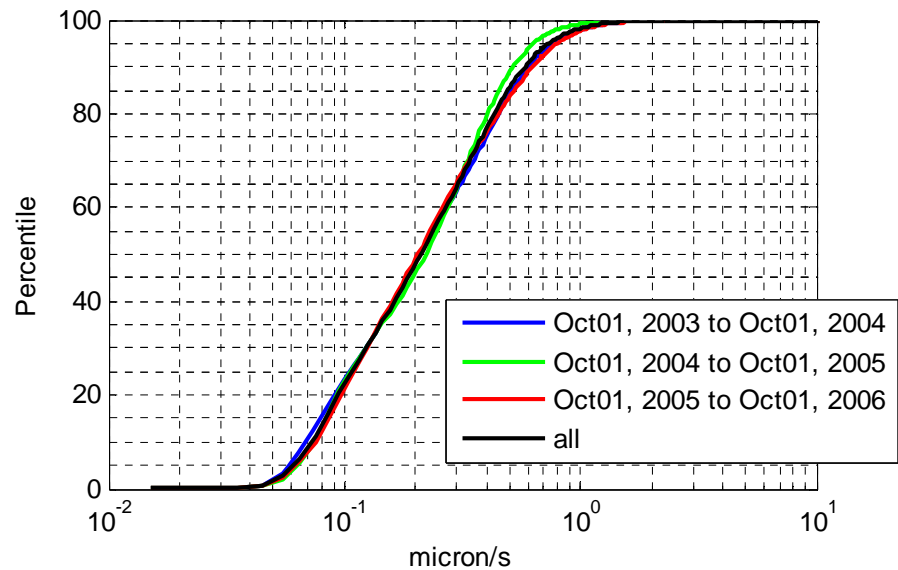
EY Station X 0.1 to 0.3 Hz



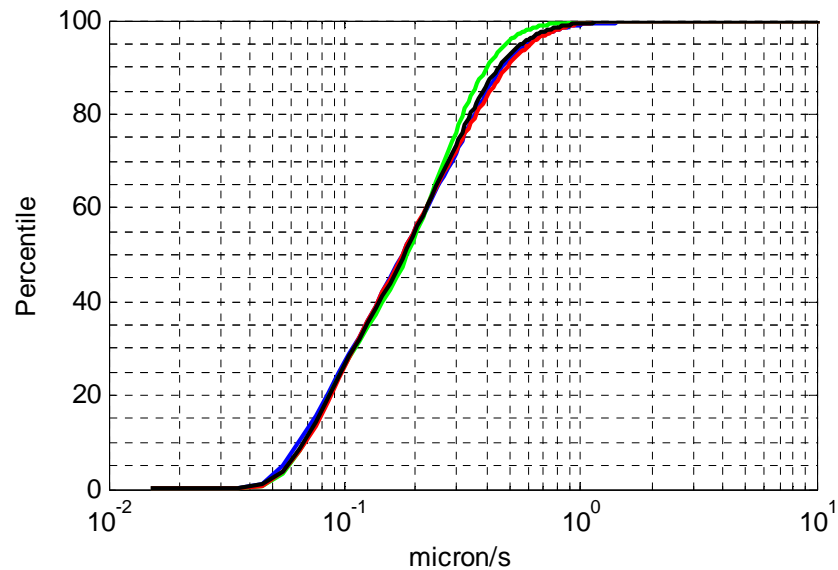
EY Station Y 0.1 to 0.3 Hz



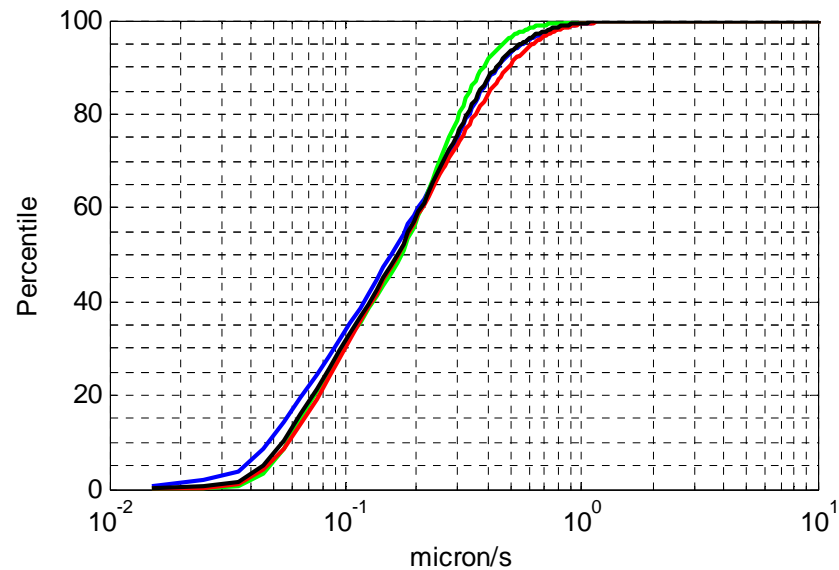
EY Station Z 0.1 to 0.3 Hz



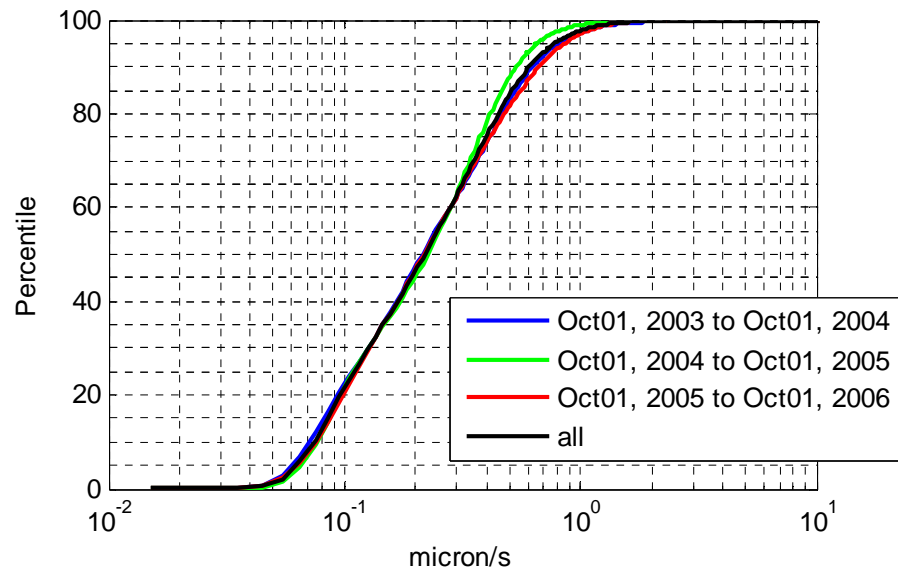
MX Station X 0.1 to 0.3 Hz



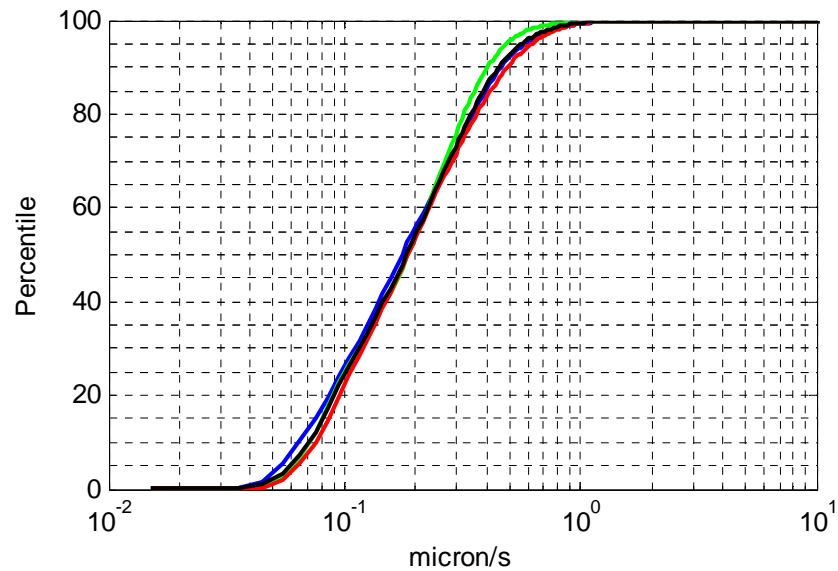
MX Station Y 0.1 to 0.3 Hz



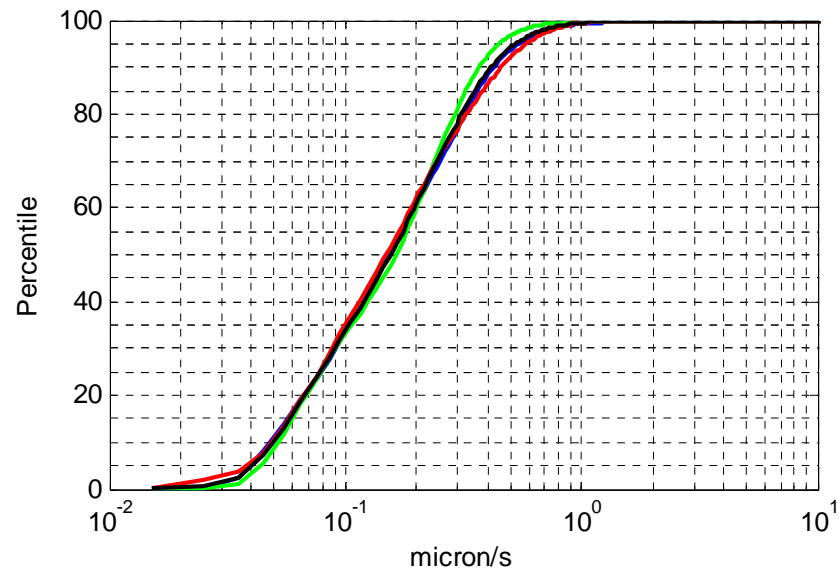
MX Station Z 0.1 to 0.3 Hz



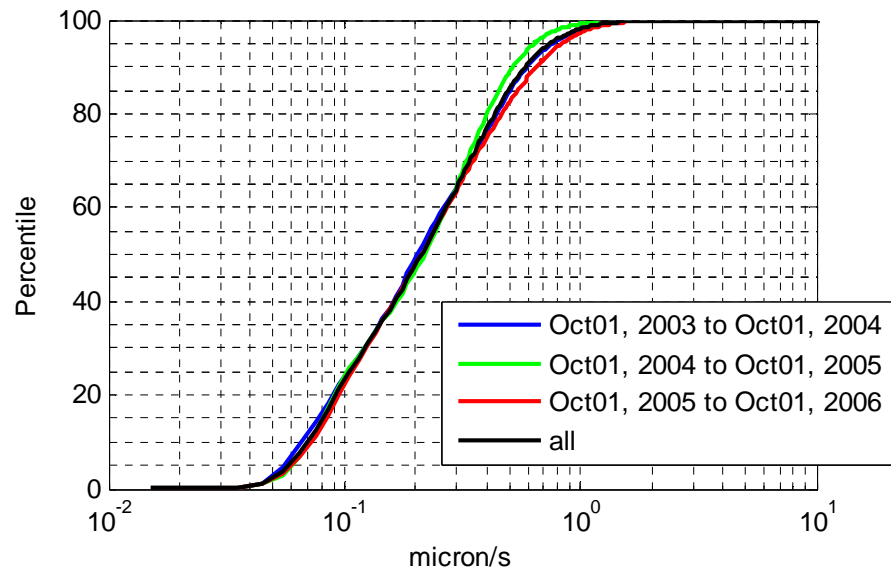
MY Station X 0.1 to 0.3 Hz



MY Station Y 0.1 to 0.3 Hz



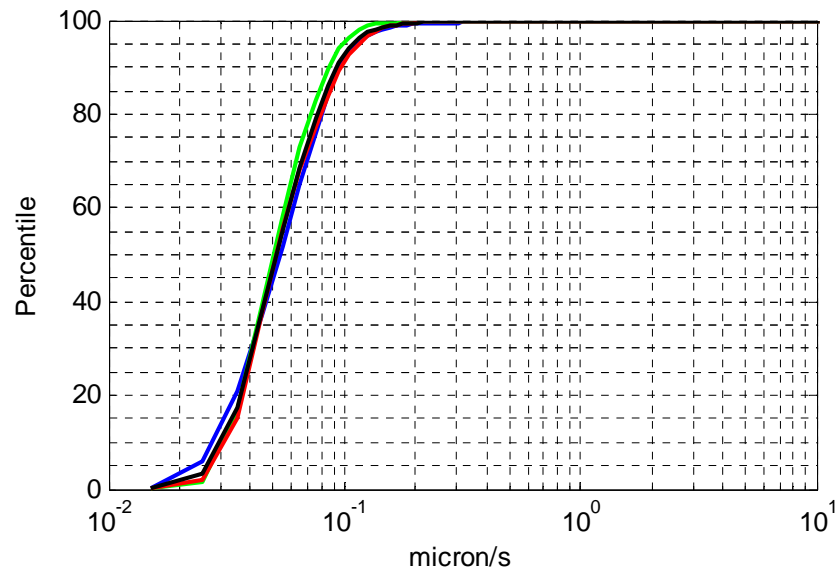
MY Station Z 0.1 to 0.3 Hz



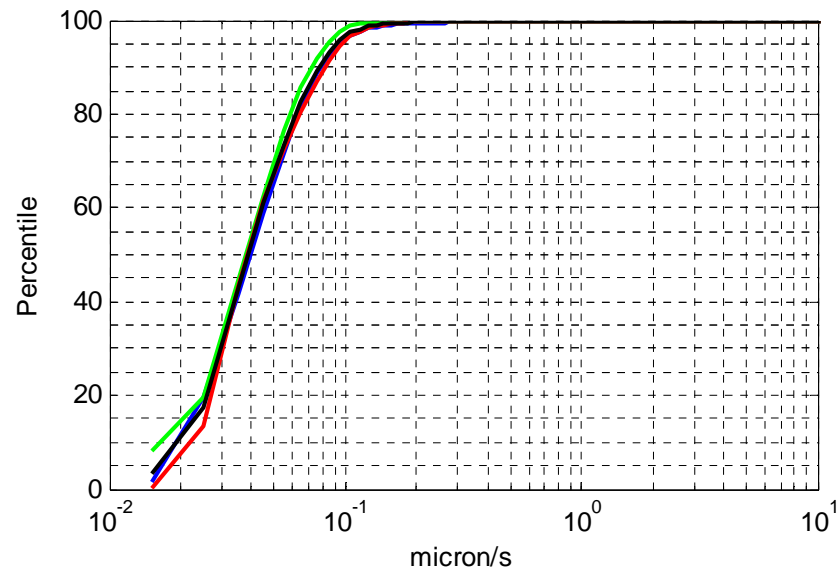
**Guralp 0.3-1Hz**

Site	Station	Axis	Time span	Velocity percentile (µm/s)			
				50%	75%	90%	95%
LHO	Corner	X	Oct 01 2003 to Oct 01 2004	0.06	0.08	0.11	0.12
			Oct 01 2004 to Oct 01 2005	0.06	0.08	0.10	0.11
			Oct 01 2005 to Oct 01 2006	0.06	0.08	0.11	0.12
			Oct 01 2003 to Oct 01 2006	0.06	0.08	0.10	0.12
			E.Daw's number	0.05	-	0.10	0.13
		Y	Oct 01 2003 to Oct 01 2004	0.05	0.07	0.09	0.10
			Oct 01 2004 to Oct 01 2005	0.05	0.06	0.08	0.09
			Oct 01 2005 to Oct 01 2006	0.05	0.07	0.09	0.11
			Oct 01 2003 to Oct 01 2006	0.05	0.07	0.09	0.10
			E.Daw's number	0.04	-	0.09	0.12
		Z	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.06	0.07
			Oct 01 2004 to Oct 01 2005	0.04	0.05	0.06	0.07
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.08
			Oct 01 2003 to Oct 01 2006	0.04	0.05	0.06	0.07
			E.Daw's number	0.03	-	0.07	0.09
	EX	X	Oct 01 2003 to Oct 01 2004	0.08	0.11	0.14	0.16
			Oct 01 2004 to Oct 01 2005	0.08	0.10	0.12	0.14
			Oct 01 2005 to Oct 01 2006	0.08	0.11	0.14	0.16
			Oct 01 2003 to Oct 01 2006	0.08	0.10	0.13	0.16
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.07	0.09	0.12	0.14
			Oct 01 2004 to Oct 01 2005	0.04	0.05	0.06	0.07
			Oct 01 2005 to Oct 01 2006	0.04	0.06	0.07	0.08
			Oct 01 2003 to Oct 01 2006	0.05	0.07	0.09	0.11
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.07	0.09
			Oct 01 2004 to Oct 01 2005	0.06	0.08	0.10	0.12
			Oct 01 2005 to Oct 01 2006	0.06	0.09	0.12	0.14
			Oct 01 2003 to Oct 01 2006	0.06	0.08	0.10	0.12
			E.Daw's number	-	-	-	-
	EY	X	Oct 01 2003 to Oct 01 2004	0.06	0.08	0.09	0.11
			Oct 01 2004 to Oct 01 2005	0.05	0.07	0.09	0.10
			Oct 01 2005 to Oct 01 2006	0.05	0.07	0.09	0.11
			Oct 01 2003 to Oct 01 2006	0.05	0.07	0.09	0.11
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.08	0.11
			Oct 01 2004 to Oct 01 2005	0.04	0.06	0.07	0.08
			Oct 01 2005 to Oct 01 2006	0.04	0.06	0.08	0.09
			Oct 01 2003 to Oct 01 2006	0.04	0.06	0.08	0.09
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.07	0.08
			Oct 01 2004 to Oct 01 2005	0.04	0.05	0.06	0.07
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.08
			Oct 01 2003 to Oct 01 2006	0.04	0.05	0.06	0.07
			E.Daw's number	-	-	-	-
MX	X	Oct 01 2003 to Oct 01 2004	0.07	0.10	0.12	0.14	
		Oct 01 2004 to Oct 01 2005	0.07	0.09	0.11	0.12	
		Oct 01 2005 to Oct 01 2006	0.07	0.09	0.12	0.14	
		Oct 01 2003 to Oct 01 2006	0.07	0.09	0.12	0.14	
		E.Daw's number	0.06	-	0.12	0.17	
	Y	Oct 01 2003 to Oct 01 2004	0.06	0.08	0.10	0.12	
		Oct 01 2004 to Oct 01 2005	0.05	0.07	0.09	0.11	
		Oct 01 2005 to Oct 01 2006	0.06	0.08	0.11	0.12	
		Oct 01 2003 to Oct 01 2006	0.06	0.08	0.10	0.12	
		E.Daw's number	0.05	-	0.11	0.14	
	Z	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.07	0.08	
		Oct 01 2004 to Oct 01 2005	0.04	0.05	0.06	0.07	
		Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.08	
		Oct 01 2003 to Oct 01 2006	0.04	0.05	0.07	0.08	
		E.Daw's number	0.04	-	0.07	0.10	
MY	X	Oct 01 2003 to Oct 01 2004	0.06	0.08	0.10	0.12	
		Oct 01 2004 to Oct 01 2005	0.06	0.08	0.09	0.11	
		Oct 01 2005 to Oct 01 2006	0.06	0.08	0.11	0.12	
		Oct 01 2003 to Oct 01 2006	0.06	0.08	0.10	0.12	
		E.Daw's number	0.06	-	0.19	0.29	
	Y	Oct 01 2003 to Oct 01 2004	0.05	0.07	0.09	0.10	
		Oct 01 2004 to Oct 01 2005	0.05	0.06	0.08	0.09	
		Oct 01 2005 to Oct 01 2006	0.05	0.07	0.09	0.10	
		Oct 01 2003 to Oct 01 2006	0.05	0.06	0.08	0.10	
		E.Daw's number	0.04	-	0.15	0.22	
	Z	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.06	0.08	
		Oct 01 2004 to Oct 01 2005	0.04	0.05	0.06	0.07	
		Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.08	
		Oct 01 2003 to Oct 01 2006	0.04	0.05	0.06	0.07	
		E.Daw's number	0.03	-	0.07	0.08	

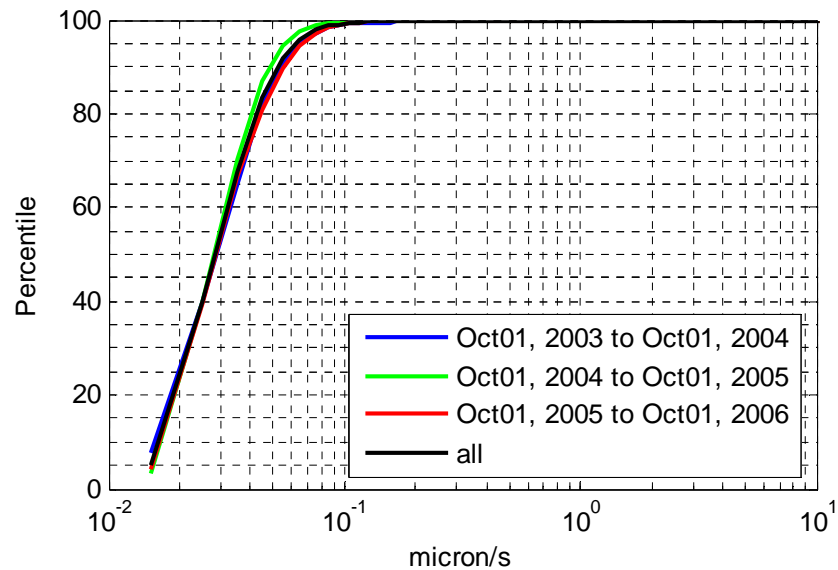
Corner Station X 0.3 to 1 Hz



Corner Station Y 0.3 to 1 Hz

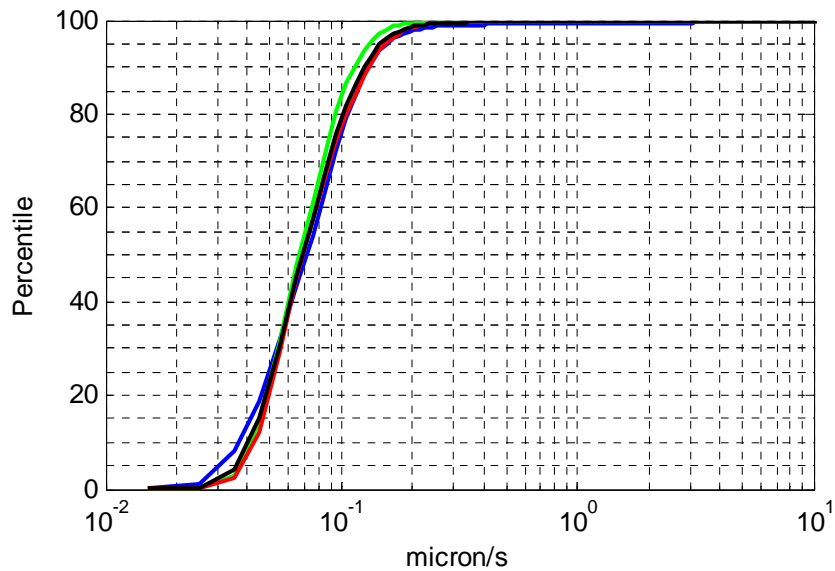


Corner Station Z 0.3 to 1 Hz

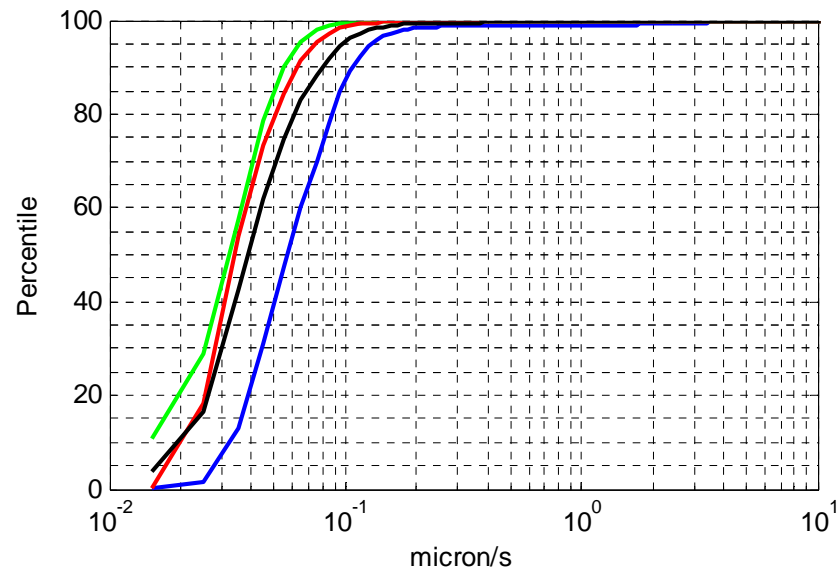




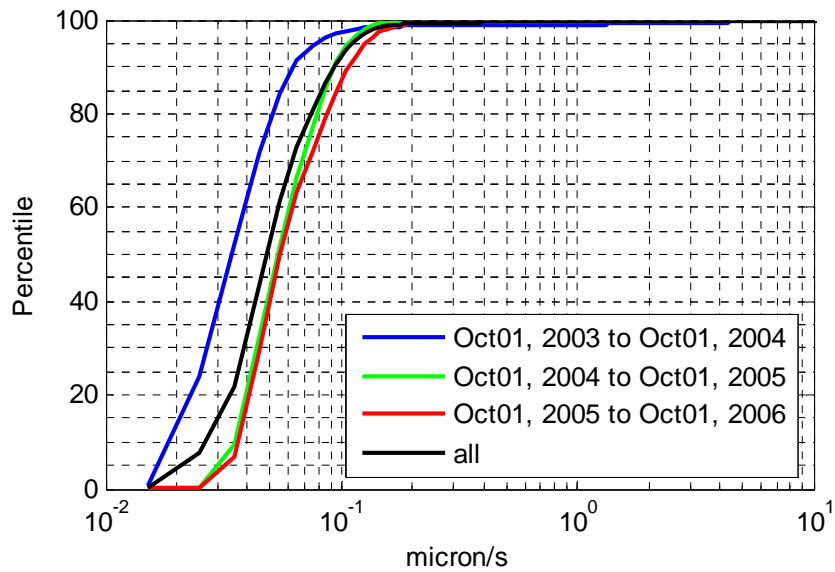
EX Station X 0.3 to 1 Hz



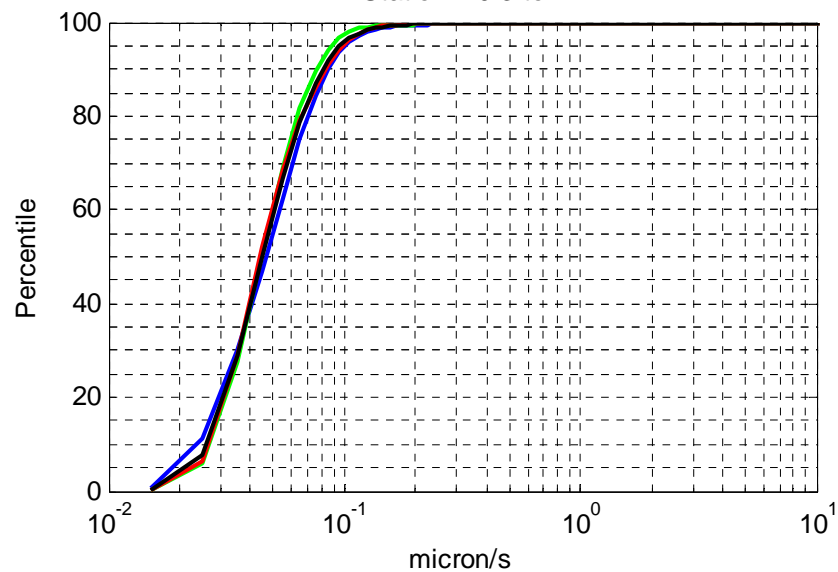
EX Station Y 0.3 to 1 Hz



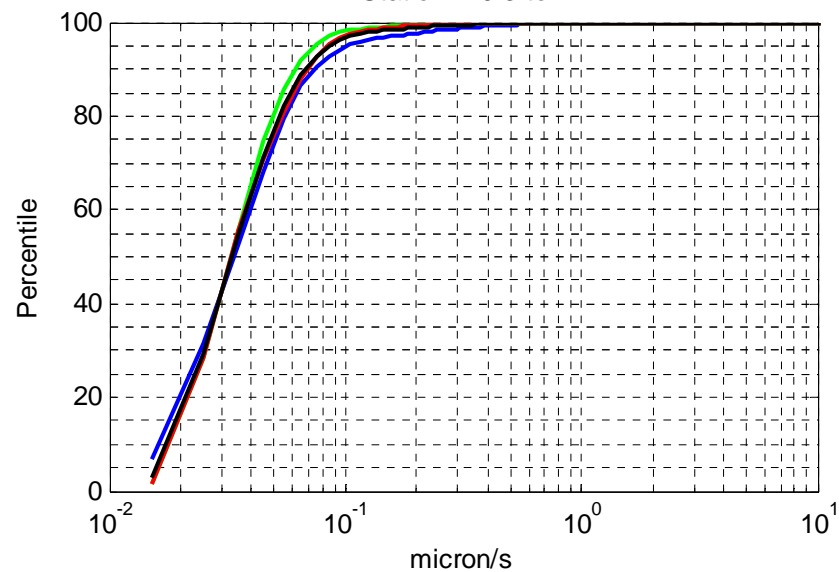
EX Station Z 0.3 to 1 Hz



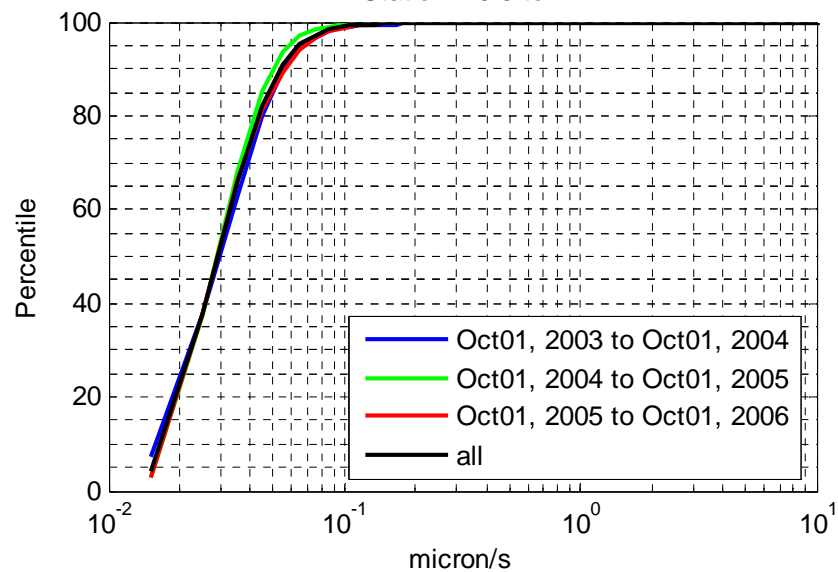
EY Station X 0.3 to 1 Hz



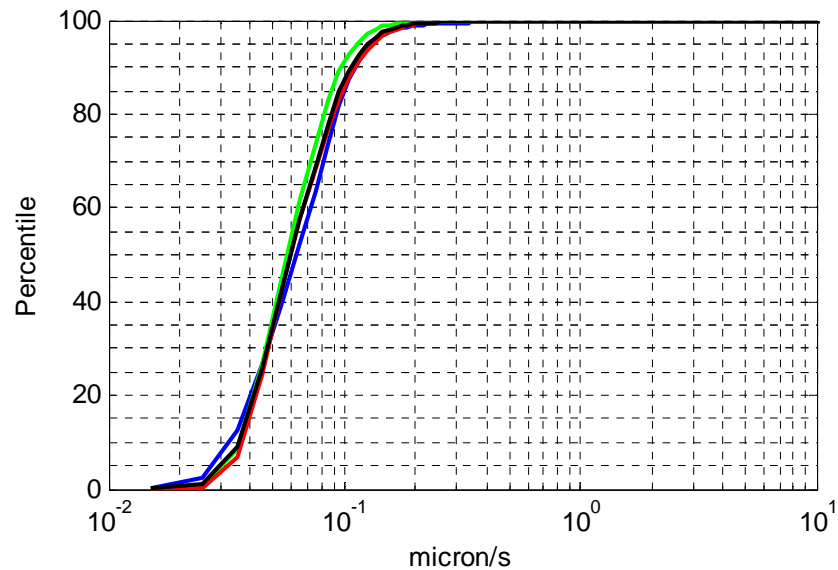
EY Station Y 0.3 to 1 Hz



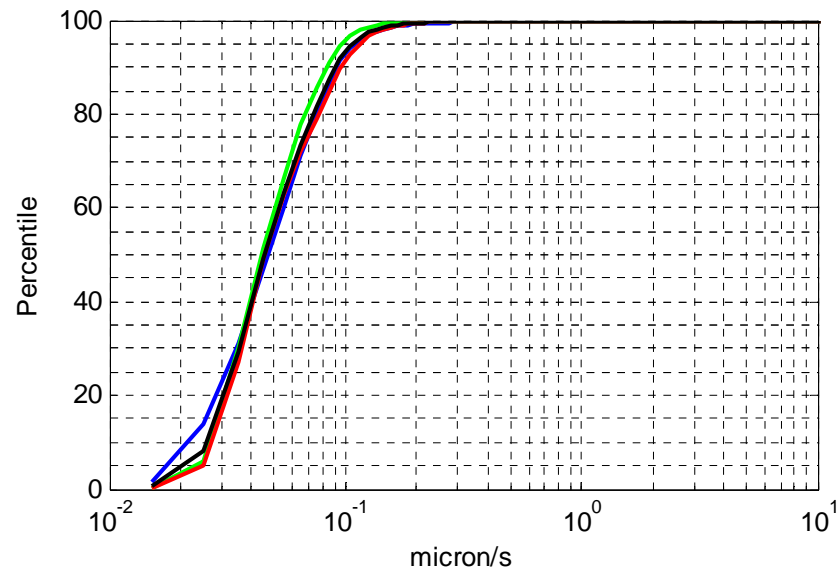
EY Station Z 0.3 to 1 Hz



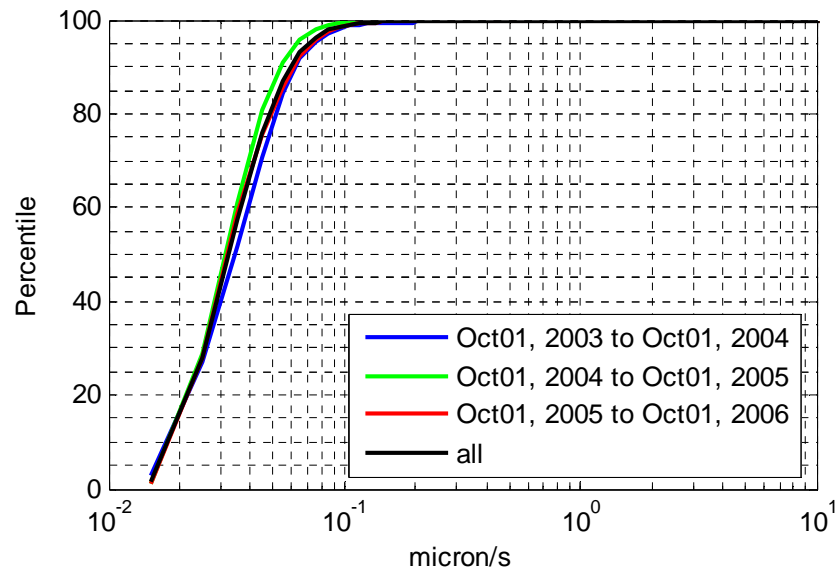
MX Station X 0.3 to 1 Hz



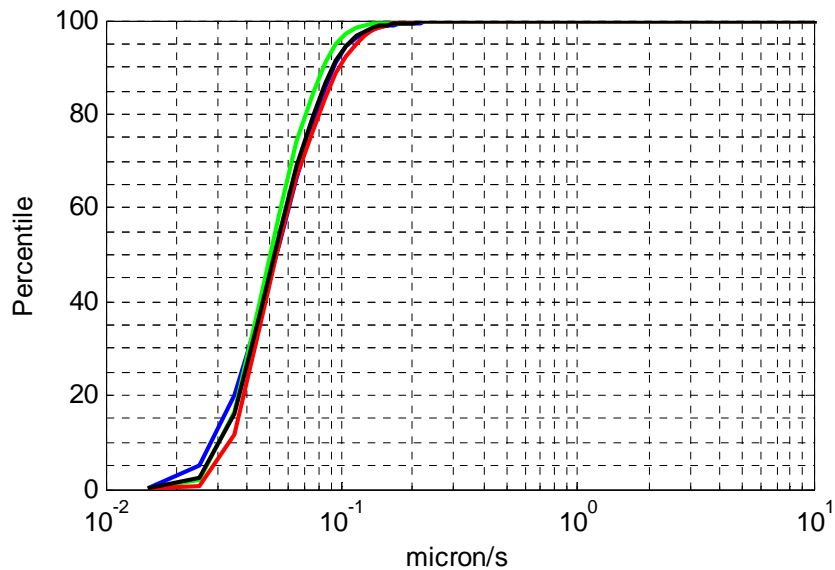
MX Station Y 0.3 to 1 Hz



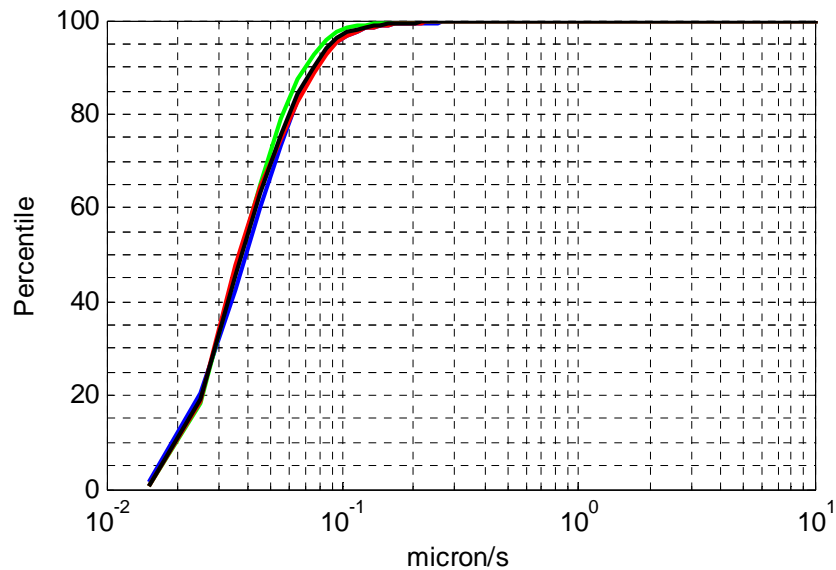
MX Station Z 0.3 to 1 Hz



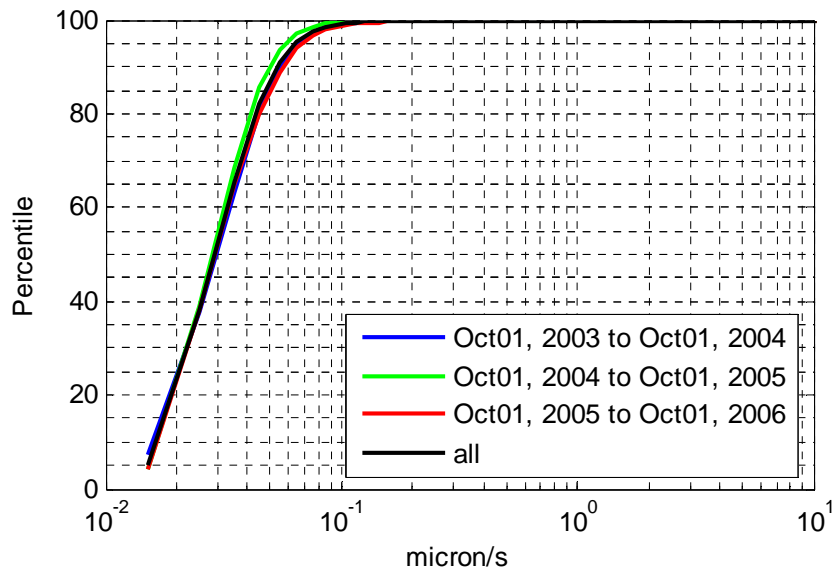
MY Station X 0.3 to 1 Hz



MY Station Y 0.3 to 1 Hz

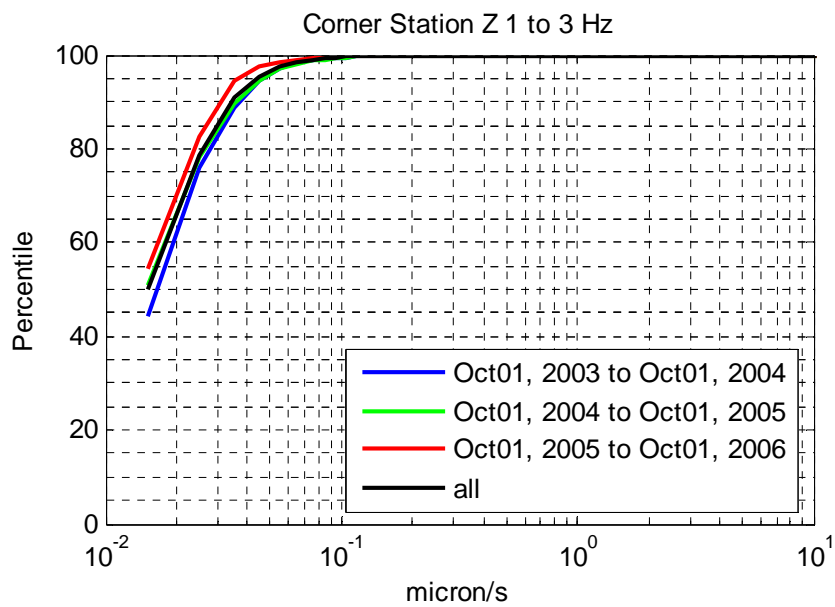
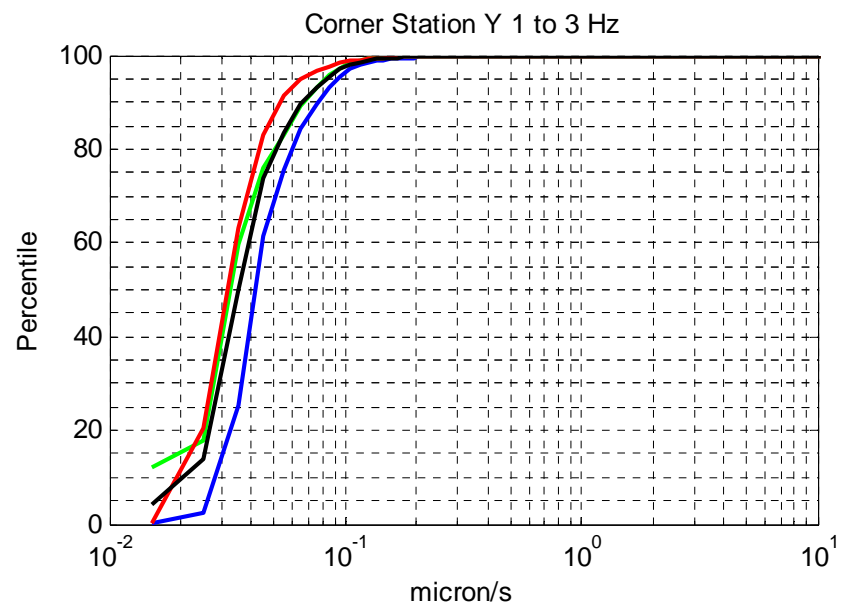
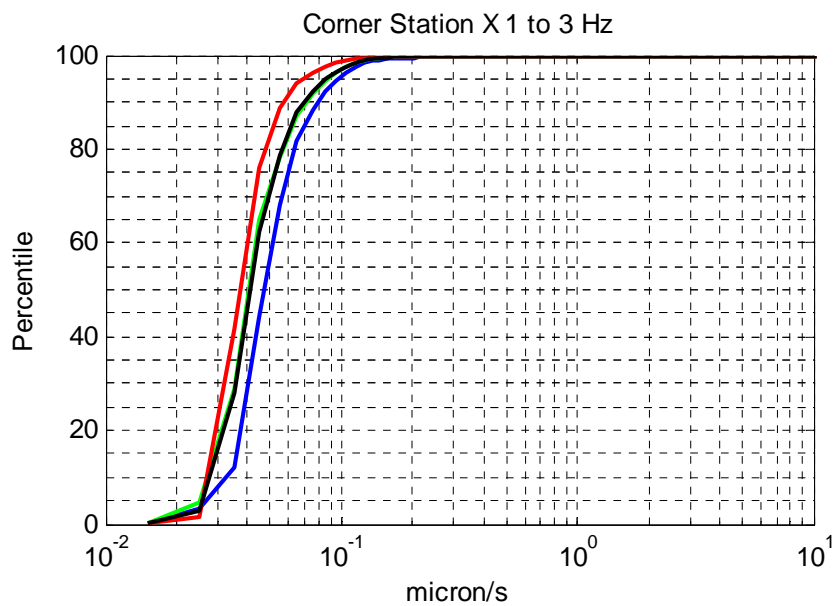


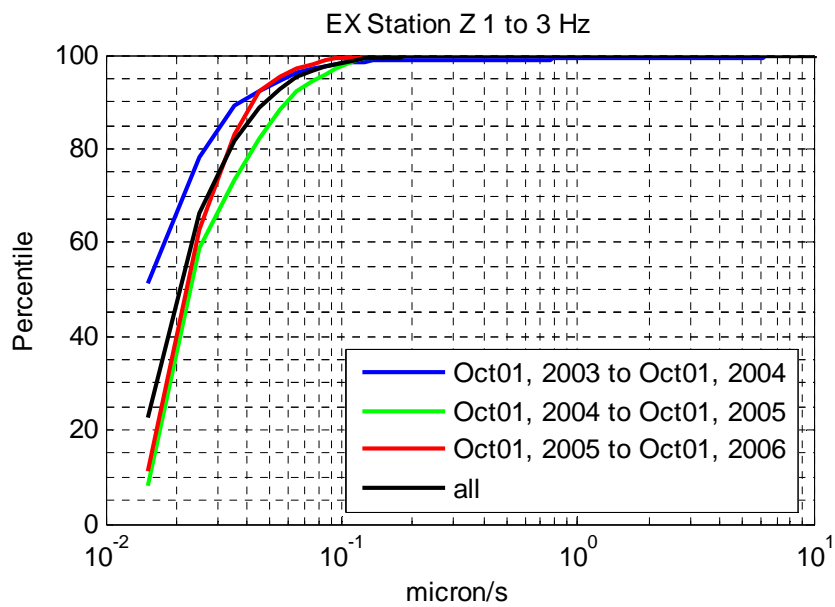
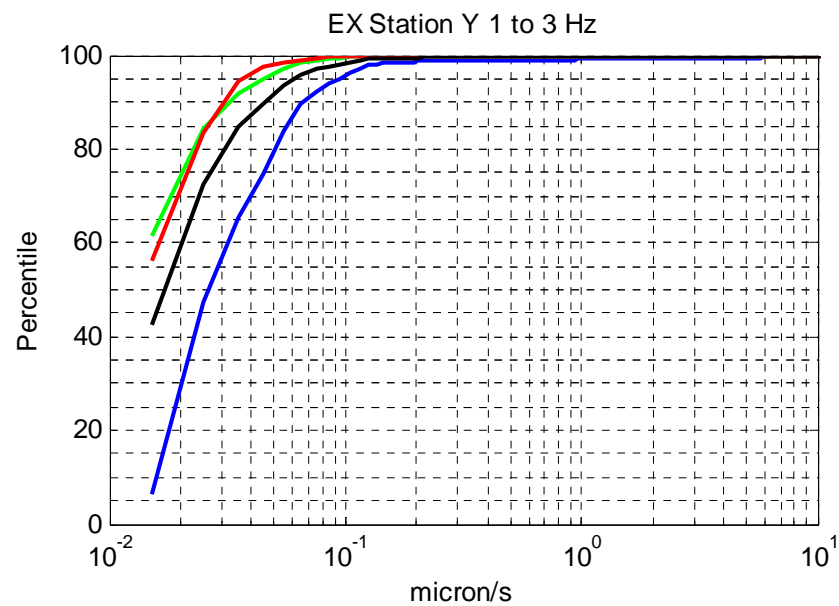
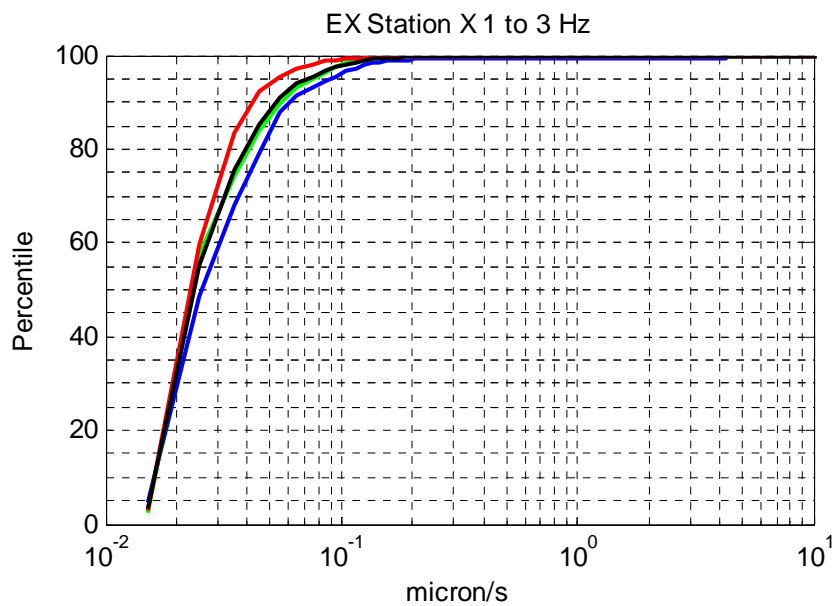
MY Station Z 0.3 to 1 Hz



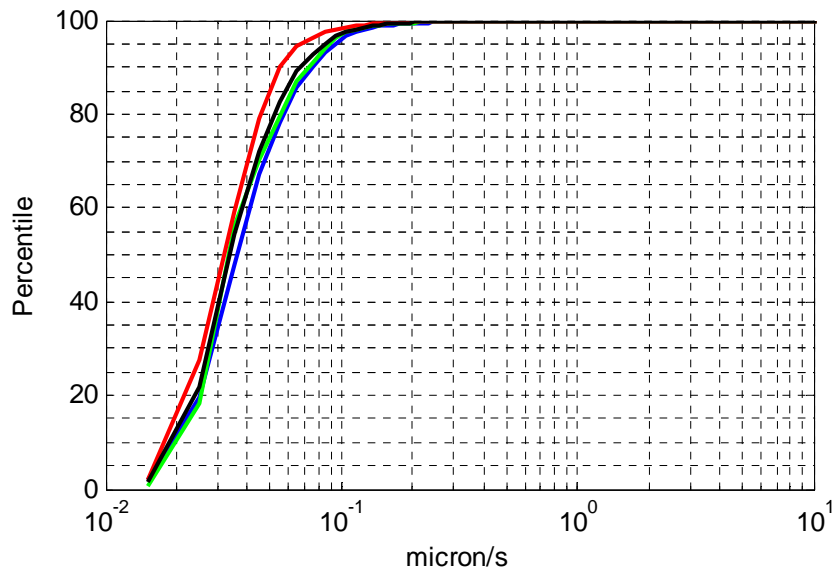
**Guralp 1 3Hz**

Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LHO	Corner	X	Oct 01 2003 to Oct 01 2004	0.06	0.07	0.09	0.11
			Oct 01 2004 to Oct 01 2005	0.05	0.06	0.08	0.10
			Oct 01 2005 to Oct 01 2006	0.05	0.05	0.07	0.08
			Oct 01 2003 to Oct 01 2006	0.05	0.06	0.08	0.10
			E.Daw's number	0.04	-	0.08	0.12
		Y	Oct 01 2003 to Oct 01 2004	0.05	0.06	0.09	0.10
			Oct 01 2004 to Oct 01 2005	0.04	0.05	0.08	0.09
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.06	0.08
			Oct 01 2003 to Oct 01 2006	0.05	0.06	0.08	0.09
			E.Daw's number	0.04	-	0.08	0.12
		Z	Oct 01 2003 to Oct 01 2004	0.03	0.03	0.05	0.06
			Oct 01 2004 to Oct 01 2005	0.02	0.03	0.05	0.06
			Oct 01 2005 to Oct 01 2006	0.02	0.03	0.04	0.05
			Oct 01 2003 to Oct 01 2006	0.02	0.03	0.04	0.05
			E.Daw's number	0.02	-	0.06	0.10
	EX	X	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.07	0.10
			Oct 01 2004 to Oct 01 2005	0.03	0.05	0.07	0.08
			Oct 01 2005 to Oct 01 2006	0.03	0.04	0.05	0.06
			Oct 01 2003 to Oct 01 2006	0.03	0.04	0.06	0.08
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.08	0.10
			Oct 01 2004 to Oct 01 2005	0.02	0.03	0.04	0.05
			Oct 01 2005 to Oct 01 2006	0.02	0.03	0.04	0.05
			Oct 01 2003 to Oct 01 2006	0.03	0.04	0.06	0.07
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.02	0.03	0.05	0.07
			Oct 01 2004 to Oct 01 2005	0.03	0.05	0.07	0.09
			Oct 01 2005 to Oct 01 2006	0.03	0.04	0.05	0.06
			Oct 01 2003 to Oct 01 2006	0.03	0.04	0.06	0.07
			E.Daw's number	-	-	-	-
	EY	X	Oct 01 2003 to Oct 01 2004	0.05	0.06	0.08	0.10
			Oct 01 2004 to Oct 01 2005	0.04	0.06	0.08	0.10
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.06	0.08
			Oct 01 2003 to Oct 01 2006	0.04	0.06	0.08	0.10
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.04	0.06	0.09	0.12
			Oct 01 2004 to Oct 01 2005	0.04	0.06	0.08	0.11
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.06	0.08
			Oct 01 2003 to Oct 01 2006	0.04	0.06	0.08	0.10
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.02	0.03	0.04	0.05
			Oct 01 2004 to Oct 01 2005	0.02	0.03	0.04	0.05
			Oct 01 2005 to Oct 01 2006	0.02	0.03	0.03	0.04
			Oct 01 2003 to Oct 01 2006	0.02	0.03	0.04	0.05
			E.Daw's number	-	-	-	-
	MX	X	Oct 01 2003 to Oct 01 2004	0.05	0.06	0.09	0.12
			Oct 01 2004 to Oct 01 2005	0.04	0.06	0.08	0.11
			Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.09
Oct 01 2003 to Oct 01 2006			0.04	0.06	0.08	0.10	
E.Daw's number			0.04	-	0.08	0.13	
Y		Oct 01 2003 to Oct 01 2004	0.04	0.06	0.08	0.10	
		Oct 01 2004 to Oct 01 2005	0.04	0.06	0.08	0.10	
		Oct 01 2005 to Oct 01 2006	0.04	0.05	0.07	0.09	
		Oct 01 2003 to Oct 01 2006	0.04	0.05	0.08	0.10	
		E.Daw's number	0.03	-	0.08	0.12	
Z		Oct 01 2003 to Oct 01 2004	0.03	0.04	0.05	0.06	
		Oct 01 2004 to Oct 01 2005	0.02	0.03	0.05	0.06	
		Oct 01 2005 to Oct 01 2006	0.02	0.03	0.04	0.05	
		Oct 01 2003 to Oct 01 2006	0.03	0.03	0.05	0.06	
		E.Daw's number	0.02	-	0.05	0.08	
MY	X	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.07	0.09	
		Oct 01 2004 to Oct 01 2005	0.04	0.05	0.07	0.08	
		Oct 01 2005 to Oct 01 2006	0.04	0.05	0.06	0.06	
		Oct 01 2003 to Oct 01 2006	0.04	0.05	0.07	0.08	
		E.Daw's number	0.04	-	0.15	0.31	
	Y	Oct 01 2003 to Oct 01 2004	0.04	0.05	0.07	0.09	
		Oct 01 2004 to Oct 01 2005	0.03	0.05	0.07	0.08	
		Oct 01 2005 to Oct 01 2006	0.03	0.04	0.05	0.06	
		Oct 01 2003 to Oct 01 2006	0.03	0.05	0.06	0.08	
		E.Daw's number	0.03	-	0.10	0.36	
	Z	Oct 01 2003 to Oct 01 2004	0.02	0.03	0.04	0.05	
		Oct 01 2004 to Oct 01 2005	0.02	0.03	0.04	0.05	
		Oct 01 2005 to Oct 01 2006	0.02	0.03	0.03	0.04	
		Oct 01 2003 to Oct 01 2006	0.02	0.03	0.04	0.05	
		E.Daw's number	0.03	-	0.10	0.36	

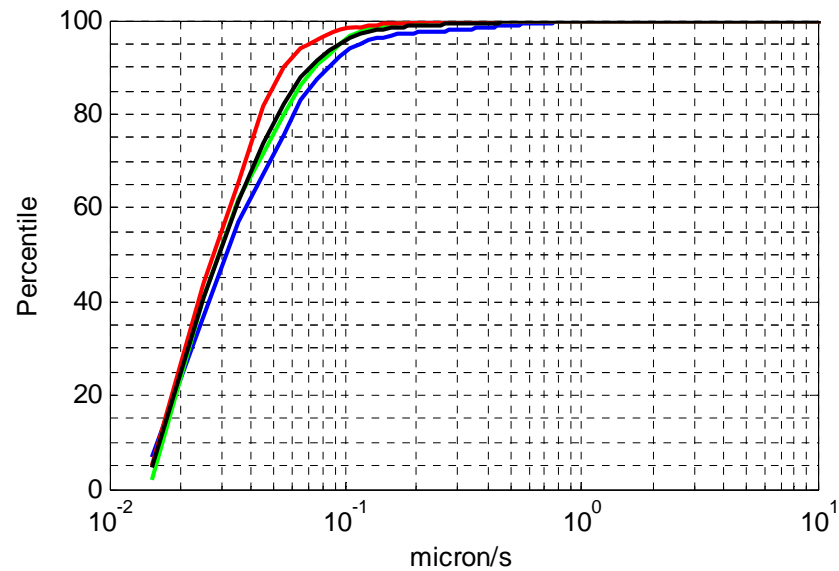




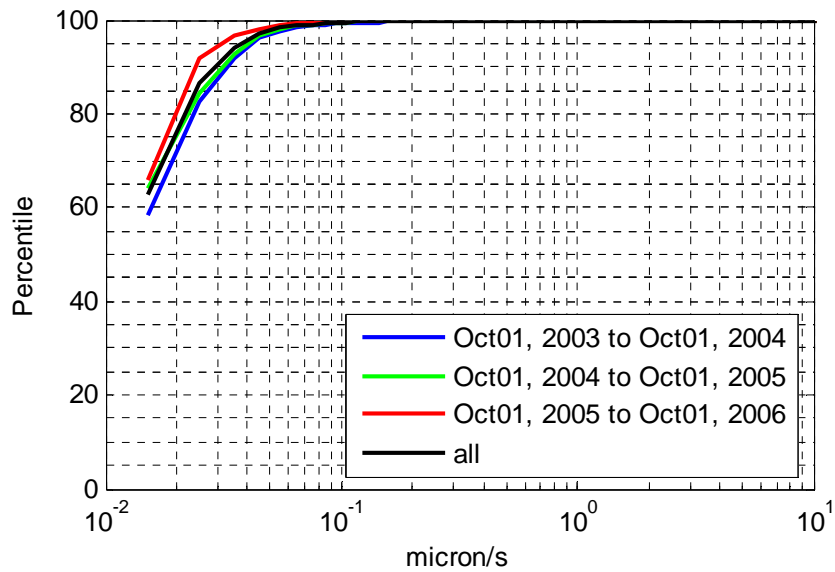
EY Station X 1 to 3 Hz



EY Station Y 1 to 3 Hz

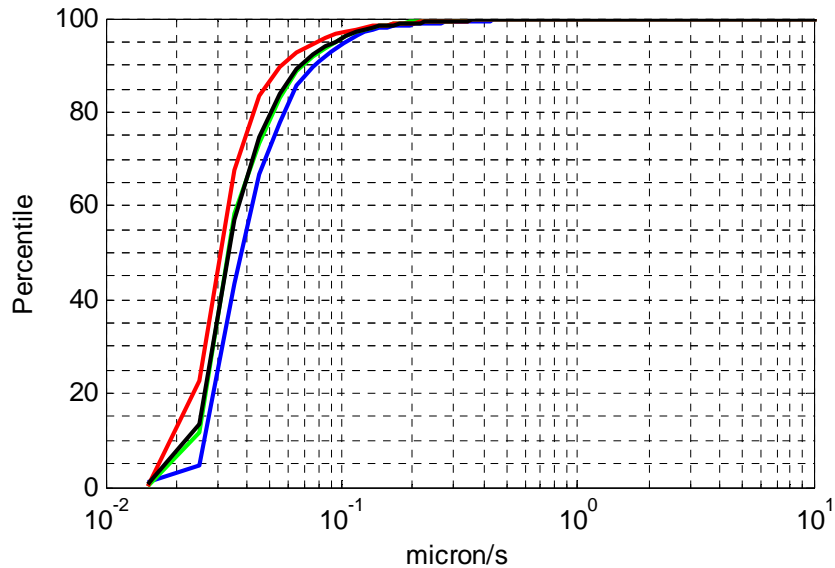


EY Station Z 1 to 3 Hz

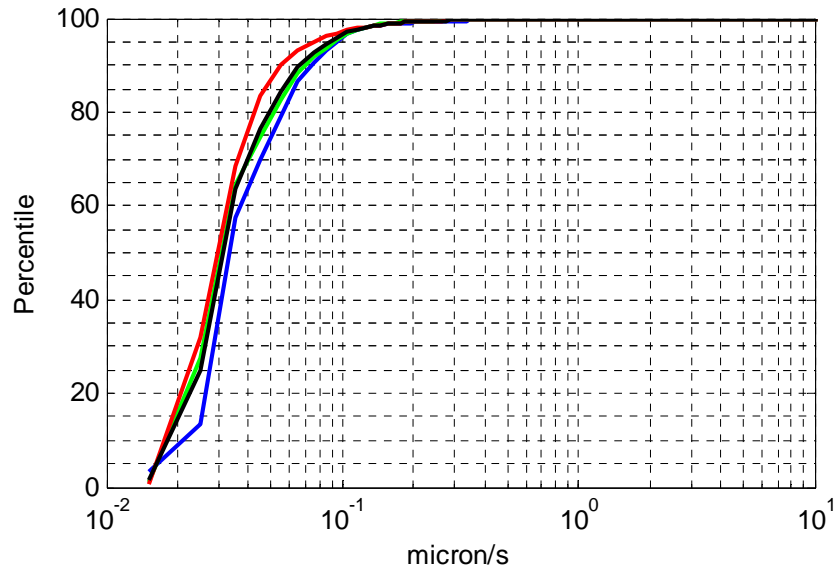




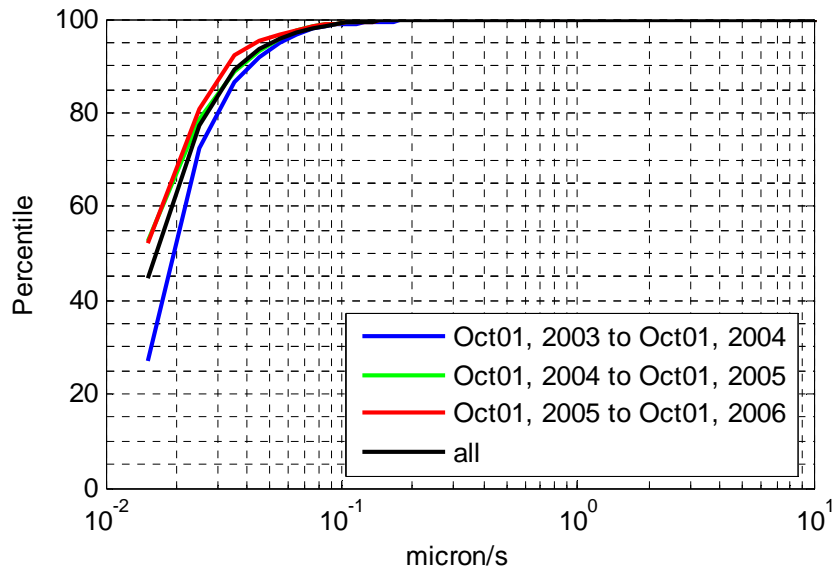
MX Station X 1 to 3 Hz



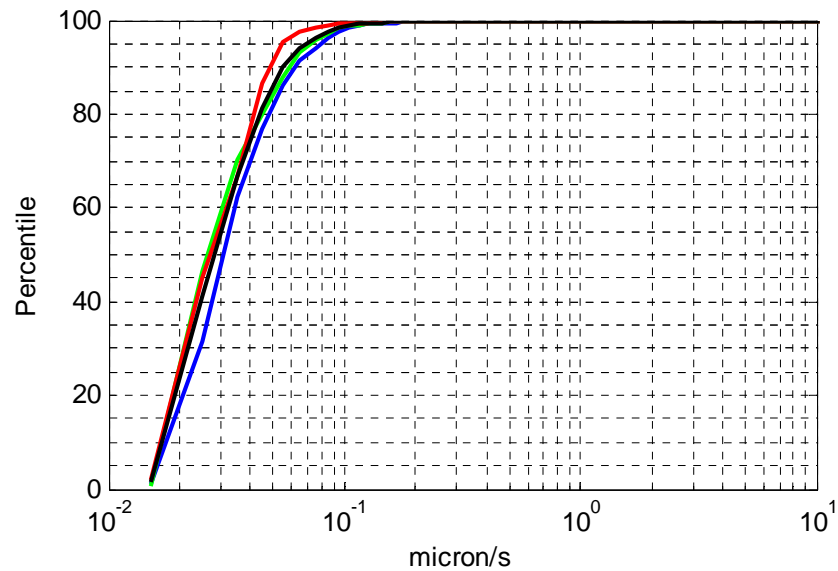
MX Station Y 1 to 3 Hz



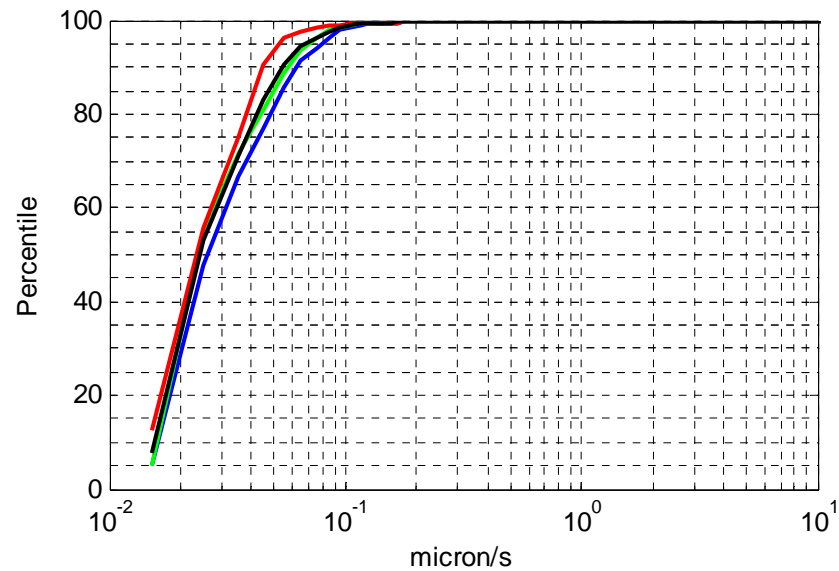
MX Station Z 1 to 3 Hz



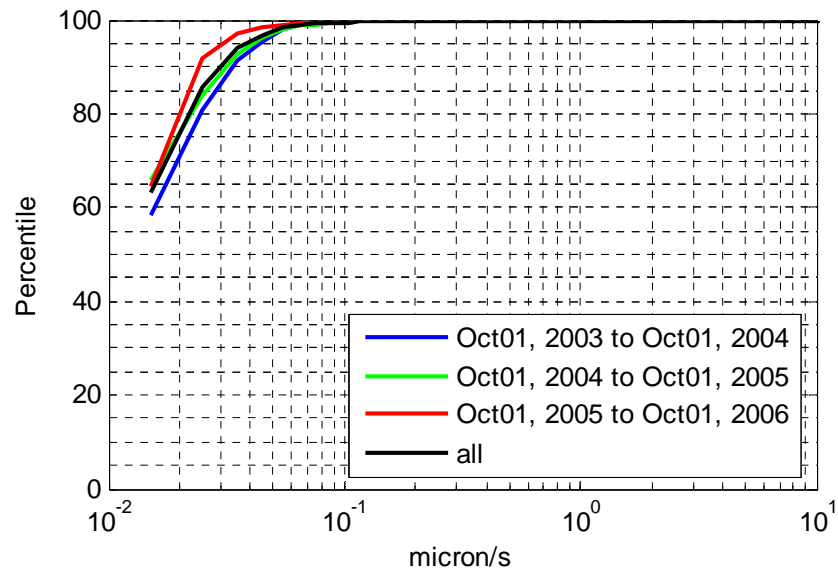
MY Station X 1 to 3 Hz



MY Station Y 1 to 3 Hz



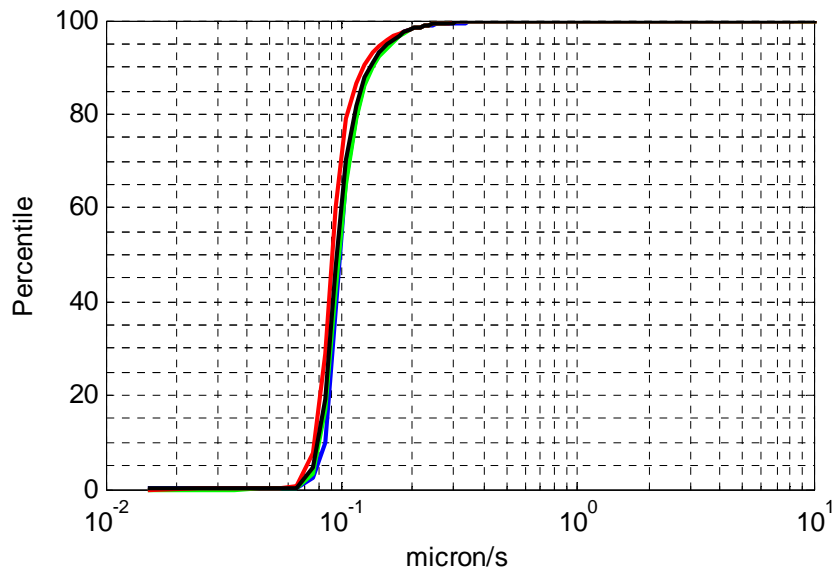
MY Station Z 1 to 3 Hz



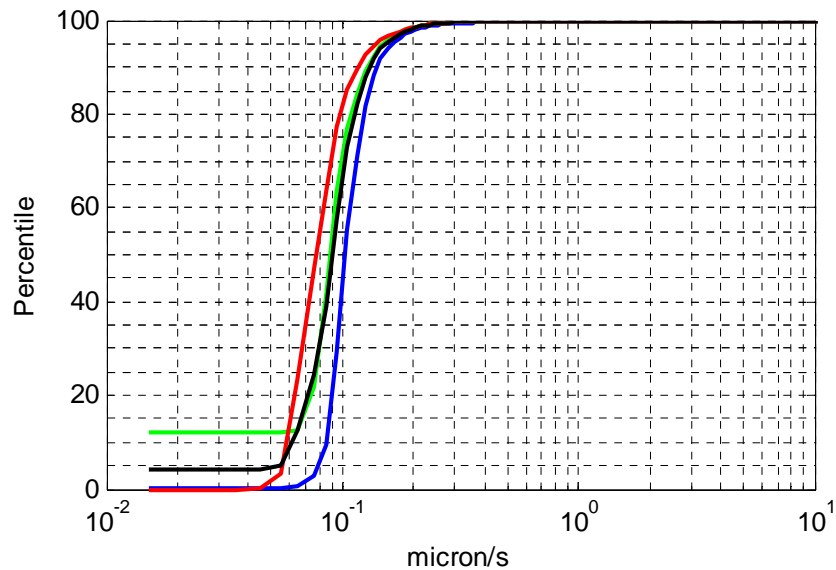
**Guralp 3-10Hz**

Site	Station	Axis	Time span	Velocity percentile ( $\mu\text{m/s}$ )			
				50%	75%	90%	95%
LHO	Corner	X	Oct 01 2003 to Oct 01 2004	0.11	0.12	0.14	0.16
			Oct 01 2004 to Oct 01 2005	0.11	0.12	0.14	0.16
			Oct 01 2005 to Oct 01 2006	0.10	0.11	0.13	0.16
			Oct 01 2003 to Oct 01 2006	0.11	0.12	0.14	0.16
			E.Daw's number	0.10	-	0.15	0.21
		Y	Oct 01 2003 to Oct 01 2004	0.11	0.13	0.15	0.16
			Oct 01 2004 to Oct 01 2005	0.10	0.11	0.14	0.16
			Oct 01 2005 to Oct 01 2006	0.09	0.10	0.13	0.15
			Oct 01 2003 to Oct 01 2006	0.10	0.12	0.14	0.16
			E.Daw's number	0.11	-	0.17	0.23
		Z	Oct 01 2003 to Oct 01 2004	0.18	0.20	0.24	0.27
			Oct 01 2004 to Oct 01 2005	0.18	0.20	0.22	0.28
			Oct 01 2005 to Oct 01 2006	0.15	0.16	0.20	0.22
			Oct 01 2003 to Oct 01 2006	0.16	0.20	0.22	0.26
			E.Daw's number	0.20	-	0.28	0.40
	EX	X	Oct 01 2003 to Oct 01 2004	0.15	0.16	0.20	0.24
			Oct 01 2004 to Oct 01 2005	0.15	0.16	0.20	0.22
			Oct 01 2005 to Oct 01 2006	0.14	0.16	0.18	0.21
			Oct 01 2003 to Oct 01 2006	0.15	0.16	0.19	0.22
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.11	0.13	0.18	0.22
			Oct 01 2004 to Oct 01 2005	0.08	0.10	0.13	0.16
			Oct 01 2005 to Oct 01 2006	0.08	0.10	0.12	0.15
			Oct 01 2003 to Oct 01 2006	0.09	0.11	0.15	0.18
			E.Daw's number	-	-	-	-
		Z	Oct 01 2003 to Oct 01 2004	0.08	0.10	0.13	0.16
			Oct 01 2004 to Oct 01 2005	0.11	0.13	0.16	0.20
			Oct 01 2005 to Oct 01 2006	0.10	0.12	0.16	0.19
			Oct 01 2003 to Oct 01 2006	0.10	0.12	0.16	0.19
			E.Daw's number	-	-	-	-
	EY	X	Oct 01 2003 to Oct 01 2004	0.11	0.18	0.29	0.36
			Oct 01 2004 to Oct 01 2005	0.12	0.19	0.30	0.37
			Oct 01 2005 to Oct 01 2006	0.11	0.18	0.28	0.35
			Oct 01 2003 to Oct 01 2006	0.11	0.18	0.29	0.36
			E.Daw's number	-	-	-	-
		Y	Oct 01 2003 to Oct 01 2004	0.13	0.20	0.33	0.42
			Oct 01 2004 to Oct 01 2005	0.14	0.20	0.31	0.39
			Oct 01 2005 to Oct 01 2006	0.14	0.20	0.31	0.38
			Oct 01 2003 to Oct 01 2006	0.14	0.20	0.31	0.40
			E.Daw's number	-	-	-	-
Z		Oct 01 2003 to Oct 01 2004	0.12	0.19	0.32	0.41	
		Oct 01 2004 to Oct 01 2005	0.12	0.20	0.35	0.44	
		Oct 01 2005 to Oct 01 2006	0.11	0.19	0.33	0.41	
		Oct 01 2003 to Oct 01 2006	0.12	0.19	0.33	0.42	
		E.Daw's number	-	-	-	-	
MX	X	Oct 01 2003 to Oct 01 2004	0.26	0.30	0.33	0.35	
		Oct 01 2004 to Oct 01 2005	0.20	0.22	0.25	0.28	
		Oct 01 2005 to Oct 01 2006	0.18	0.21	0.24	0.27	
		Oct 01 2003 to Oct 01 2006	0.21	0.24	0.30	0.33	
		E.Daw's number	0.29	-	0.41	0.44	
	Y	Oct 01 2003 to Oct 01 2004	0.21	0.25	0.28	0.31	
		Oct 01 2004 to Oct 01 2005	0.16	0.20	0.24	0.29	
		Oct 01 2005 to Oct 01 2006	0.14	0.16	0.22	0.27	
		Oct 01 2003 to Oct 01 2006	0.16	0.21	0.26	0.29	
		E.Daw's number	0.20	-	0.28	0.32	
	Z	Oct 01 2003 to Oct 01 2004	0.16	0.22	0.26	0.28	
		Oct 01 2004 to Oct 01 2005	0.11	0.13	0.16	0.19	
		Oct 01 2005 to Oct 01 2006	0.10	0.12	0.15	0.16	
		Oct 01 2003 to Oct 01 2006	0.12	0.15	0.21	0.25	
		E.Daw's number	0.12	-	0.17	0.21	
MY	X	Oct 01 2003 to Oct 01 2004	0.19	0.21	0.22	0.24	
		Oct 01 2004 to Oct 01 2005	0.14	0.15	0.18	0.21	
		Oct 01 2005 to Oct 01 2006	0.12	0.15	0.16	0.19	
		Oct 01 2003 to Oct 01 2006	0.15	0.18	0.21	0.22	
		E.Daw's number	0.15	-	0.26	0.57	
	Y	Oct 01 2003 to Oct 01 2004	0.18	0.21	0.25	0.27	
		Oct 01 2004 to Oct 01 2005	0.15	0.16	0.19	0.21	
		Oct 01 2005 to Oct 01 2006	0.14	0.16	0.19	0.21	
		Oct 01 2003 to Oct 01 2006	0.16	0.18	0.22	0.25	
		E.Daw's number	0.19	-	0.28	0.66	
	Z	Oct 01 2003 to Oct 01 2004	0.15	0.18	0.20	0.21	
		Oct 01 2004 to Oct 01 2005	0.12	0.13	0.16	0.18	
		Oct 01 2005 to Oct 01 2006	0.11	0.13	0.15	0.16	
		Oct 01 2003 to Oct 01 2006	0.12	0.15	0.18	0.20	
		E.Daw's number	0.14	-	0.19	0.21	

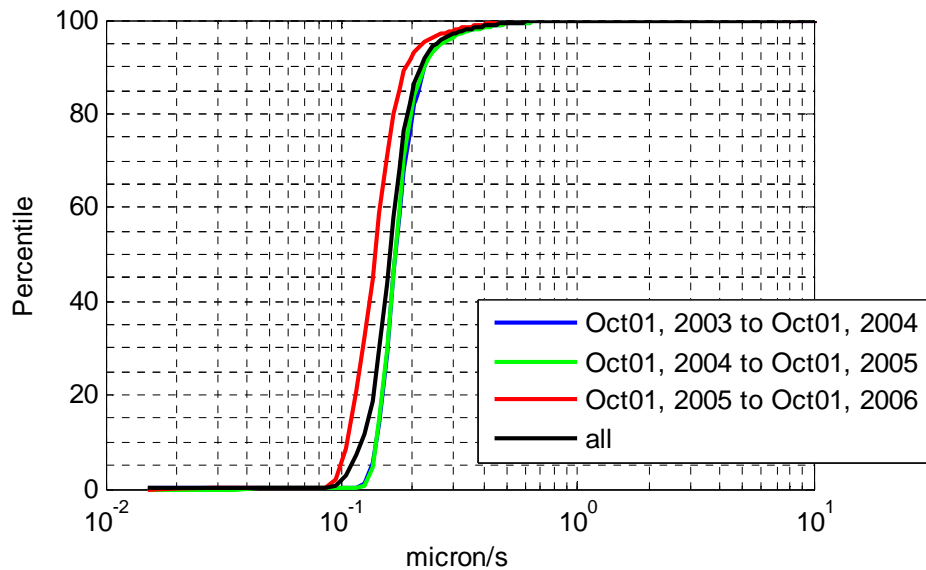
Comer Station X 3 to 10 Hz



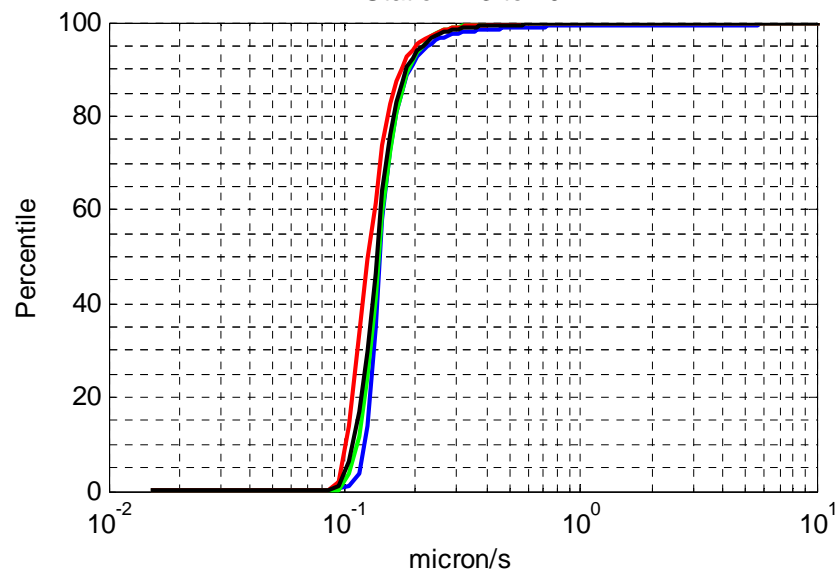
Comer Station Y 3 to 10 Hz



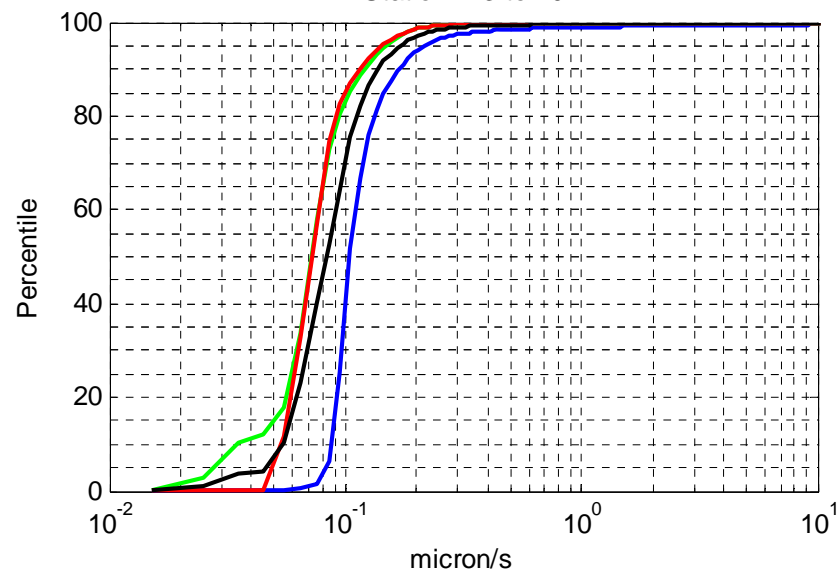
Comer Station Z 3 to 10 Hz



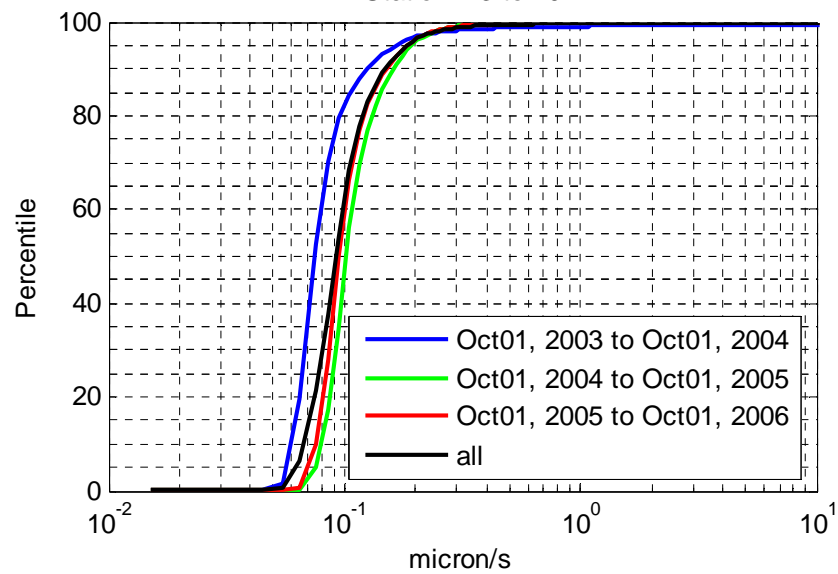
EX Station X 3 to 10 Hz



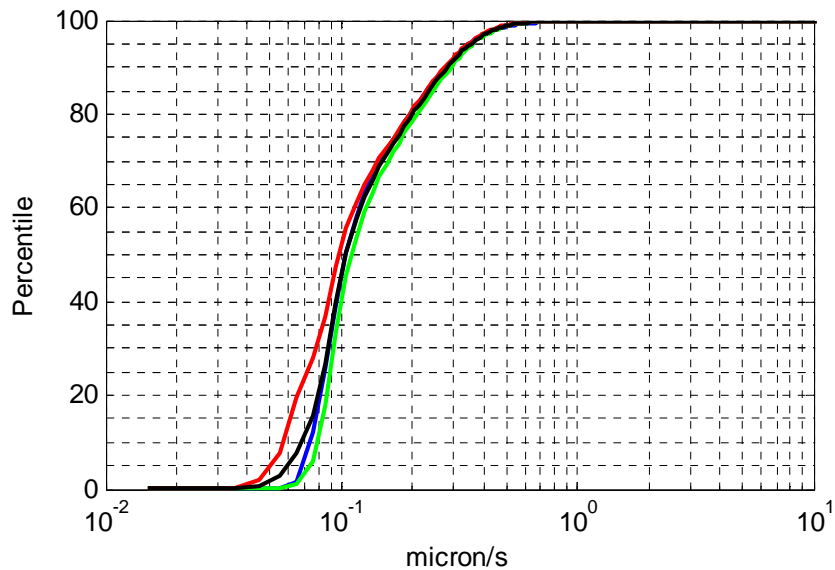
EX Station Y 3 to 10 Hz



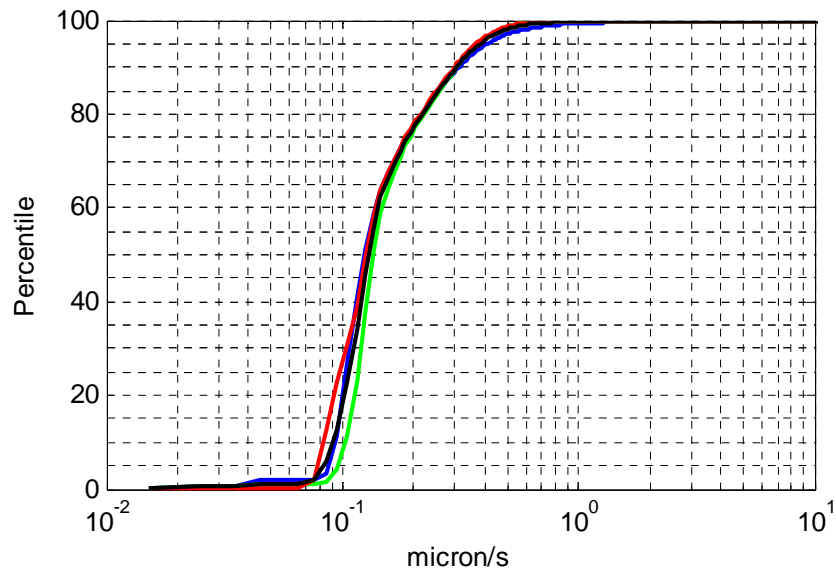
EX Station Z 3 to 10 Hz



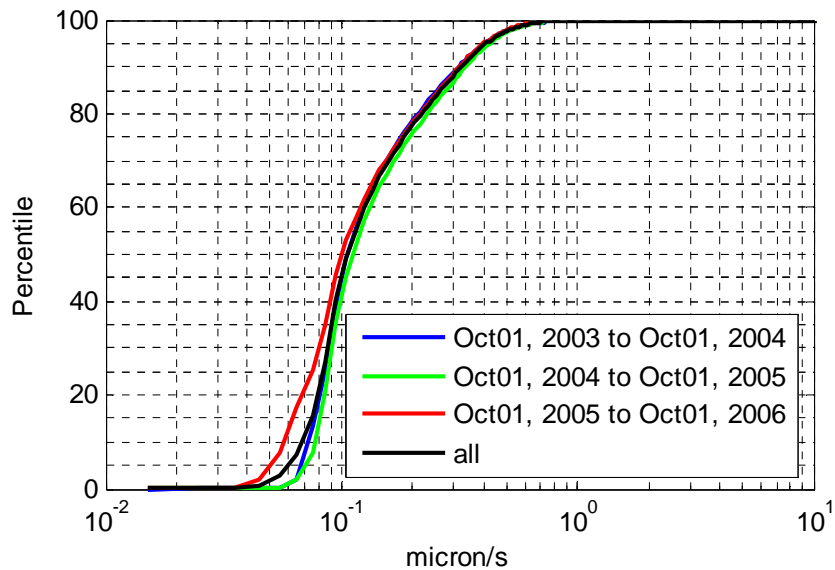
EY Station X 3 to 10 Hz



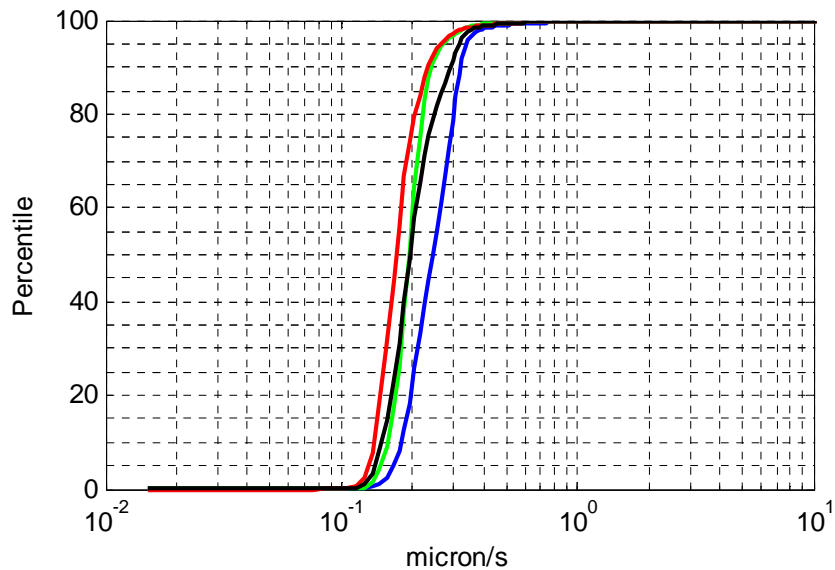
EY Station Y 3 to 10 Hz



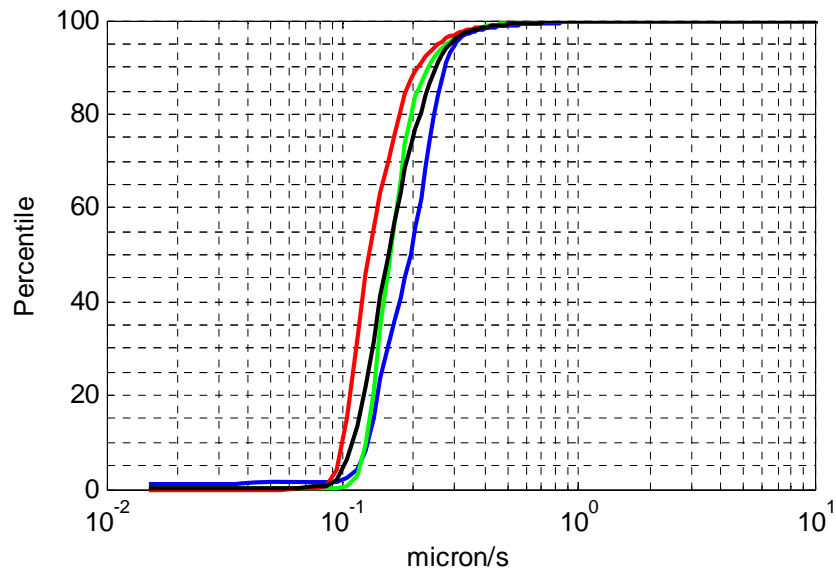
EY Station Z 3 to 10 Hz



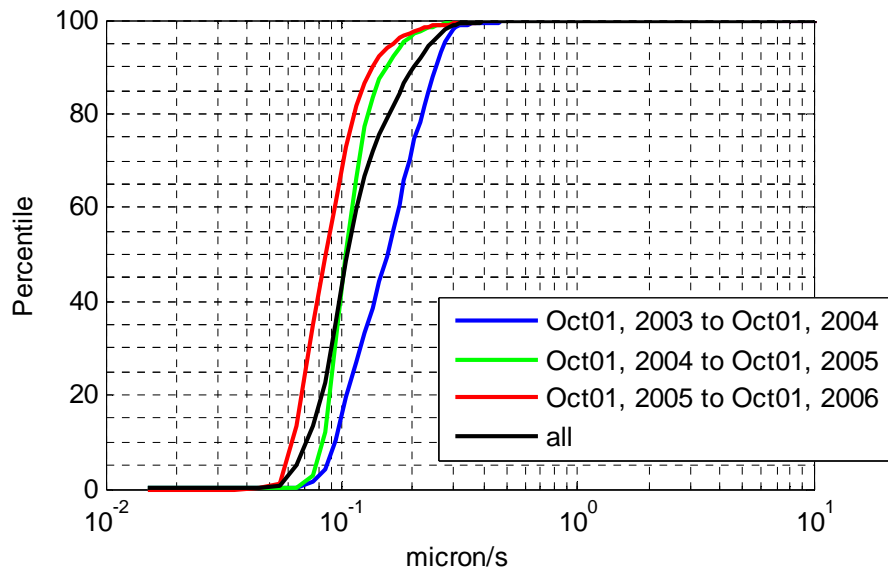
MX Station X 3 to 10 Hz



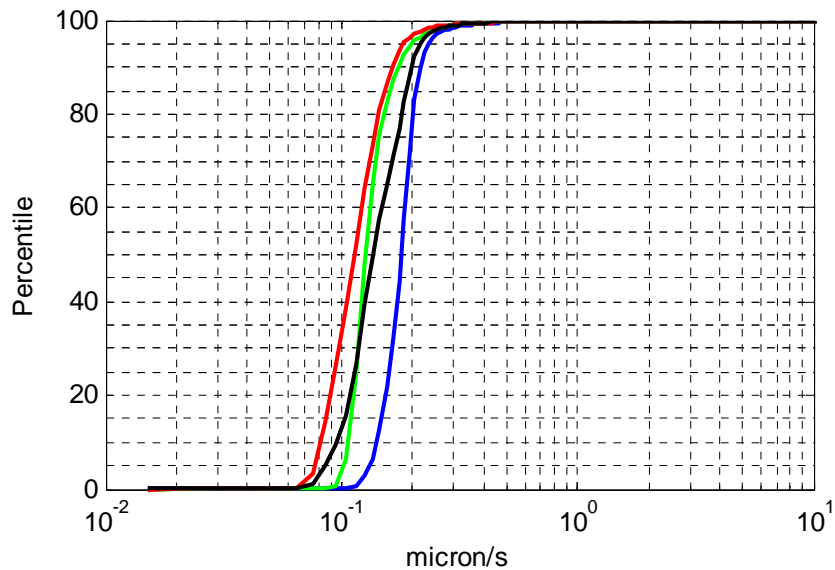
MX Station Y 3 to 10 Hz



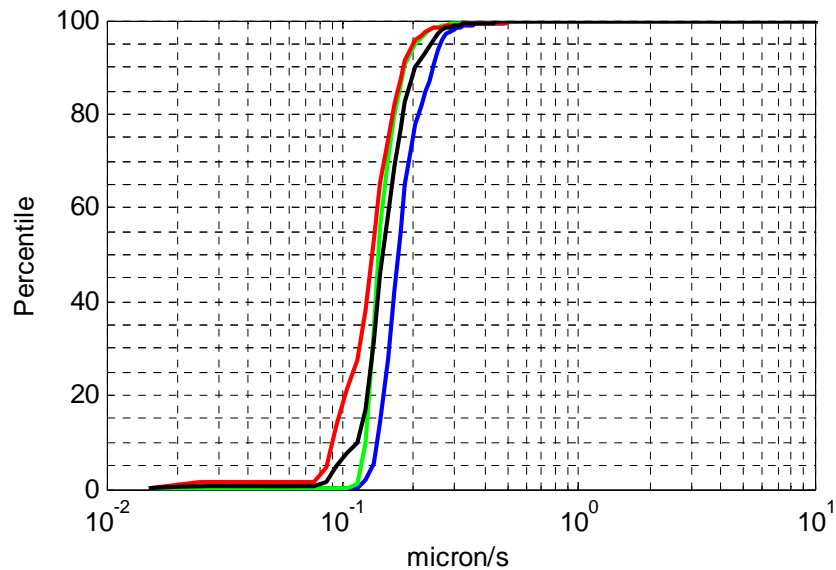
MX Station Z 3 to 10 Hz



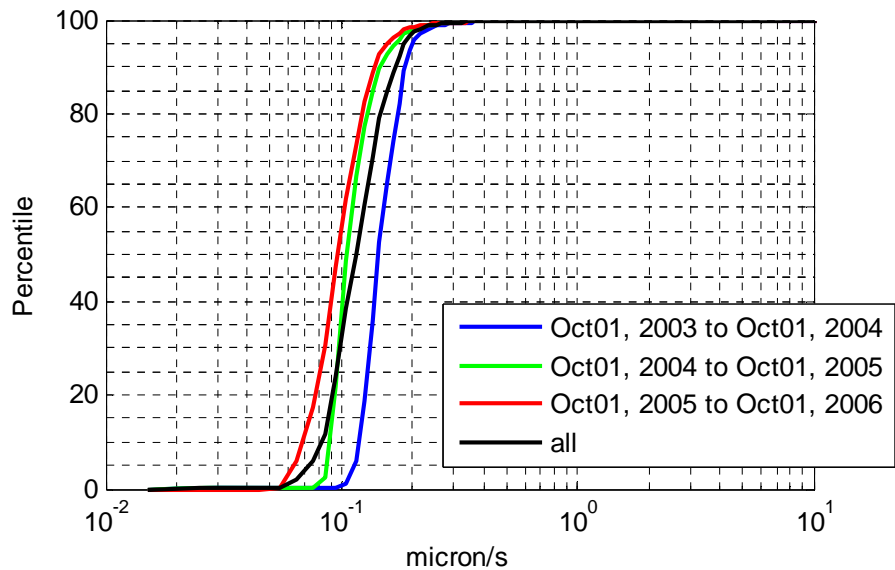
MY Station X 3 to 10 Hz



MY Station Y 3 to 10 Hz



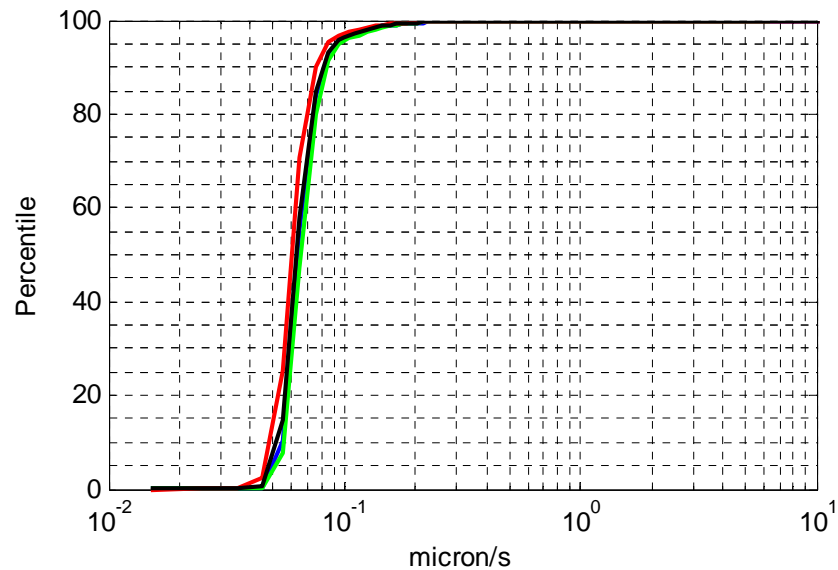
MY Station Z 3 to 10 Hz



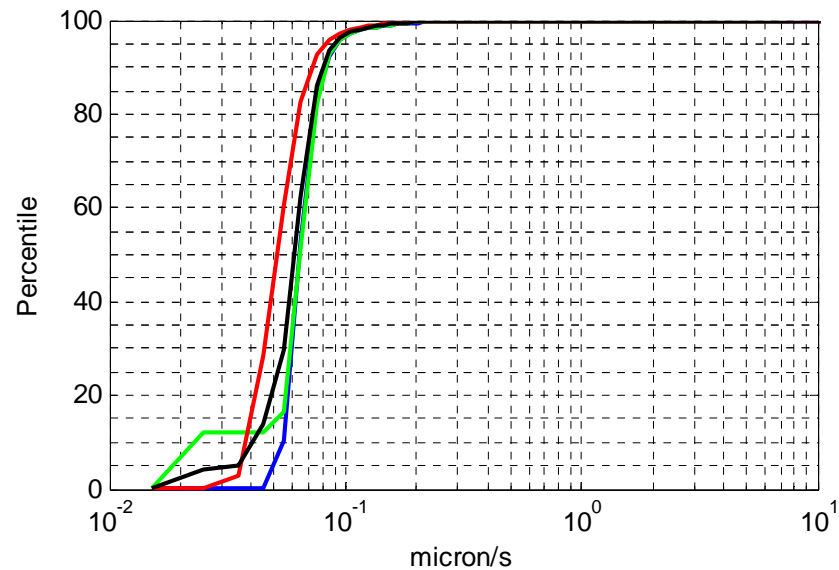


Guralp 10_30Hz							
Site	Station	Axis	Time span	Velocity percentile (µm/s)			
				50%	75%	90%	95%
LHO	Corner	X	Oct 01 2003 to Oct 01 2004	0.07	0.08	0.09	0.10
			Oct 01 2004 to Oct 01 2005	0.08	0.08	0.09	0.11
			Oct 01 2005 to Oct 01 2006	0.07	0.08	0.08	0.09
			Oct 01 2003 to Oct 01 2006	0.07	0.08	0.09	0.10
		Y	Oct 01 2003 to Oct 01 2004	0.07	0.08	0.09	0.10
			Oct 01 2004 to Oct 01 2005	0.07	0.08	0.09	0.10
			Oct 01 2005 to Oct 01 2006	0.06	0.07	0.08	0.09
			Oct 01 2003 to Oct 01 2006	0.07	0.08	0.09	0.10
		Z	Oct 01 2003 to Oct 01 2004	0.40	0.42	0.45	0.48
			Oct 01 2004 to Oct 01 2005	0.38	0.41	0.44	0.48
			Oct 01 2005 to Oct 01 2006	0.25	0.32	0.35	0.39
			Oct 01 2003 to Oct 01 2006	0.36	0.40	0.43	0.46
	EX	X	Oct 01 2003 to Oct 01 2004	0.20	0.22	0.24	0.27
			Oct 01 2004 to Oct 01 2005	0.20	0.21	0.24	0.25
			Oct 01 2005 to Oct 01 2006	0.19	0.20	0.22	0.24
			Oct 01 2003 to Oct 01 2006	0.20	0.21	0.22	0.26
		Y	Oct 01 2003 to Oct 01 2004	0.18	0.20	0.22	0.26
			Oct 01 2004 to Oct 01 2005	0.16	0.19	0.22	0.25
			Oct 01 2005 to Oct 01 2006	0.16	0.19	0.22	0.24
			Oct 01 2003 to Oct 01 2006	0.18	0.19	0.22	0.25
		Z	Oct 01 2003 to Oct 01 2004	0.16	0.19	0.22	0.27
			Oct 01 2004 to Oct 01 2005	0.18	0.19	0.22	0.24
			Oct 01 2005 to Oct 01 2006	0.16	0.19	0.21	0.22
			Oct 01 2003 to Oct 01 2006	0.16	0.19	0.22	0.24
	EY	X	Oct 01 2003 to Oct 01 2004	0.14	0.18	0.24	0.30
			Oct 01 2004 to Oct 01 2005	0.14	0.18	0.26	0.31
			Oct 01 2005 to Oct 01 2006	0.14	0.16	0.24	0.29
			Oct 01 2003 to Oct 01 2006	0.14	0.18	0.25	0.30
		Y	Oct 01 2003 to Oct 01 2004	0.14	0.18	0.26	0.33
			Oct 01 2004 to Oct 01 2005	0.15	0.19	0.26	0.31
			Oct 01 2005 to Oct 01 2006	0.14	0.18	0.25	0.30
			Oct 01 2003 to Oct 01 2006	0.15	0.18	0.25	0.31
		Z	Oct 01 2003 to Oct 01 2004	0.16	0.22	0.31	0.40
			Oct 01 2004 to Oct 01 2005	0.16	0.22	0.33	0.42
			Oct 01 2005 to Oct 01 2006	0.16	0.21	0.31	0.39
			Oct 01 2003 to Oct 01 2006	0.16	0.22	0.32	0.40
	MX	X	Oct 01 2003 to Oct 01 2004	0.31	0.38	0.41	0.43
			Oct 01 2004 to Oct 01 2005	0.22	0.25	0.27	0.28
			Oct 01 2005 to Oct 01 2006	0.18	0.22	0.26	0.27
			Oct 01 2003 to Oct 01 2006	0.22	0.27	0.37	0.40
		Y	Oct 01 2003 to Oct 01 2004	0.28	0.33	0.36	0.38
			Oct 01 2004 to Oct 01 2005	0.20	0.22	0.25	0.27
			Oct 01 2005 to Oct 01 2006	0.15	0.19	0.22	0.24
			Oct 01 2003 to Oct 01 2006	0.20	0.24	0.32	0.35
		Z	Oct 01 2003 to Oct 01 2004	0.28	0.33	0.39	0.41
			Oct 01 2004 to Oct 01 2005	0.20	0.22	0.26	0.28
			Oct 01 2005 to Oct 01 2006	0.15	0.19	0.22	0.25
			Oct 01 2003 to Oct 01 2006	0.21	0.25	0.32	0.38
MY	X	Oct 01 2003 to Oct 01 2004	0.25	0.27	0.28	0.29	
		Oct 01 2004 to Oct 01 2005	0.18	0.19	0.22	0.24	
		Oct 01 2005 to Oct 01 2006	0.18	0.19	0.22	0.25	
		Oct 01 2003 to Oct 01 2006	0.19	0.24	0.27	0.28	
	Y	Oct 01 2003 to Oct 01 2004	0.22	0.26	0.32	0.34	
		Oct 01 2004 to Oct 01 2005	0.18	0.19	0.22	0.24	
		Oct 01 2005 to Oct 01 2006	0.16	0.19	0.22	0.25	
		Oct 01 2003 to Oct 01 2006	0.19	0.22	0.26	0.30	
	Z	Oct 01 2003 to Oct 01 2004	0.22	0.25	0.28	0.30	
		Oct 01 2004 to Oct 01 2005	0.19	0.21	0.22	0.26	
		Oct 01 2005 to Oct 01 2006	0.19	0.21	0.24	0.28	
		Oct 01 2003 to Oct 01 2006	0.20	0.22	0.26	0.29	

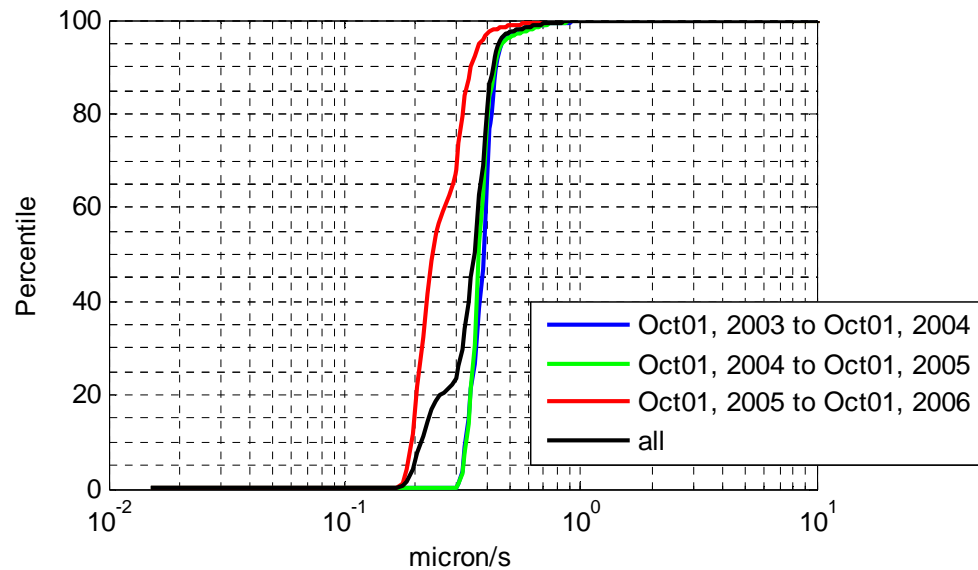
Comer Station X 10 to 30 Hz



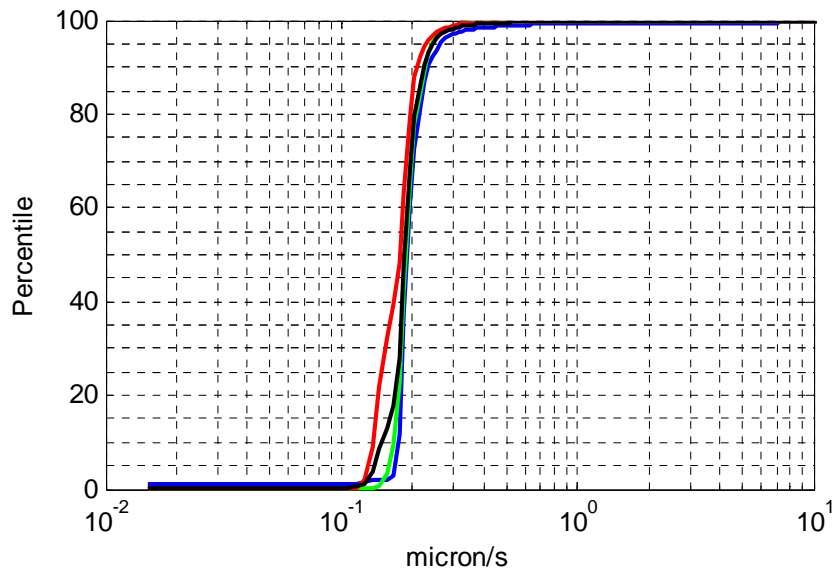
Comer Station Y 10 to 30 Hz



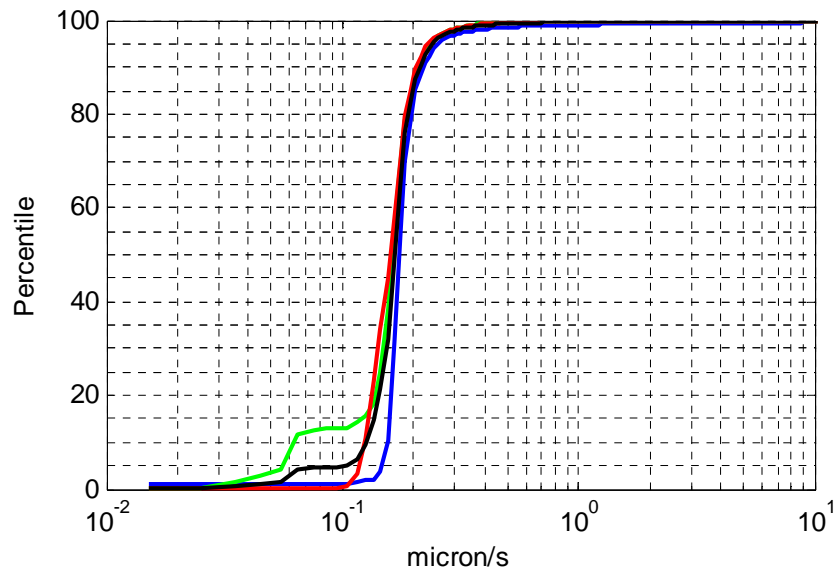
Comer Station Z 10 to 30 Hz



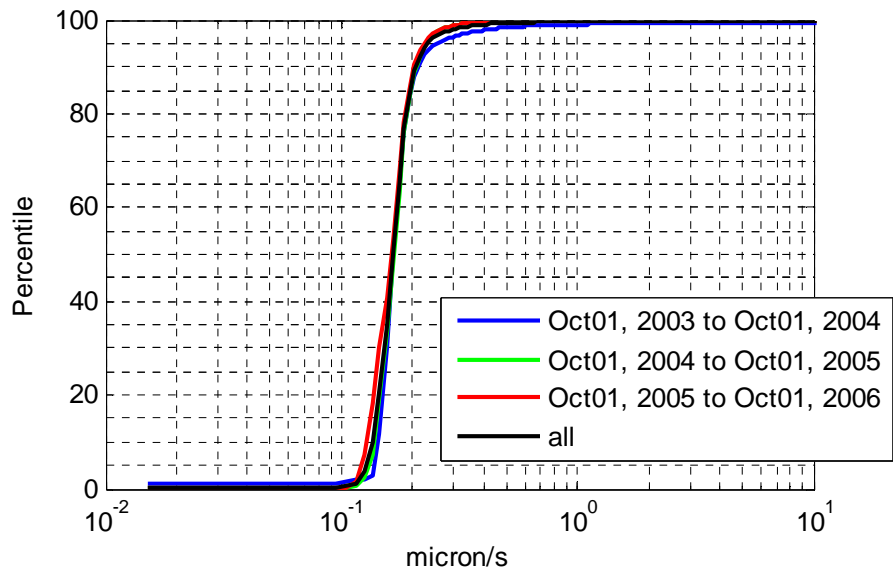
EX Station X 10 to 30 Hz



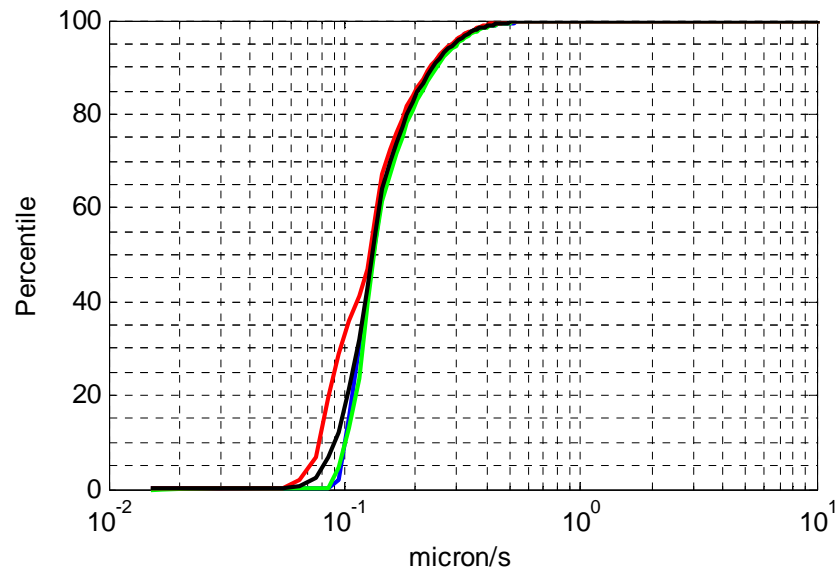
EX Station Y 10 to 30 Hz



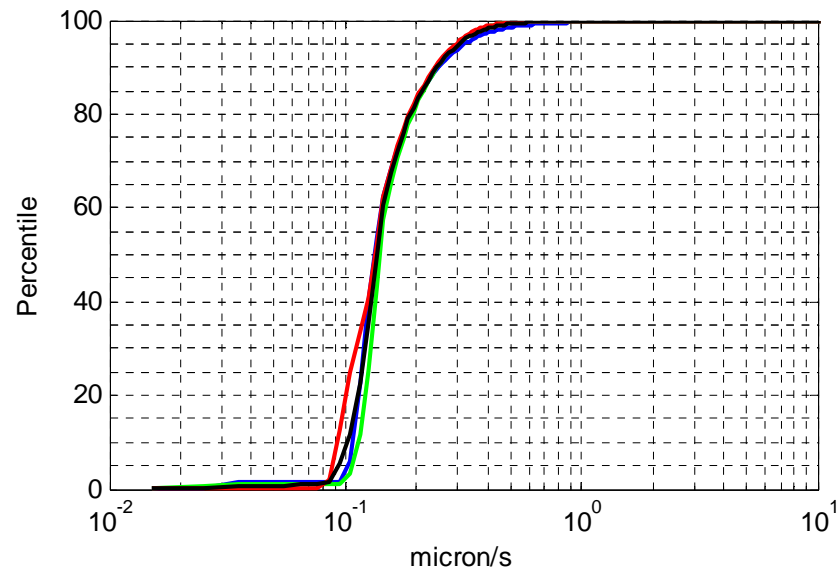
EX Station Z 10 to 30 Hz



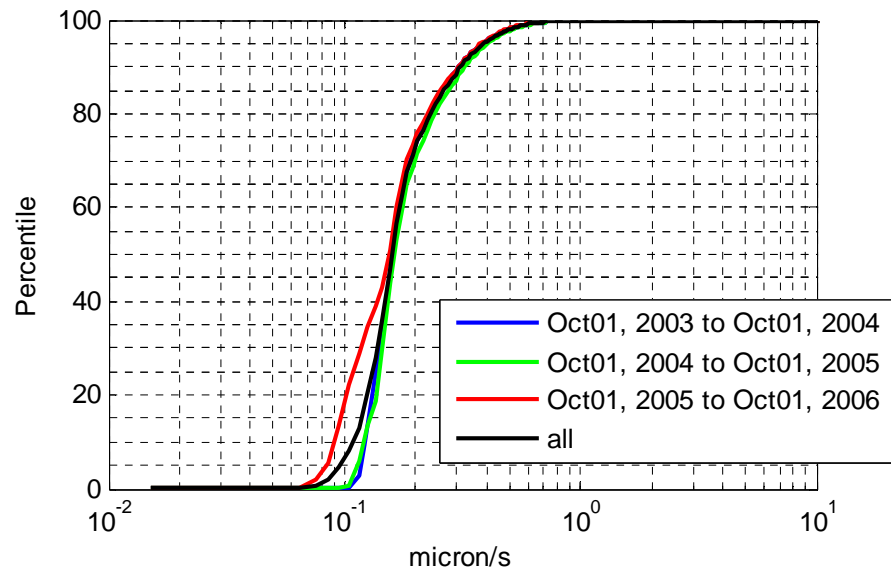
EY Station X 10 to 30 Hz



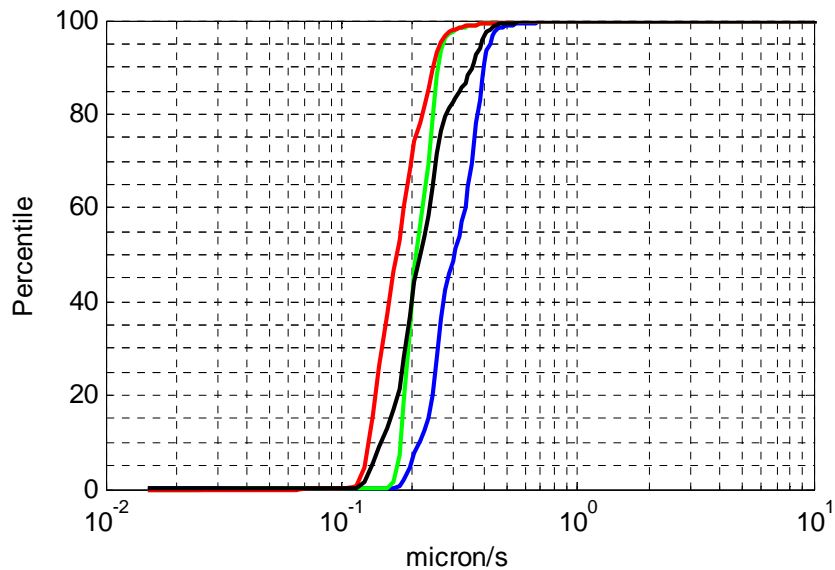
EY Station Y 10 to 30 Hz



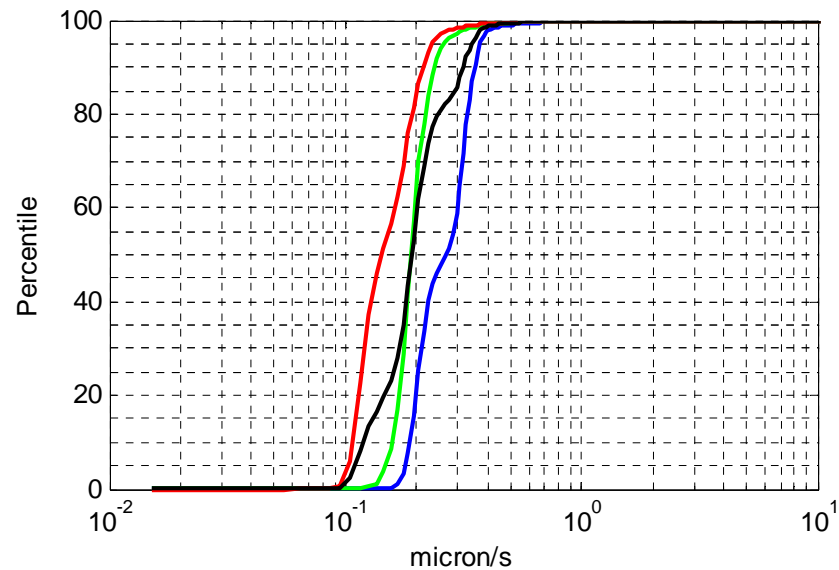
EY Station Z 10 to 30 Hz



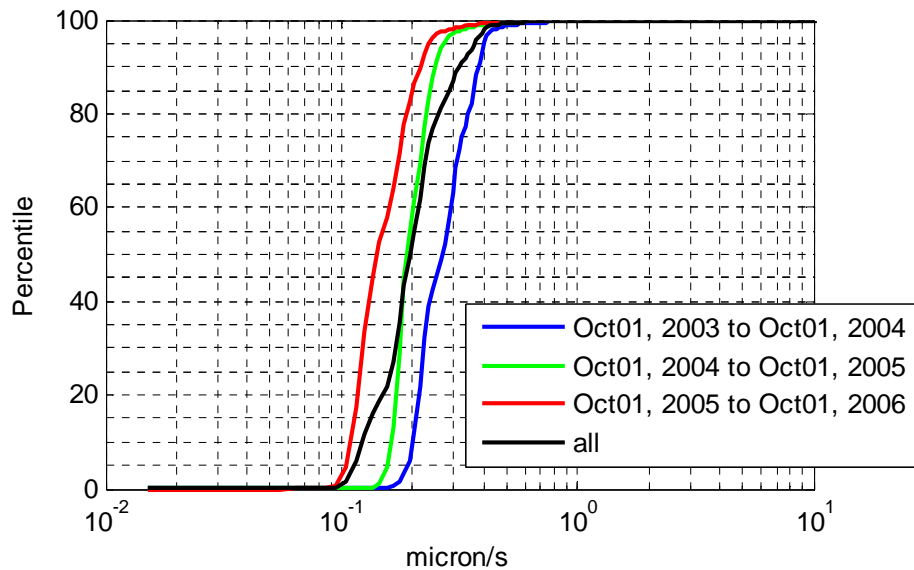
MX Station X 10 to 30 Hz



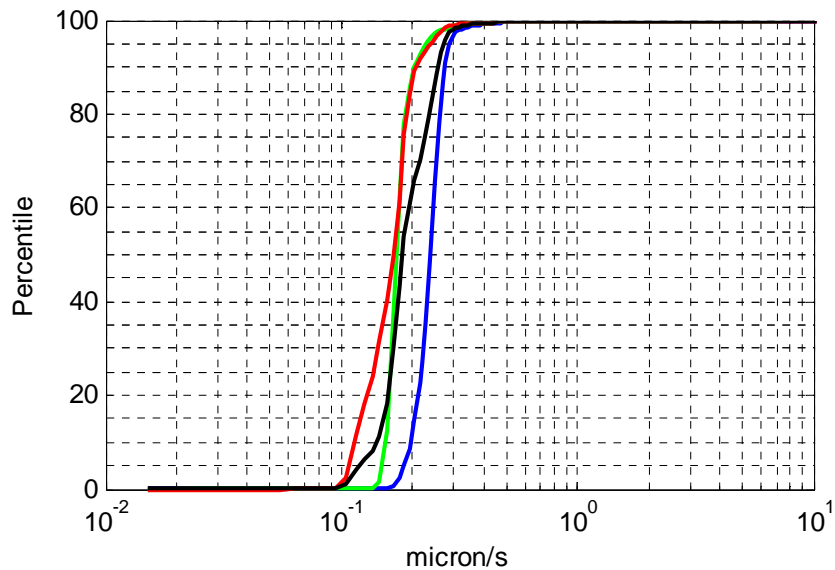
MX Station Y 10 to 30 Hz



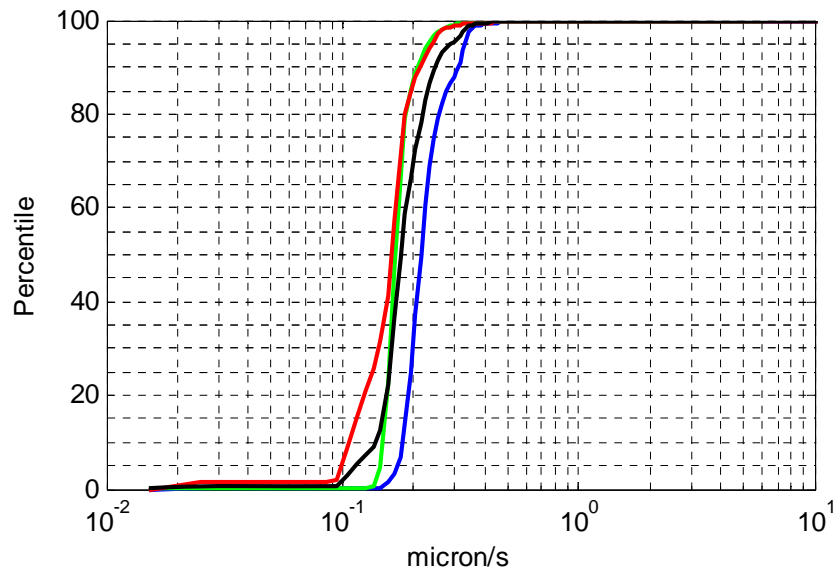
MX Station Z 10 to 30 Hz



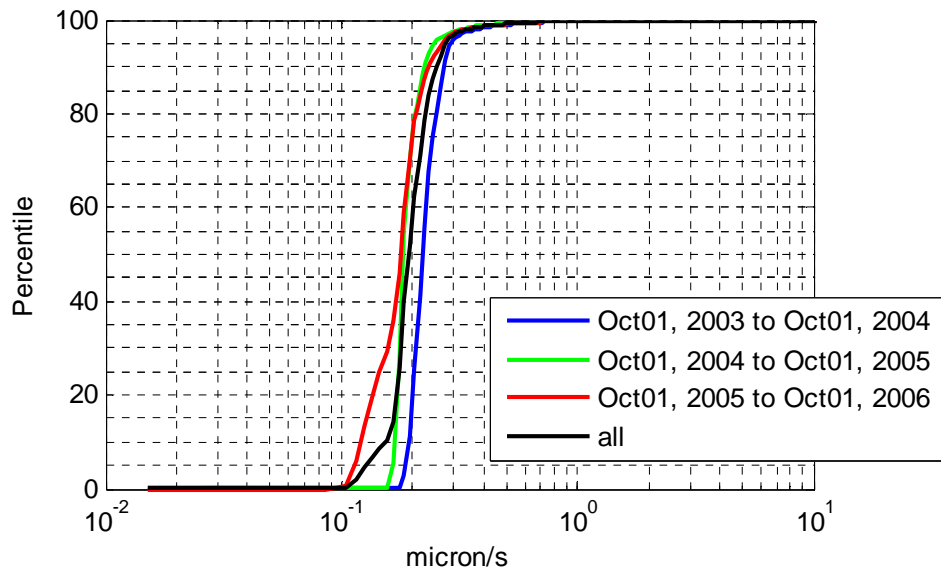
MY Station X 10 to 30 Hz



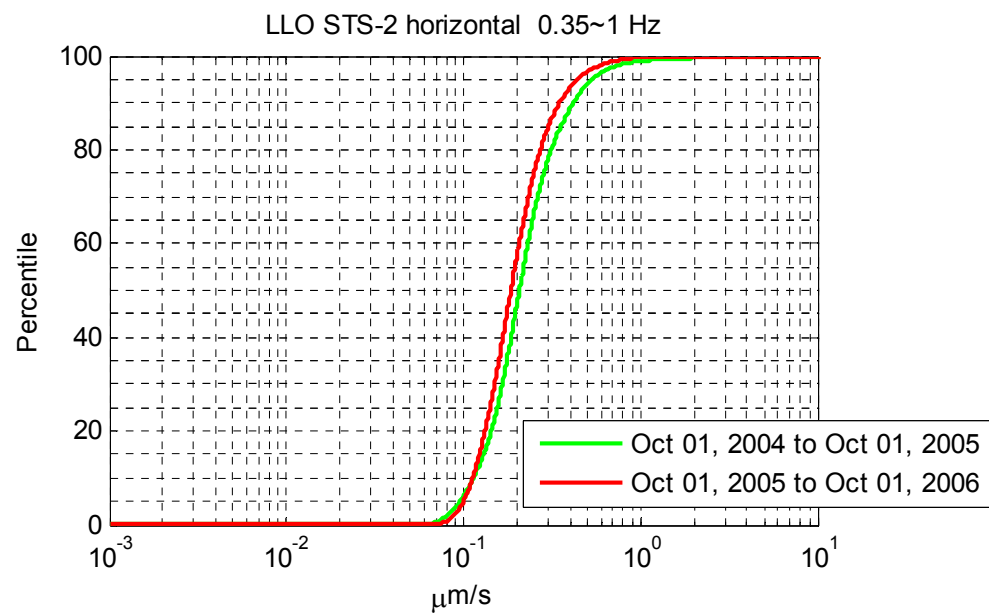
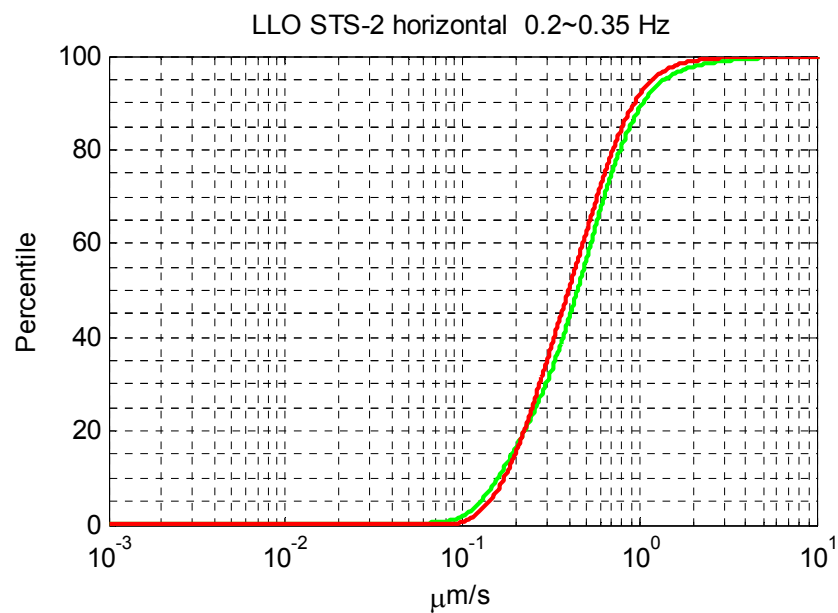
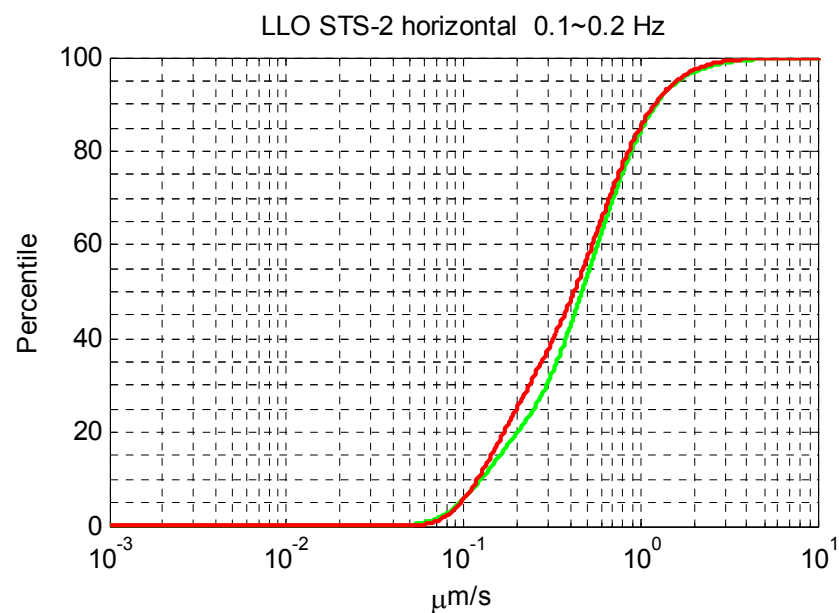
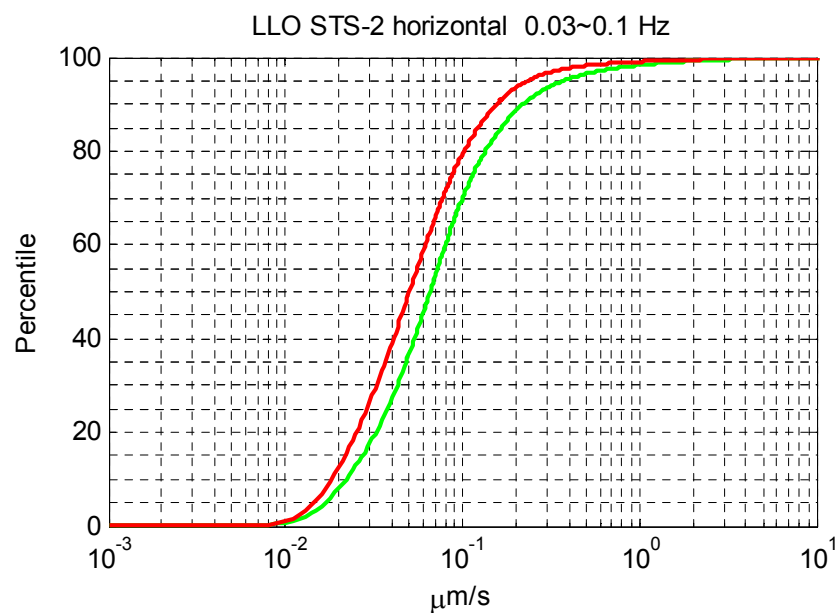
MY Station Y 10 to 30 Hz



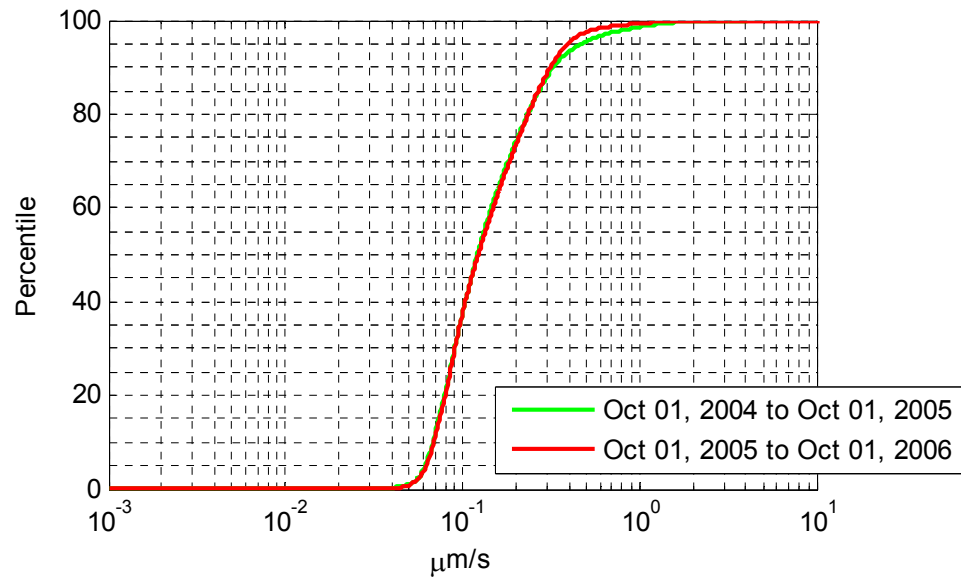
MY Station Z 10 to 30 Hz



### B.1 LLO yearly cumulative normalized histograms per band, measured by STS-2 seismometers.



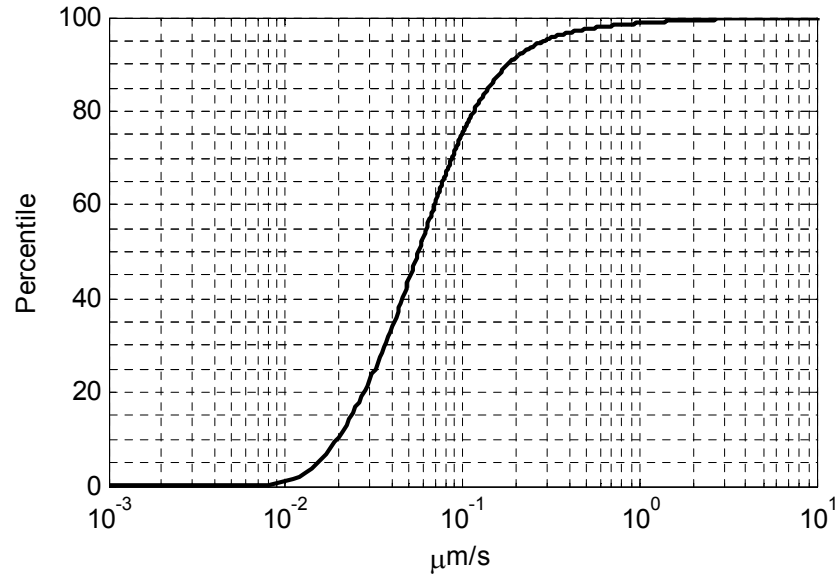
LLO STS-2 horizontal 1~3 Hz



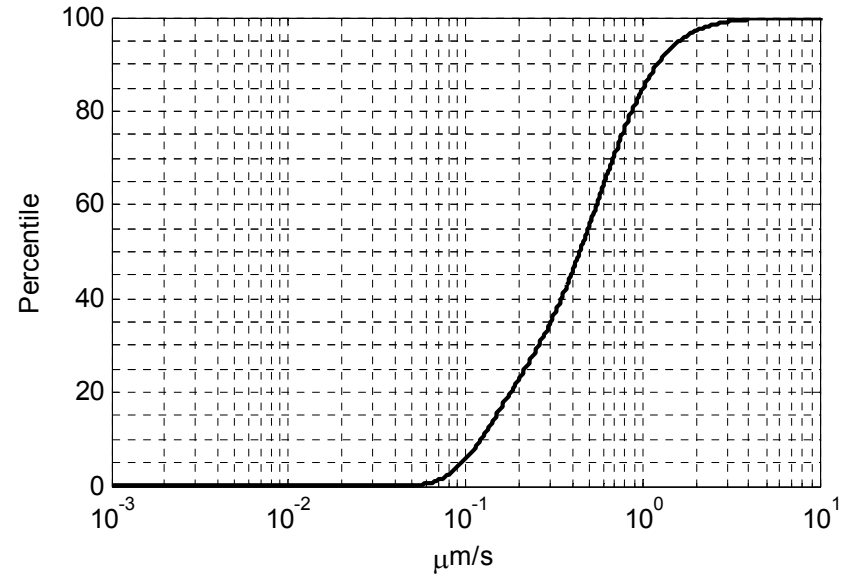


B.2 LLO cumulative normalized histograms per band, from Oct. 01, 2004 to Oct. 01, 2006, measured by STS-2 seismometers.

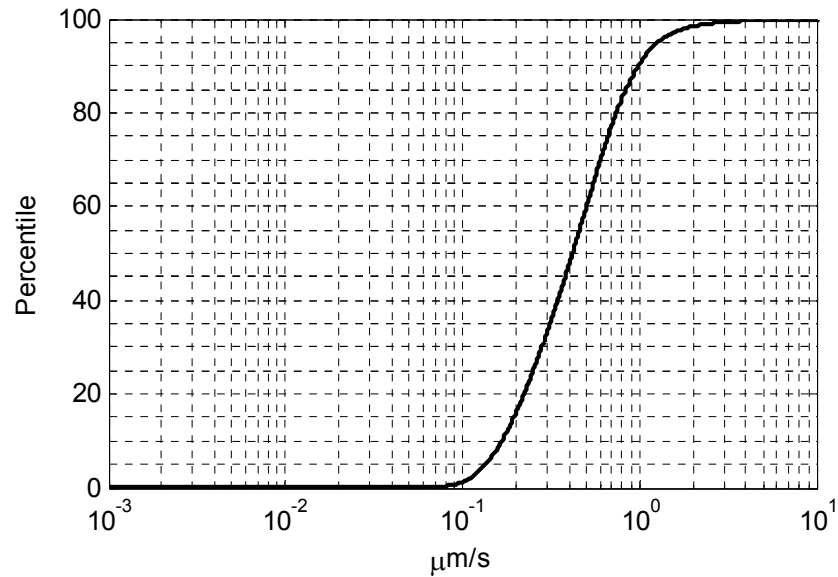
LLO STS-2 horizontal 0.03~0.1 Hz



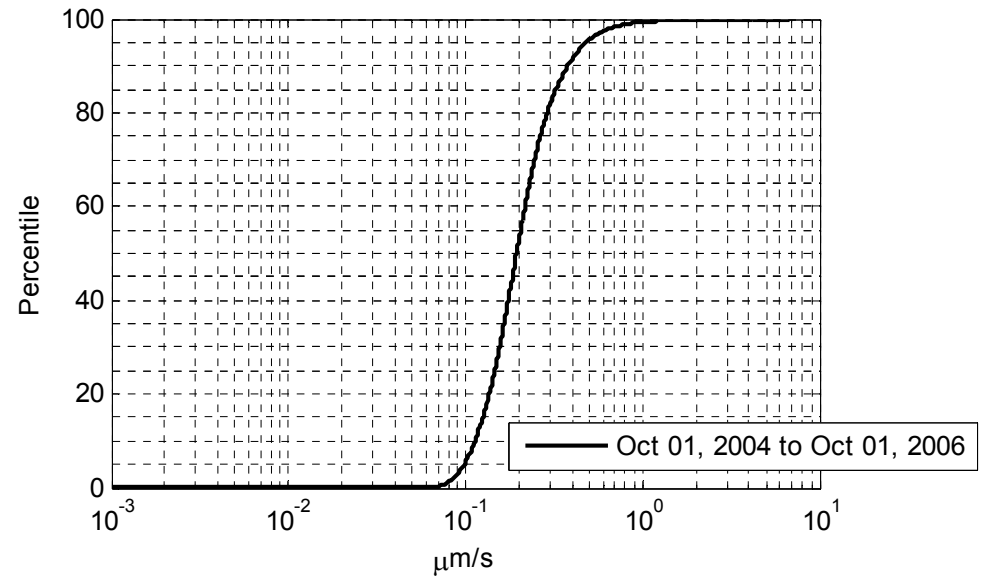
LLO STS-2 horizontal 0.1~0.2 Hz



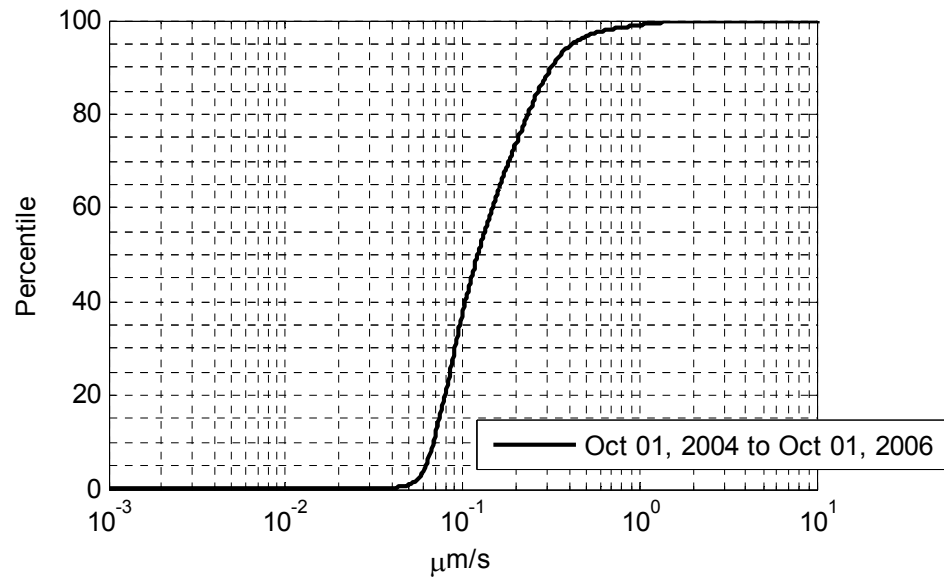
LLO STS-2 horizontal 0.2~0.35 Hz



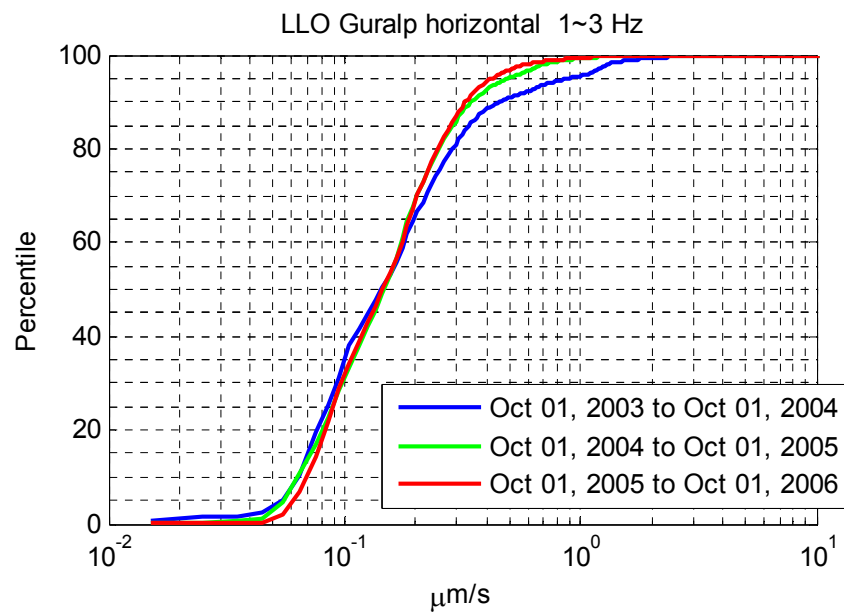
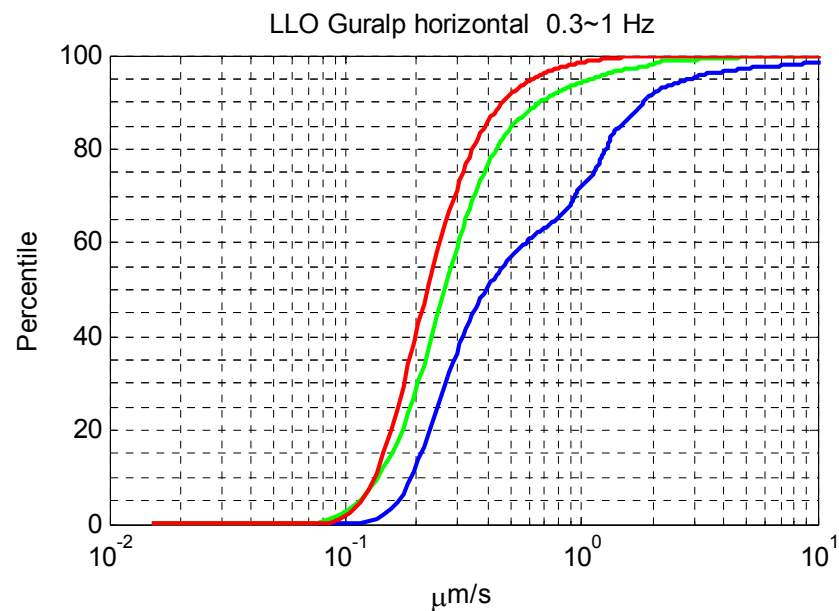
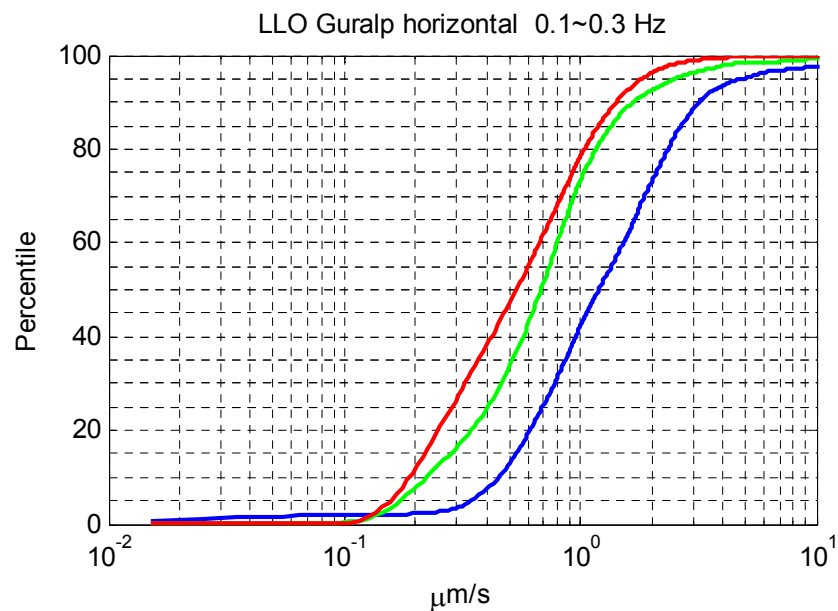
LLO STS-2 horizontal 0.35~1 Hz

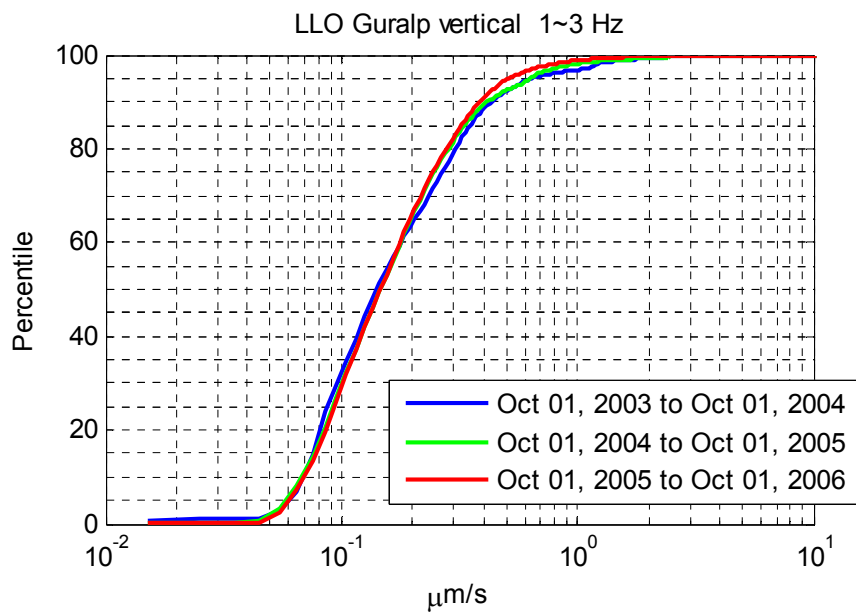
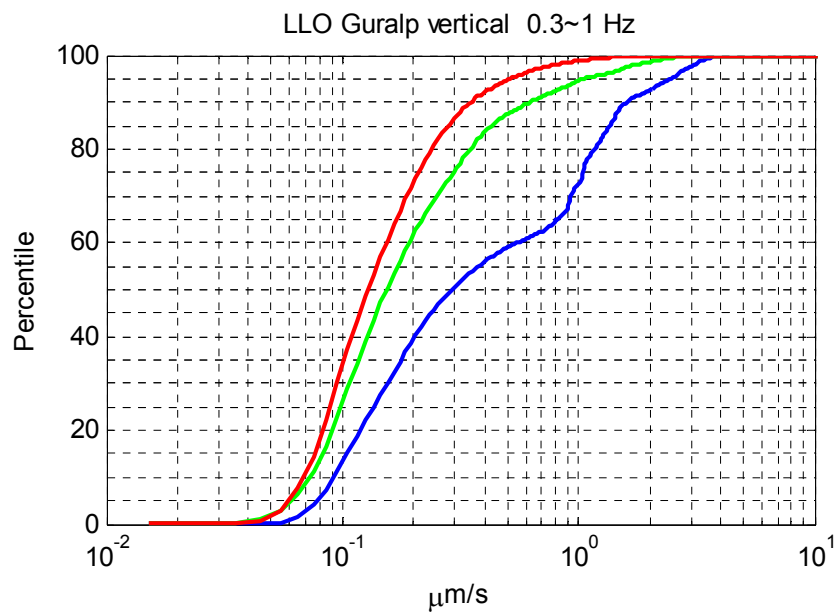
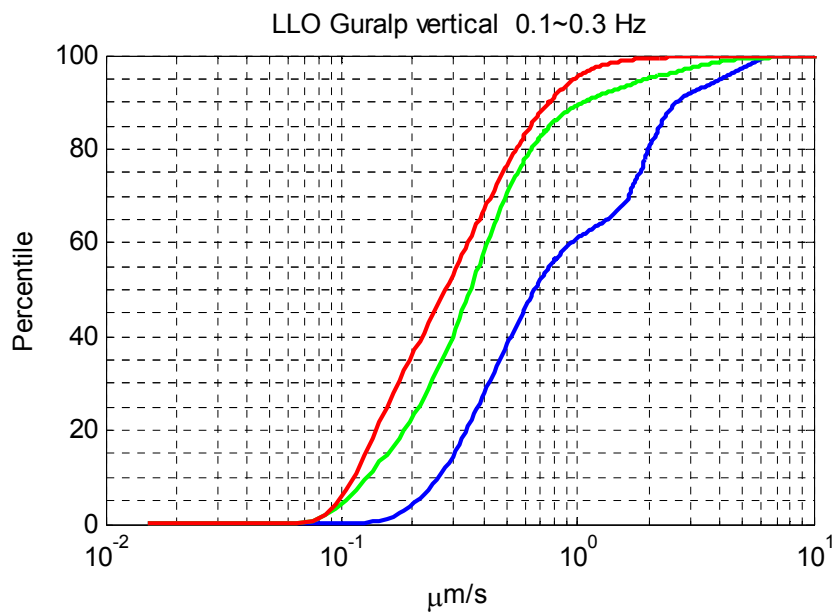


LLO STS-2 horizontal 1~3 Hz

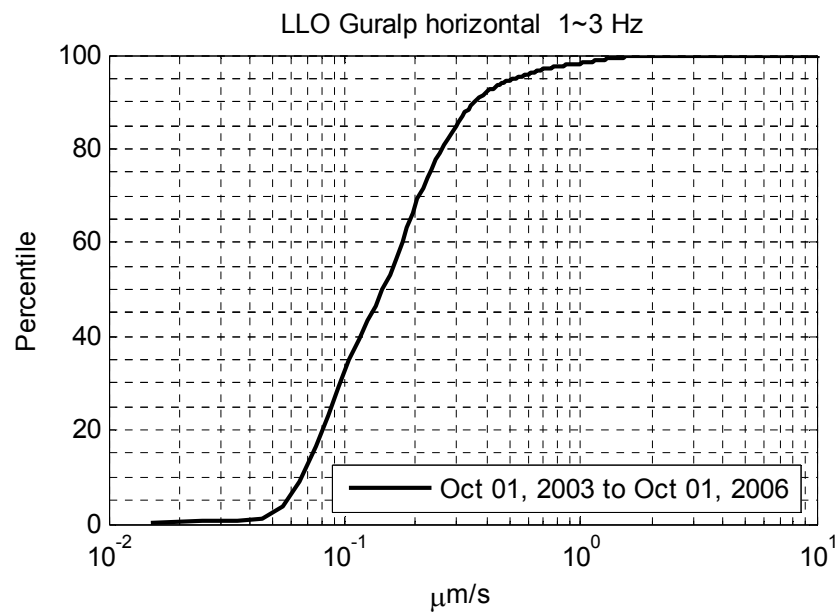
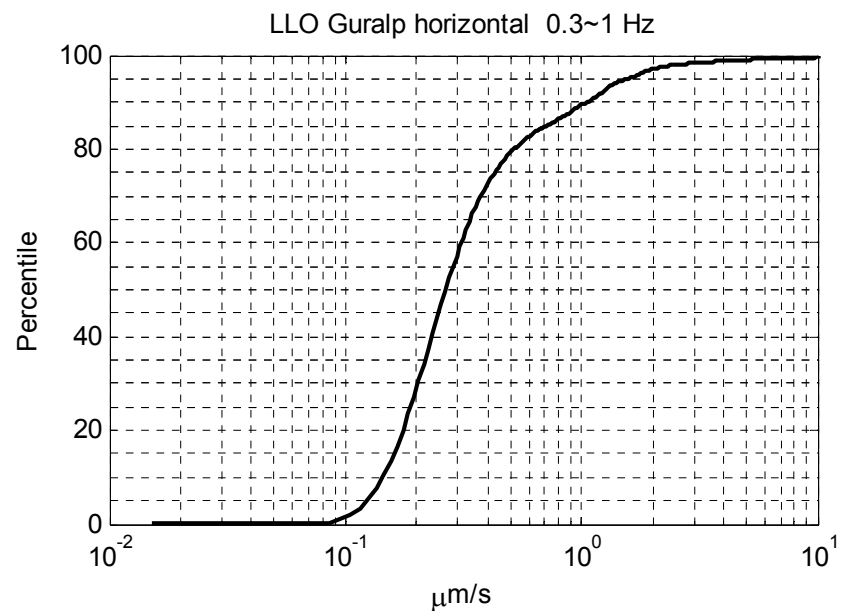
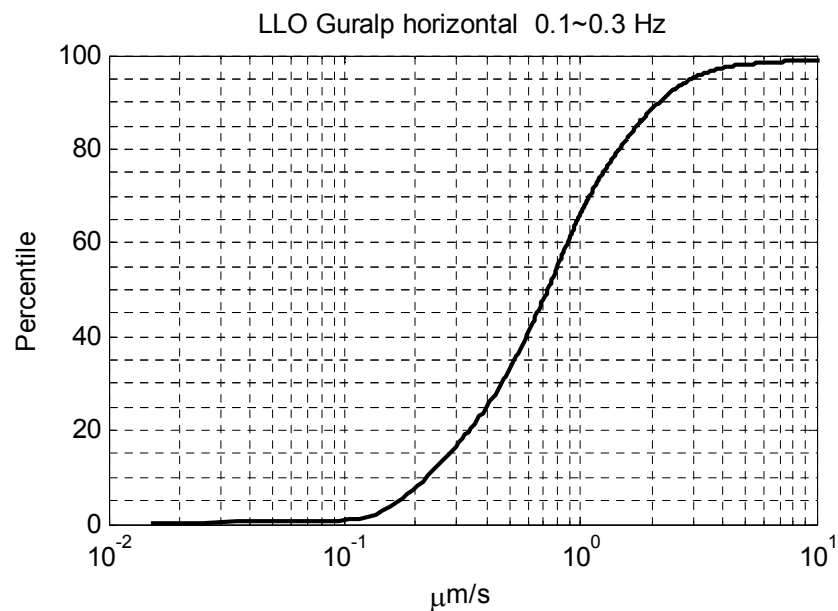


### B.3 LLO yearly cumulative normalized histograms per band, measured by Guralp seismometers.

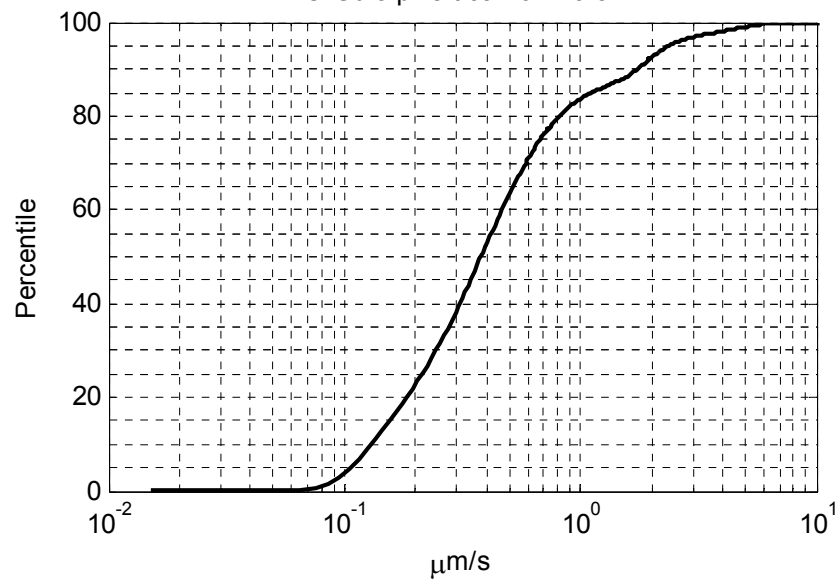




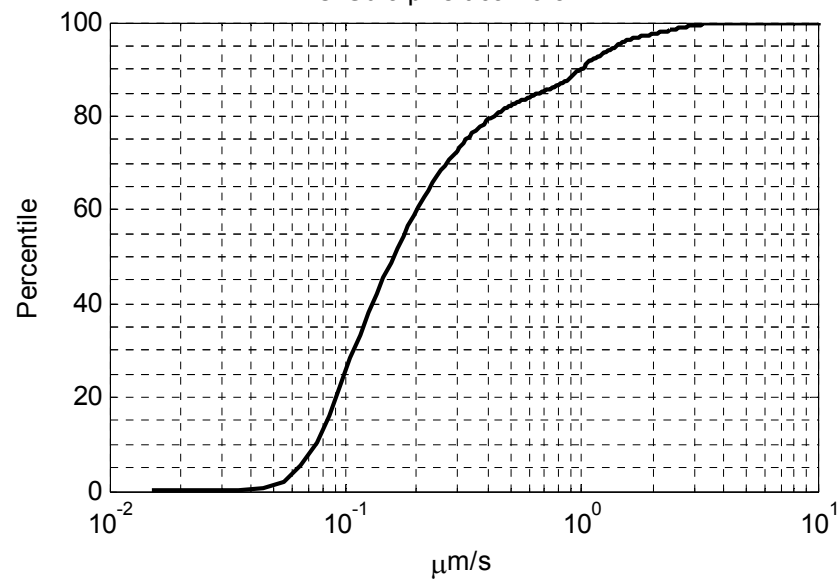
B.4 LLO cumulative normalized histograms per band, from Oct. 01, 2003 to Oct. 01, 2006, measured by Guralp seismometers.



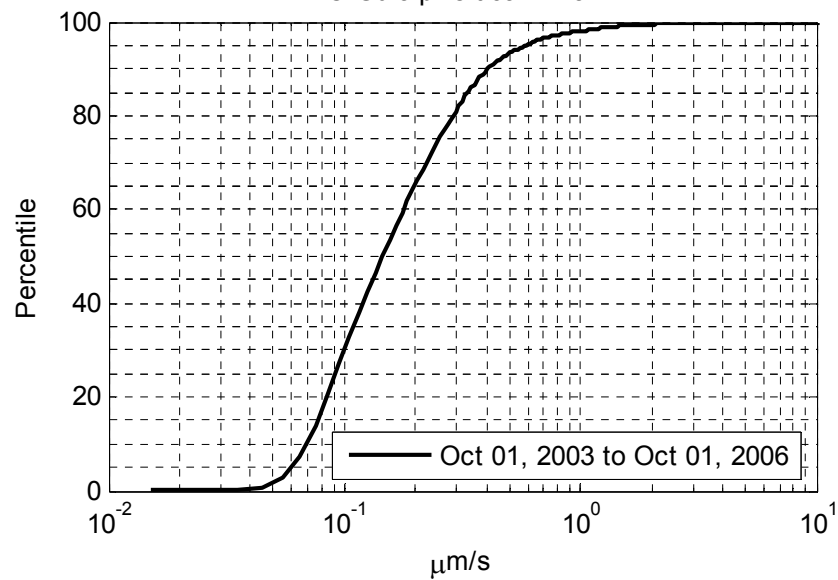
LLO Guralp vertical 0.1~0.3 Hz



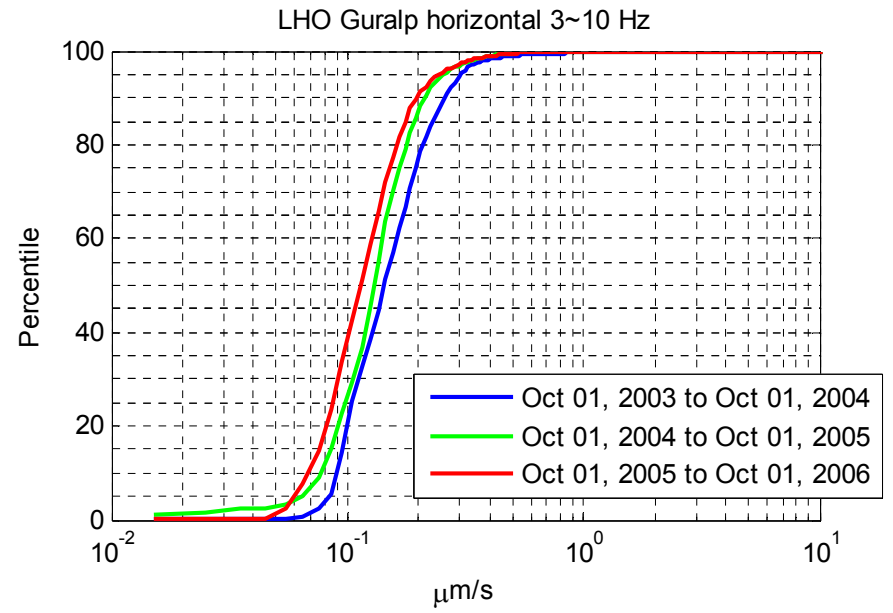
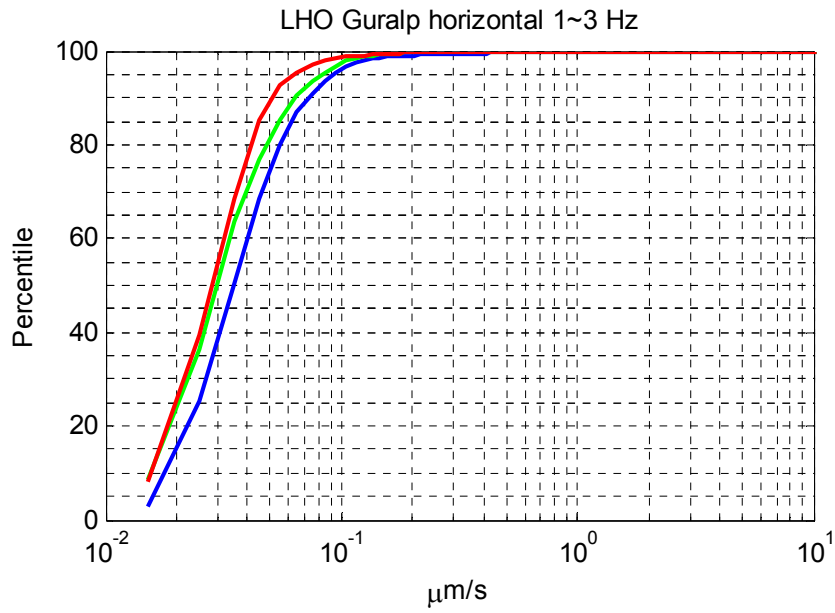
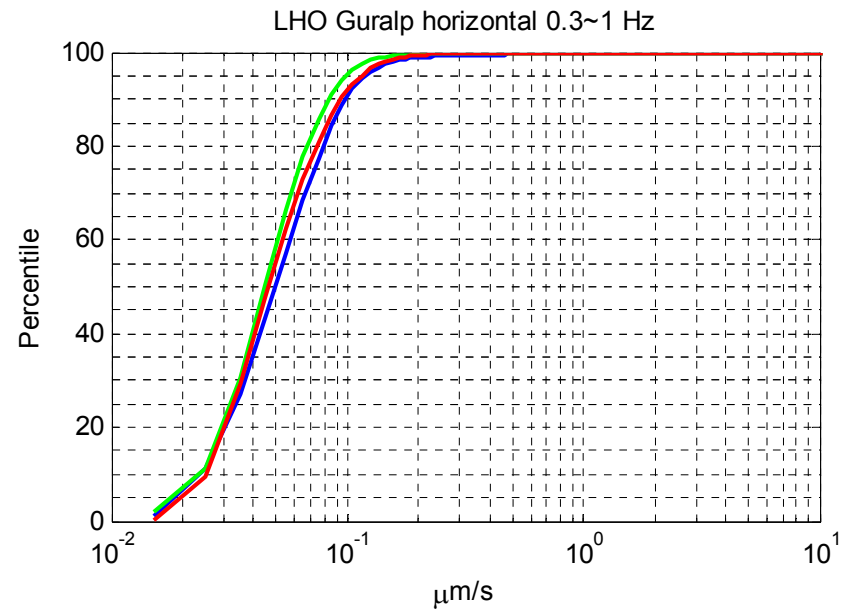
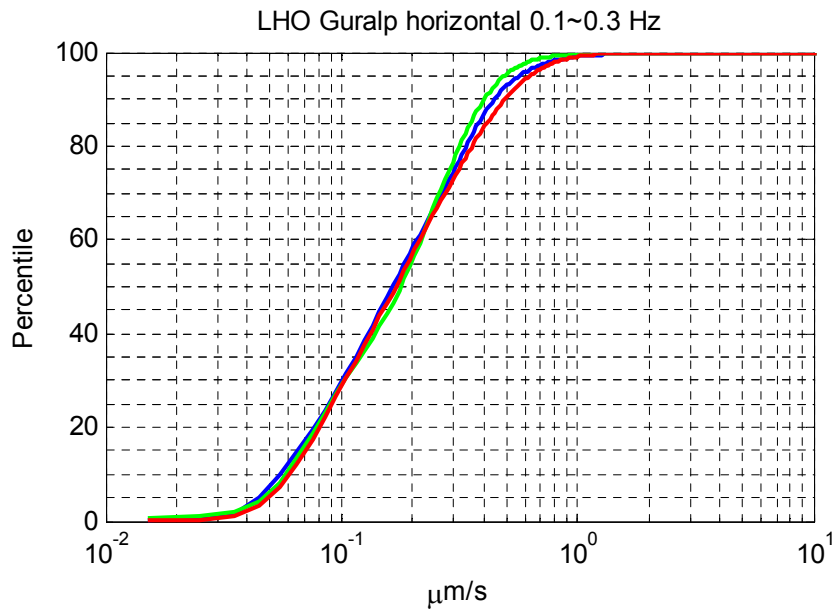
LLO Guralp vertical 0.3~1 Hz



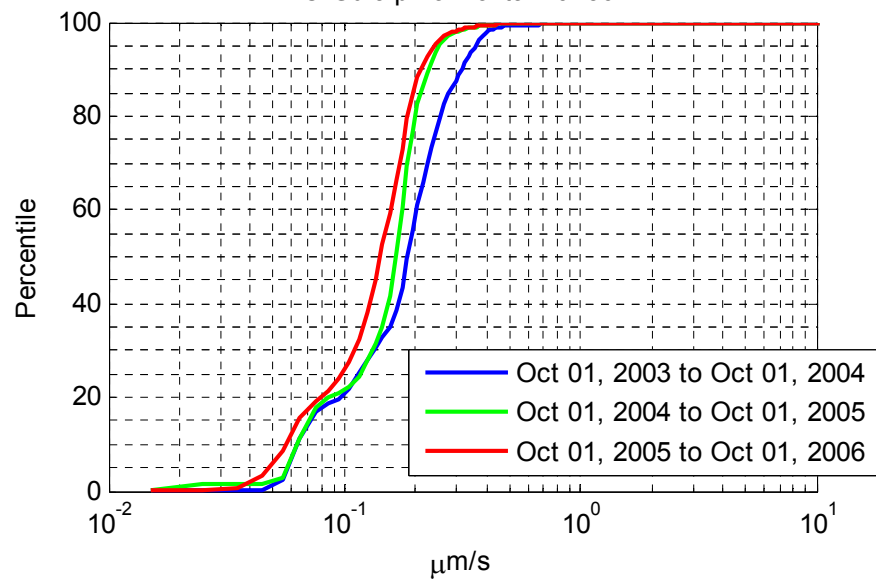
LLO Guralp vertical 1~3 Hz



B.5 LHO yearly cumulative normalized histograms per band, measured by Guralp seismometers.

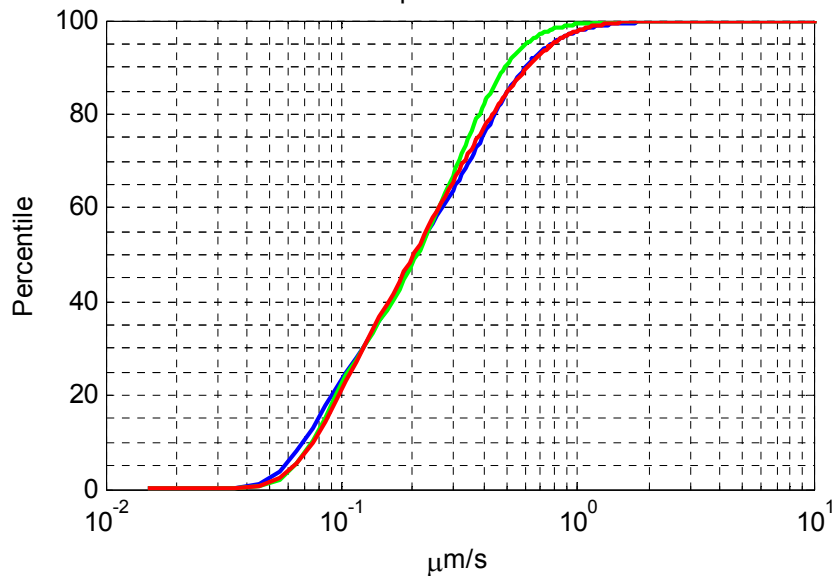


LHO Guralp horizontal 10~30 Hz

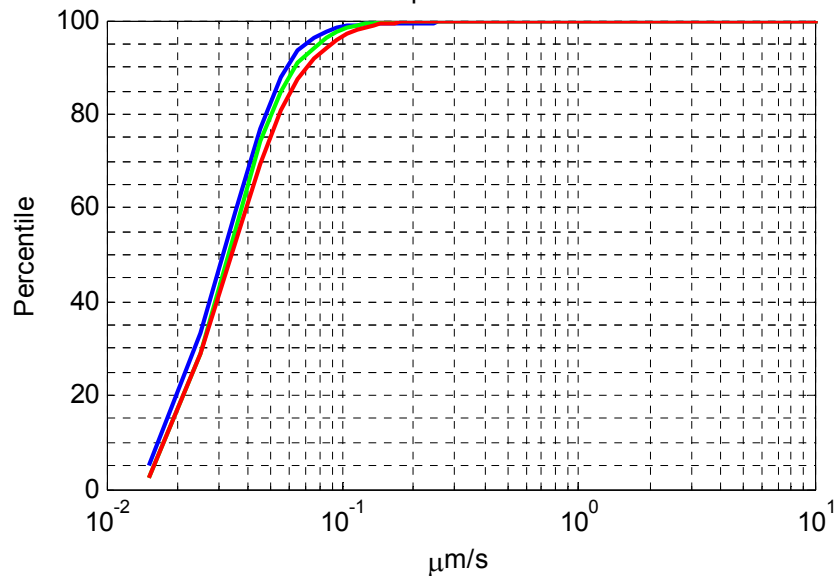




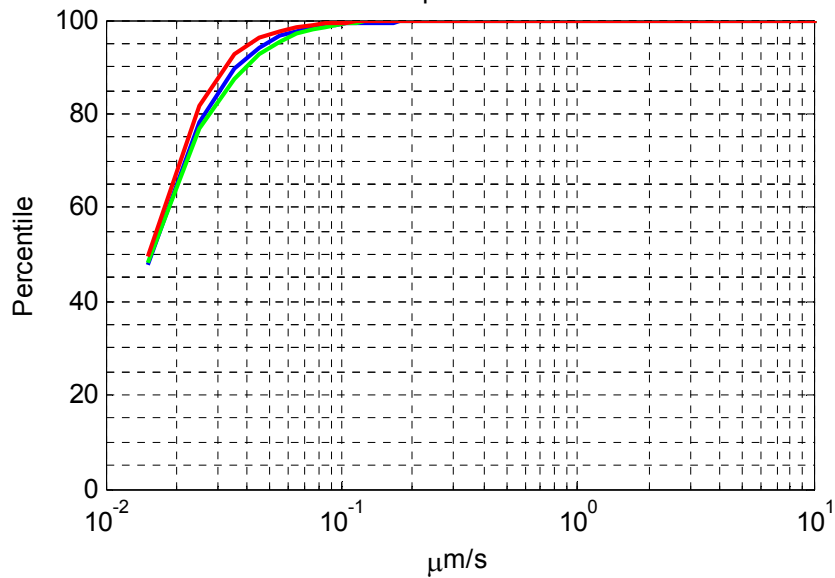
LHO Guralp vertical 0.1~0.3 Hz



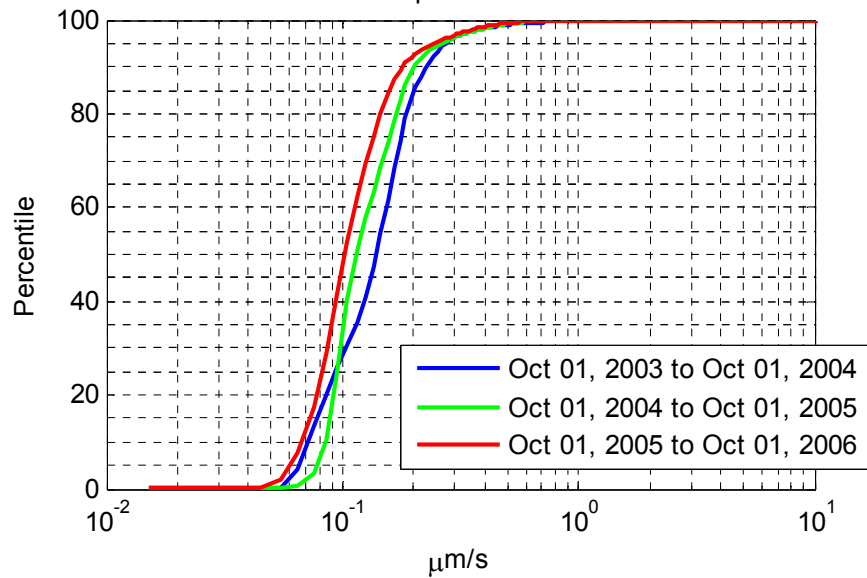
LHO Guralp vertical 0.3~1 Hz



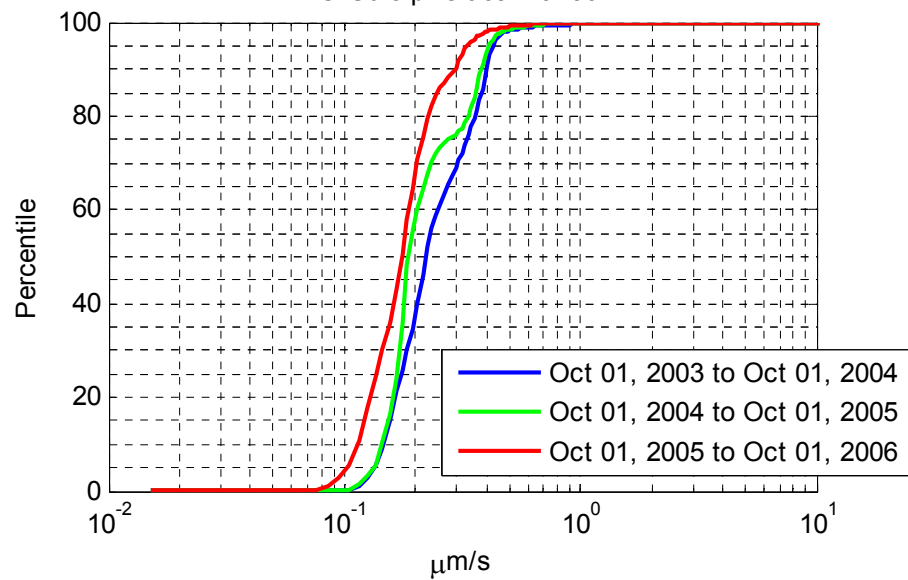
LHO Guralp vertical 1~3 Hz



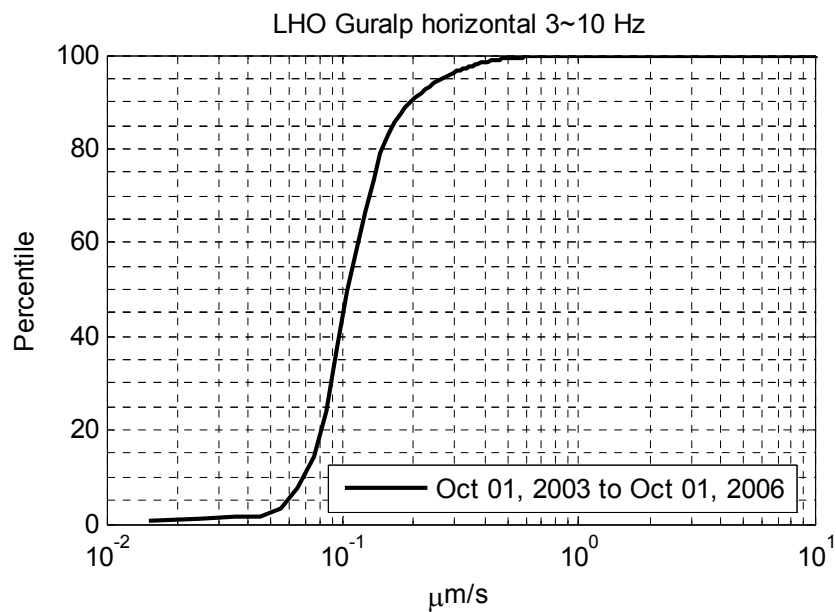
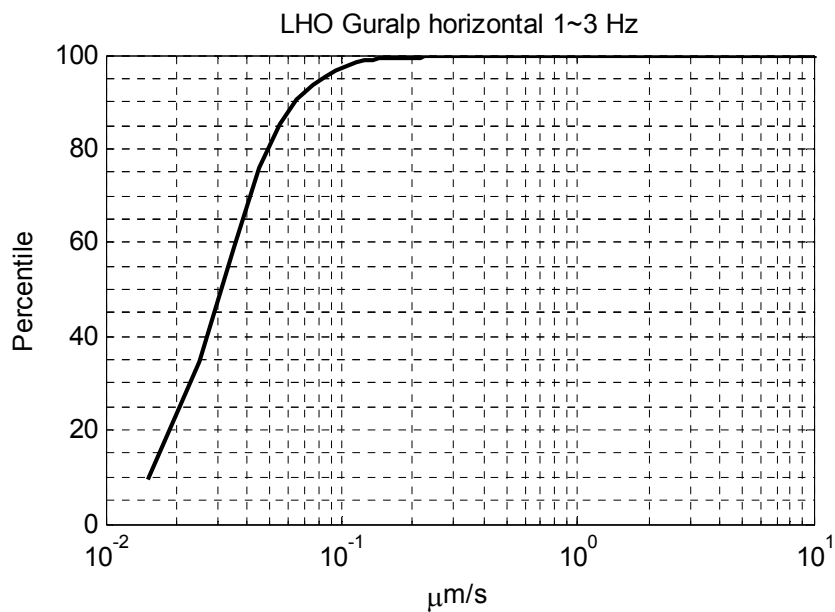
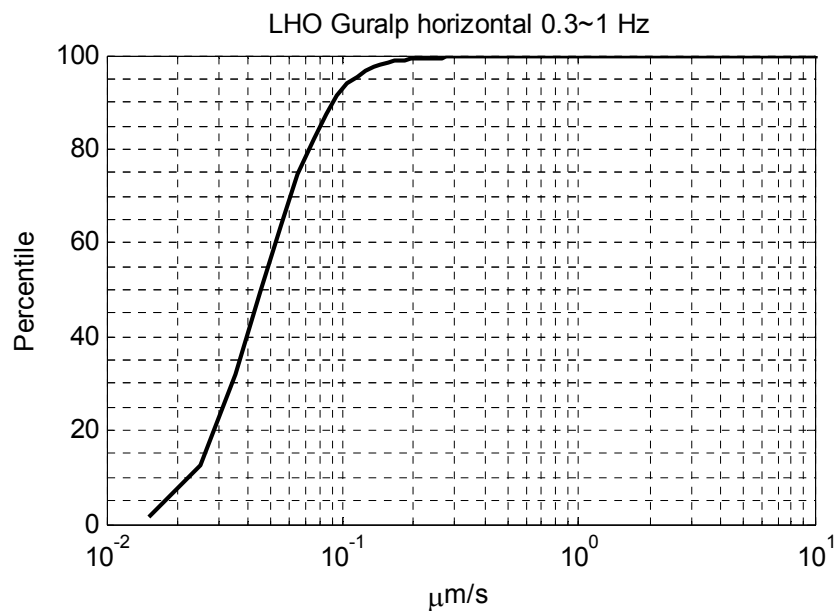
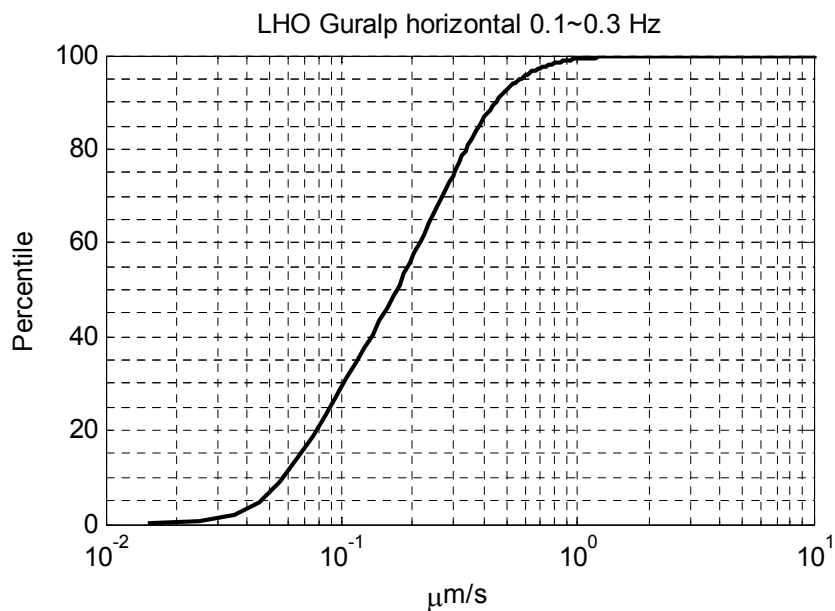
LHO Guralp vertical 3~10 Hz



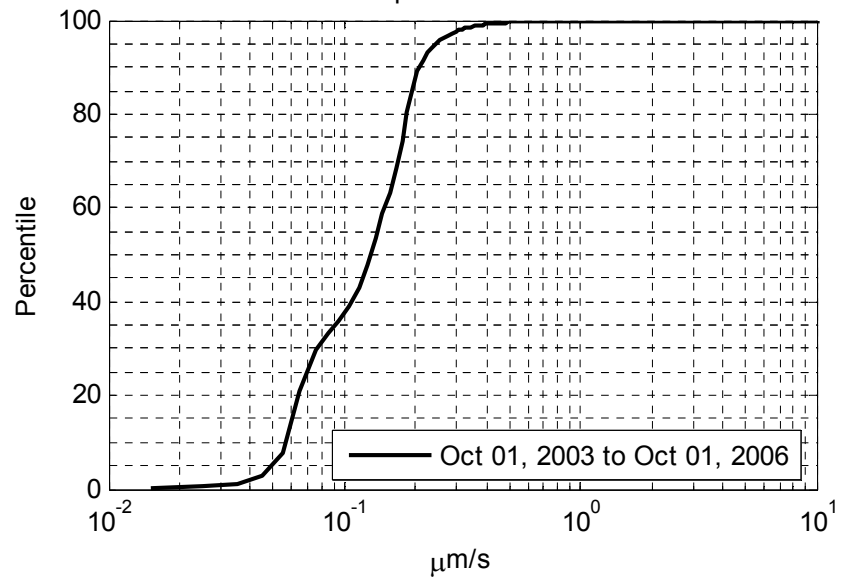
LHO Guralp vertical 10~30 Hz



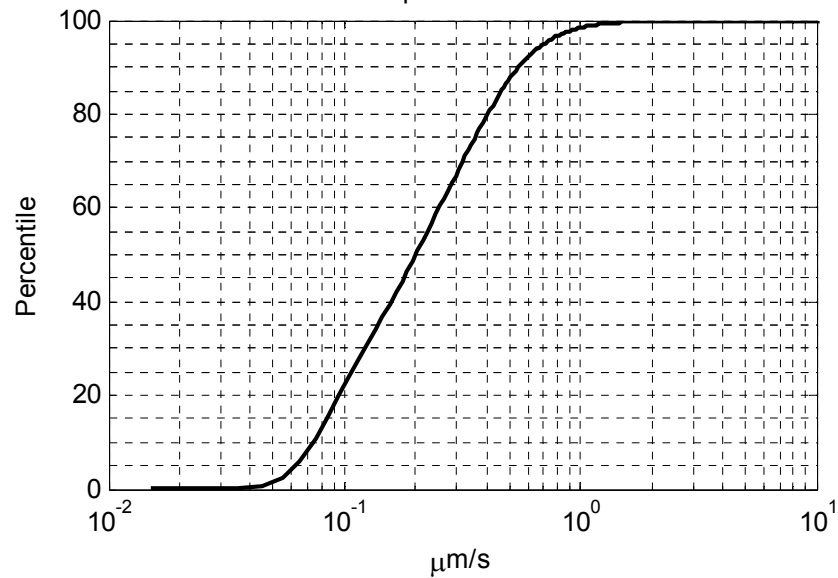
B.6 LHO cumulative normalized histograms per band, from Oct. 01, 2003 to Oct. 01, 2006, measured by Guralp seismometers.



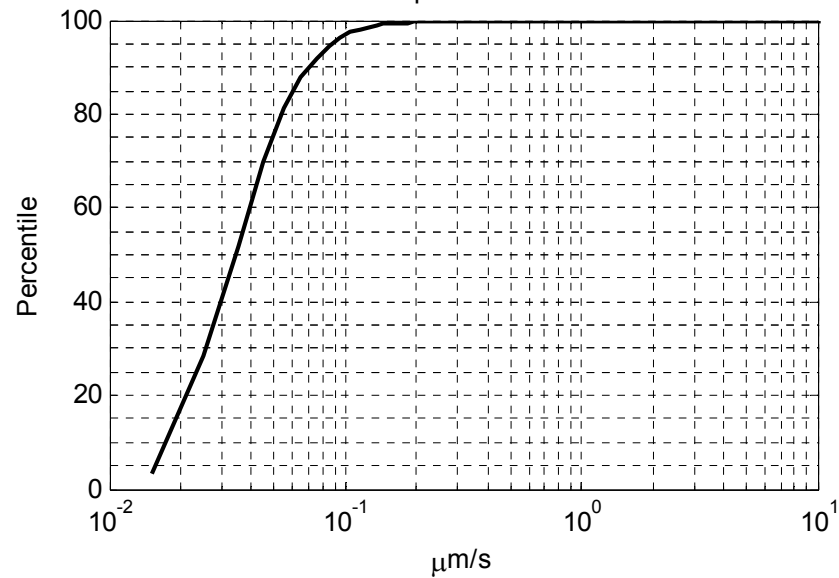
LHO Guralp horizontal 10~30 Hz



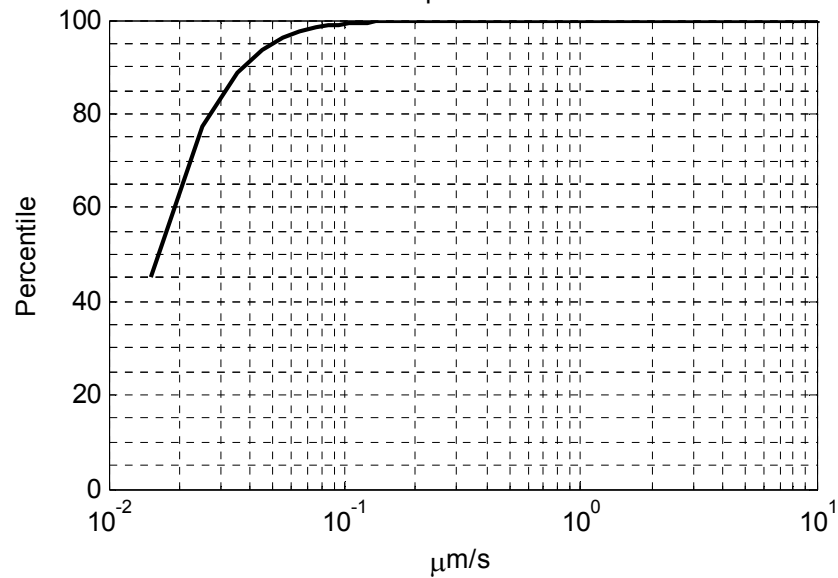
LHO Guralp vertical 0.1~0.3 Hz



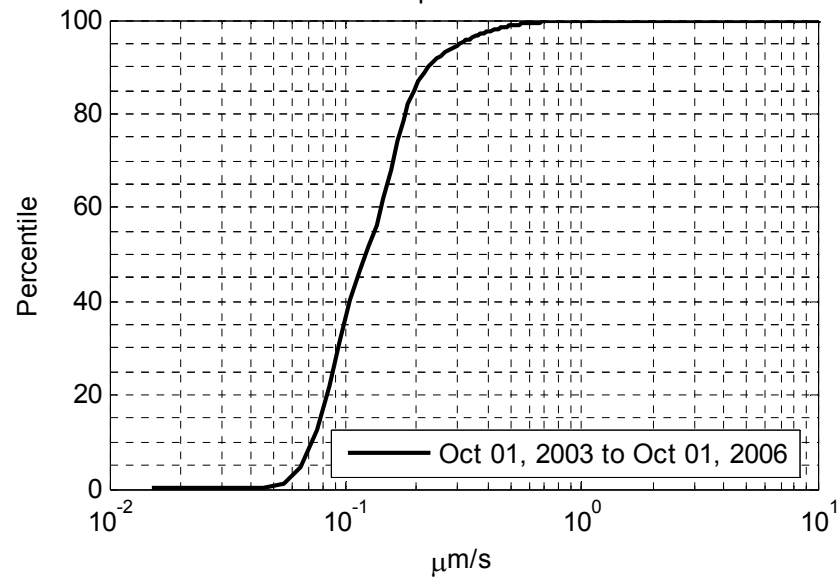
LHO Guralp vertical 0.3~1 Hz



LHO Guralp vertical 1~3 Hz



LHO Guralp vertical 3~10 Hz



LHO Guralp vertical 10~30 Hz

