Preliminary Results of KEK-GM Measurement

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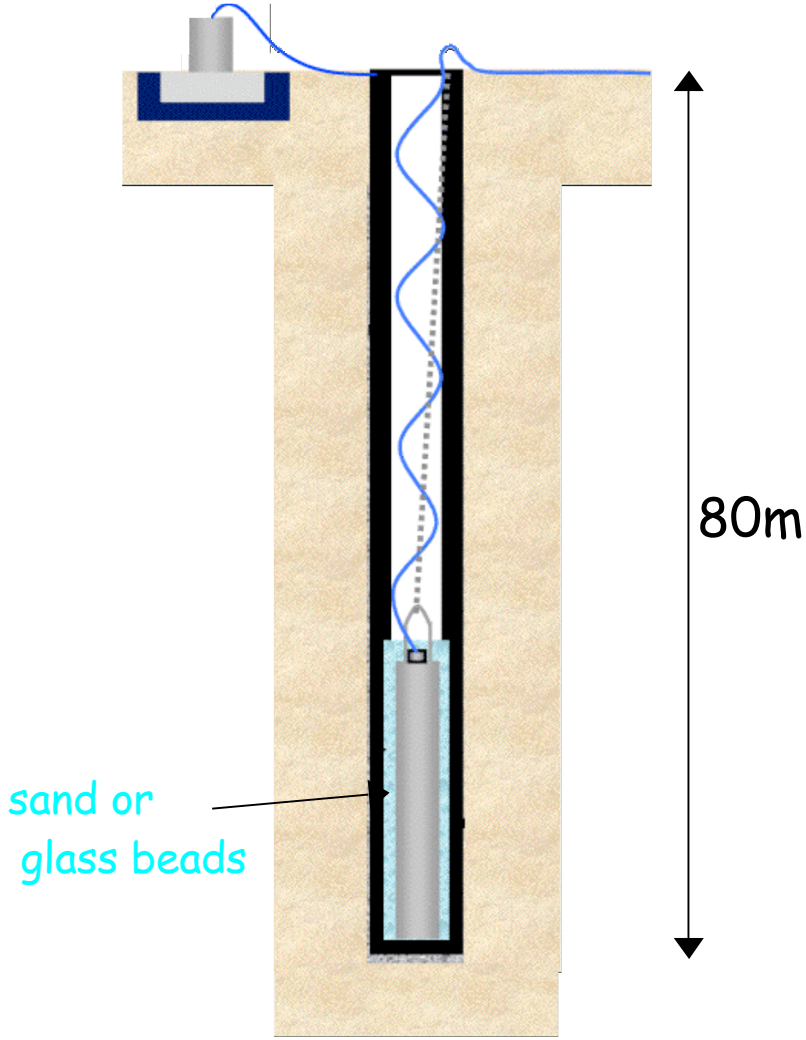
H.Yamaoka, N,Uchida, 2003.5.8

Ground Motion Measurement at KEK

地質

in 2003.1 ~ 3.31

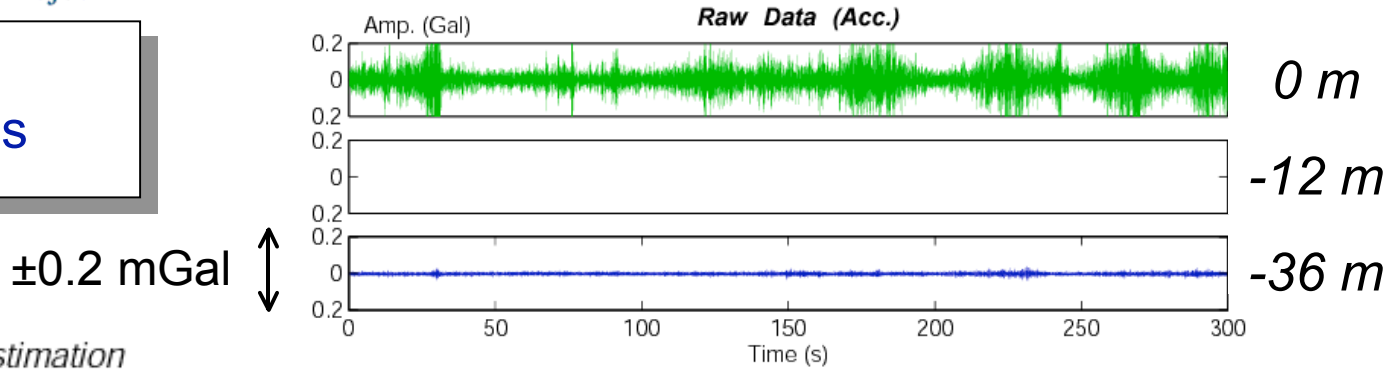
2 sensors (CMG40T)

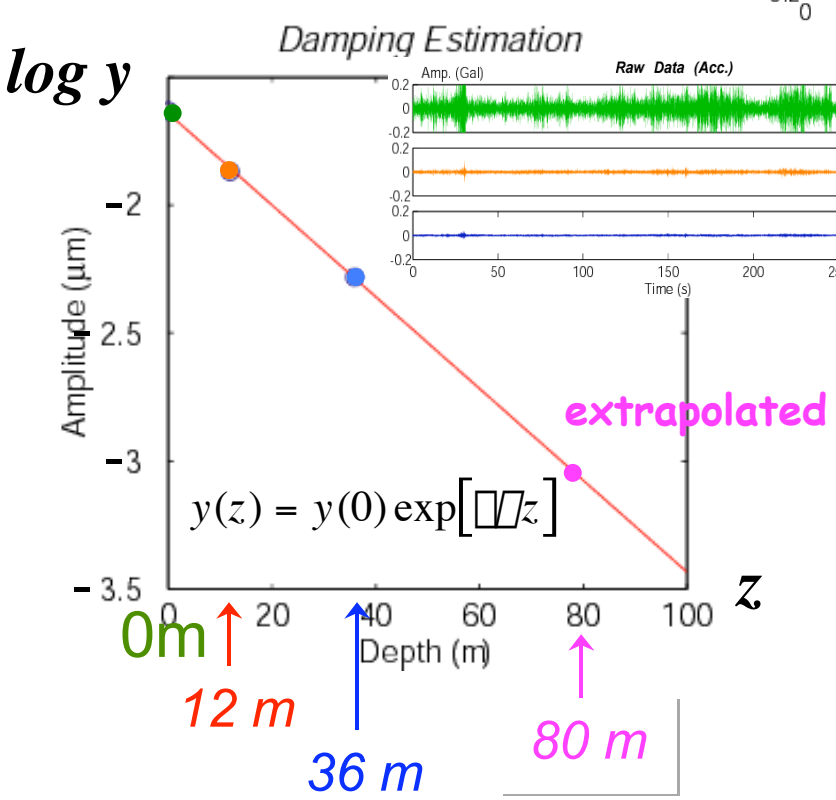


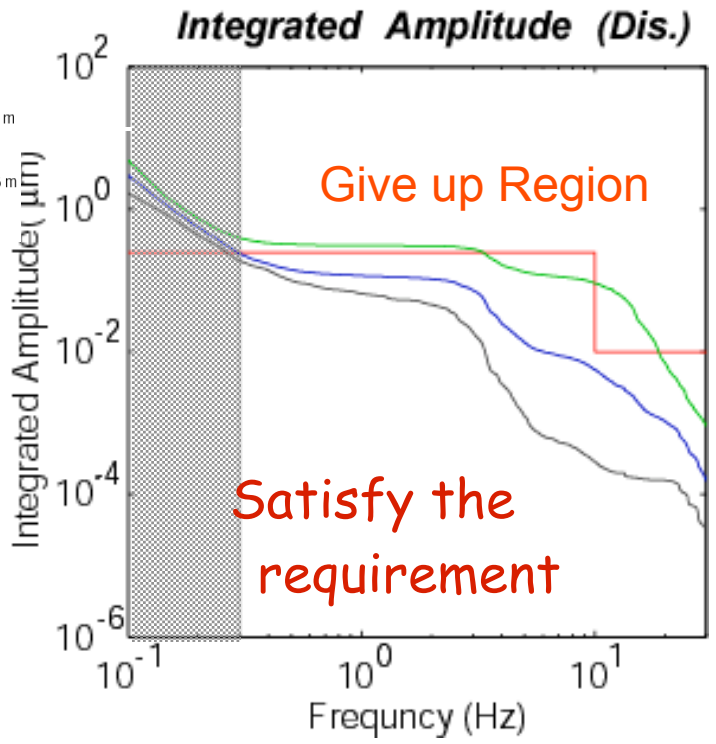
JLC Expected Amplitude at GL-80 m

Electron-Positron Linear Collider Project

- 2002/08/22
  11:00 Z-axis







Geology

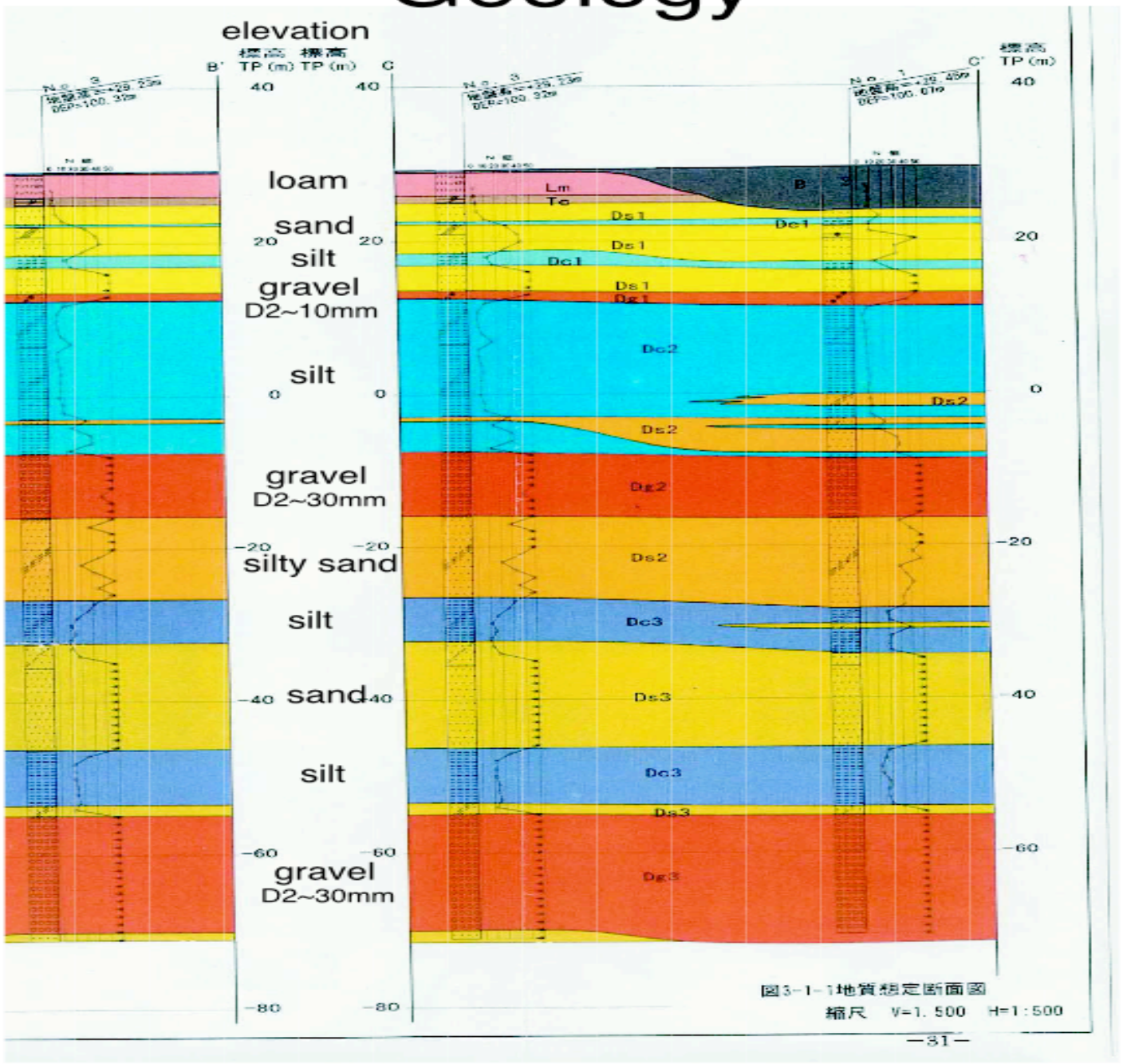
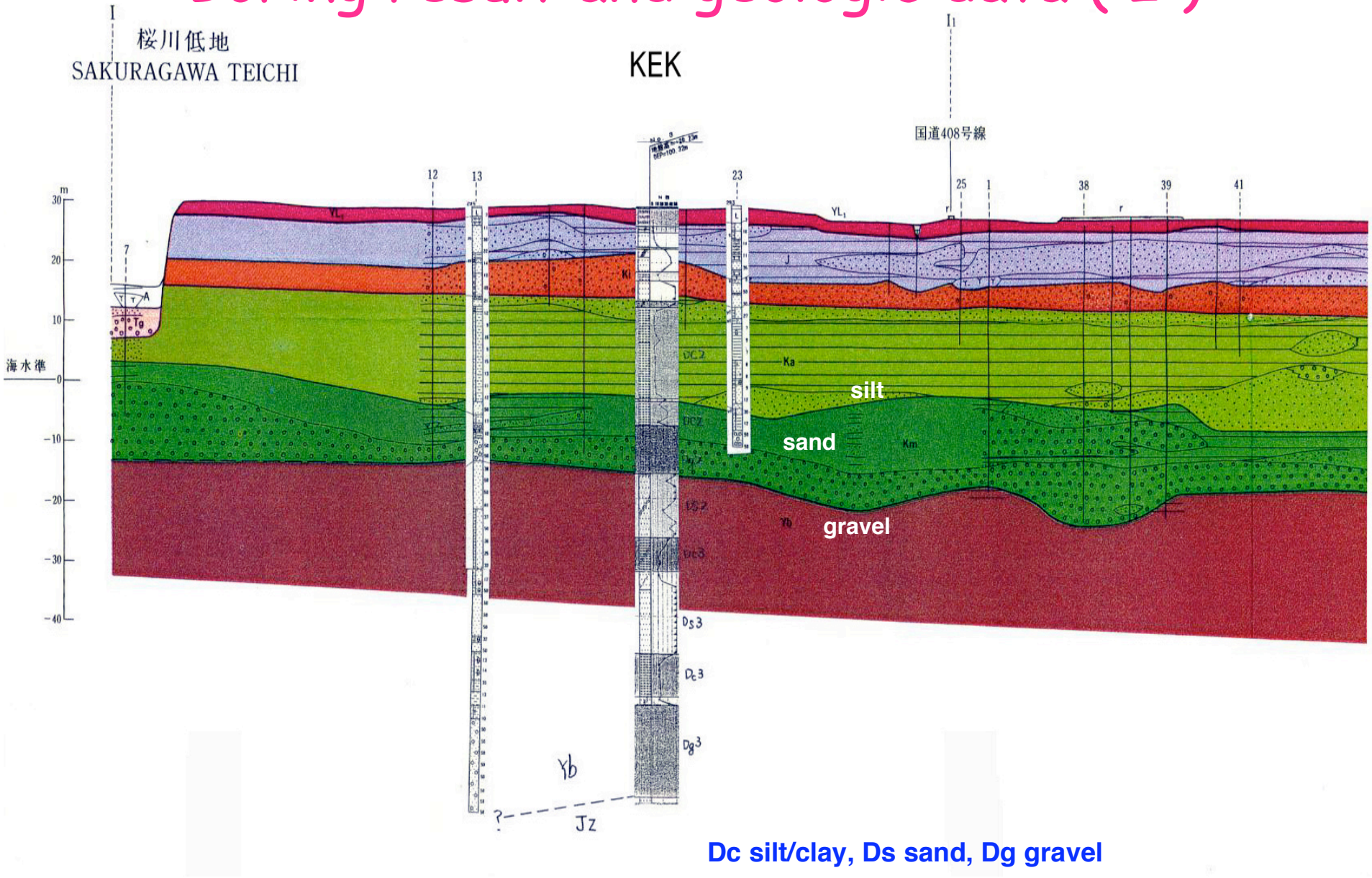


図3-1-1地質想定断面図
縮尺 V=1.500 H=1:500

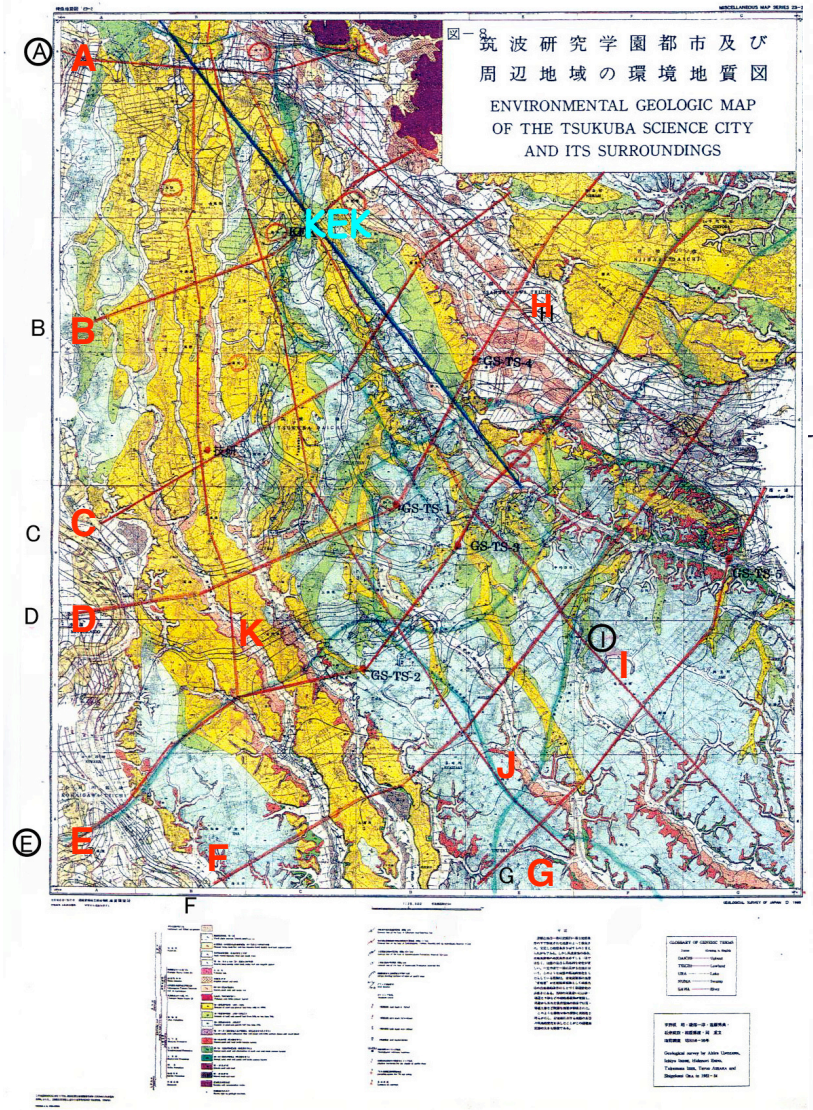
Boring result and geologic data (I)

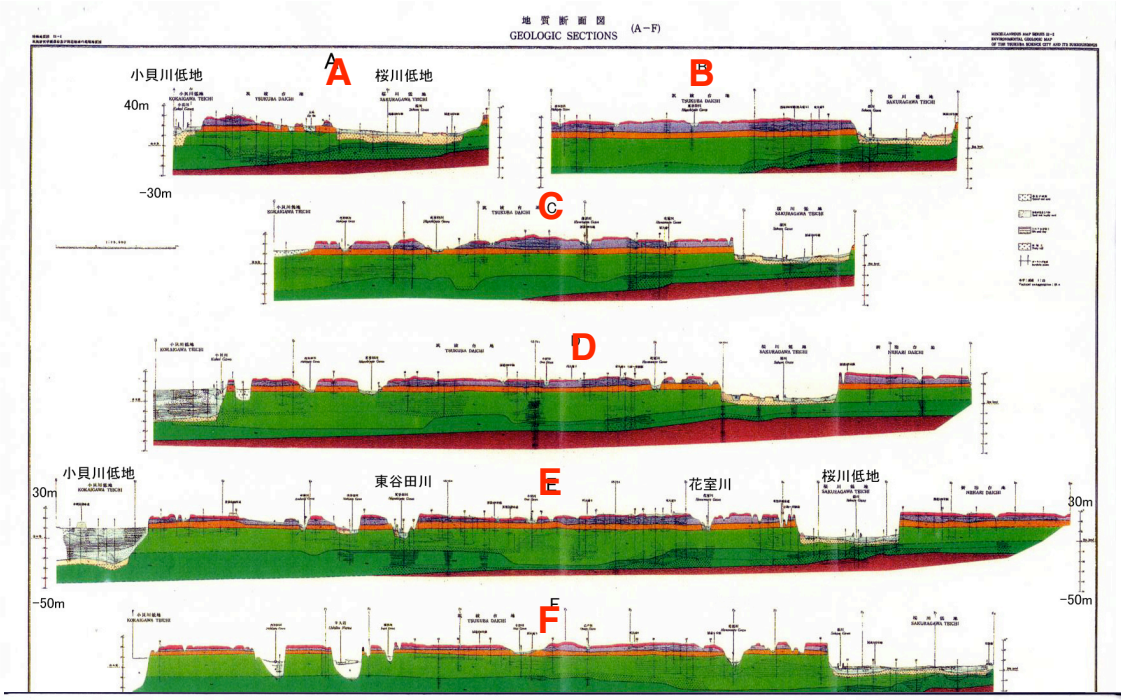
図－11　JLC ルートに沿った KEK 付近のボーリング柱状図と地質断面図

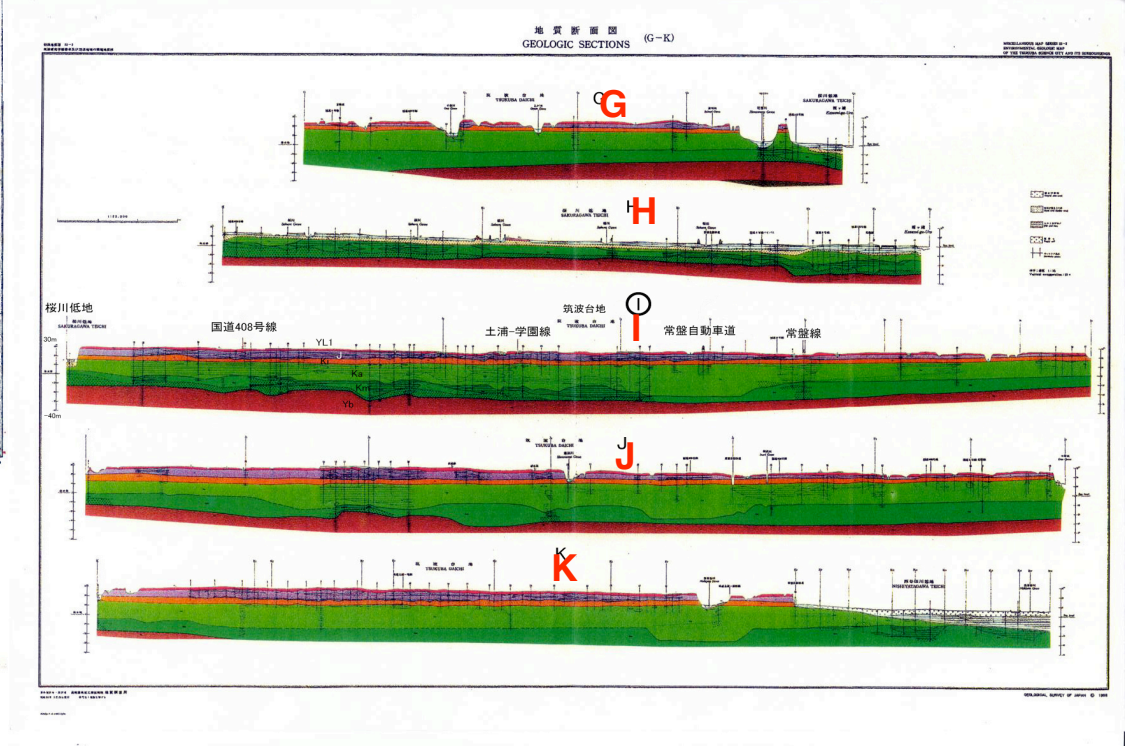


Dc silt/clay, Ds sand, Dg gravel

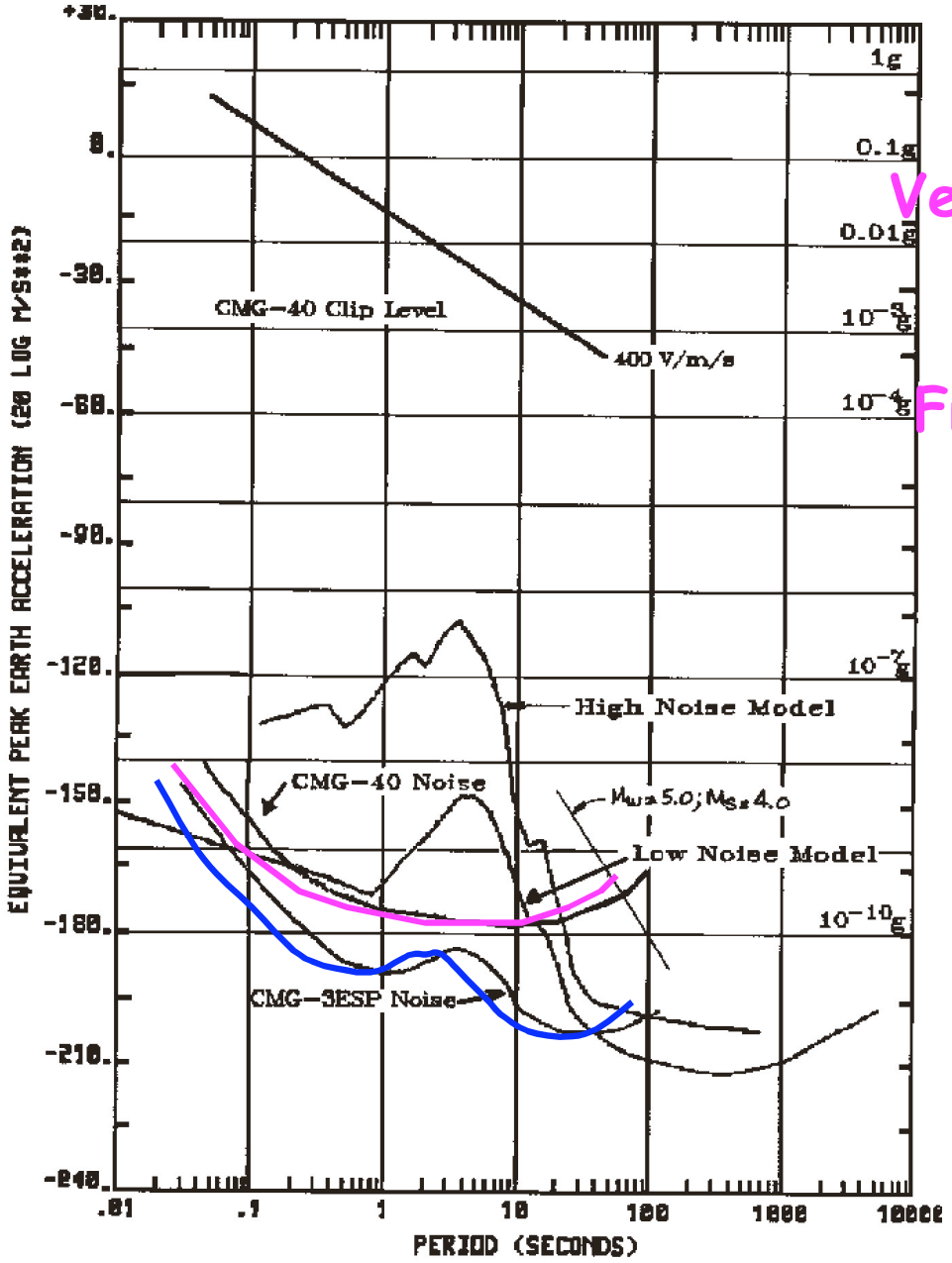
Tsukuba
Geologic Sections







"30 sec" sensor : CMG40T of GURALP



Velocity Output: 2 x 400 V/m/s

for borehole 2 x 800 V/m/s

Frequency band: 0.033 to 50Hz

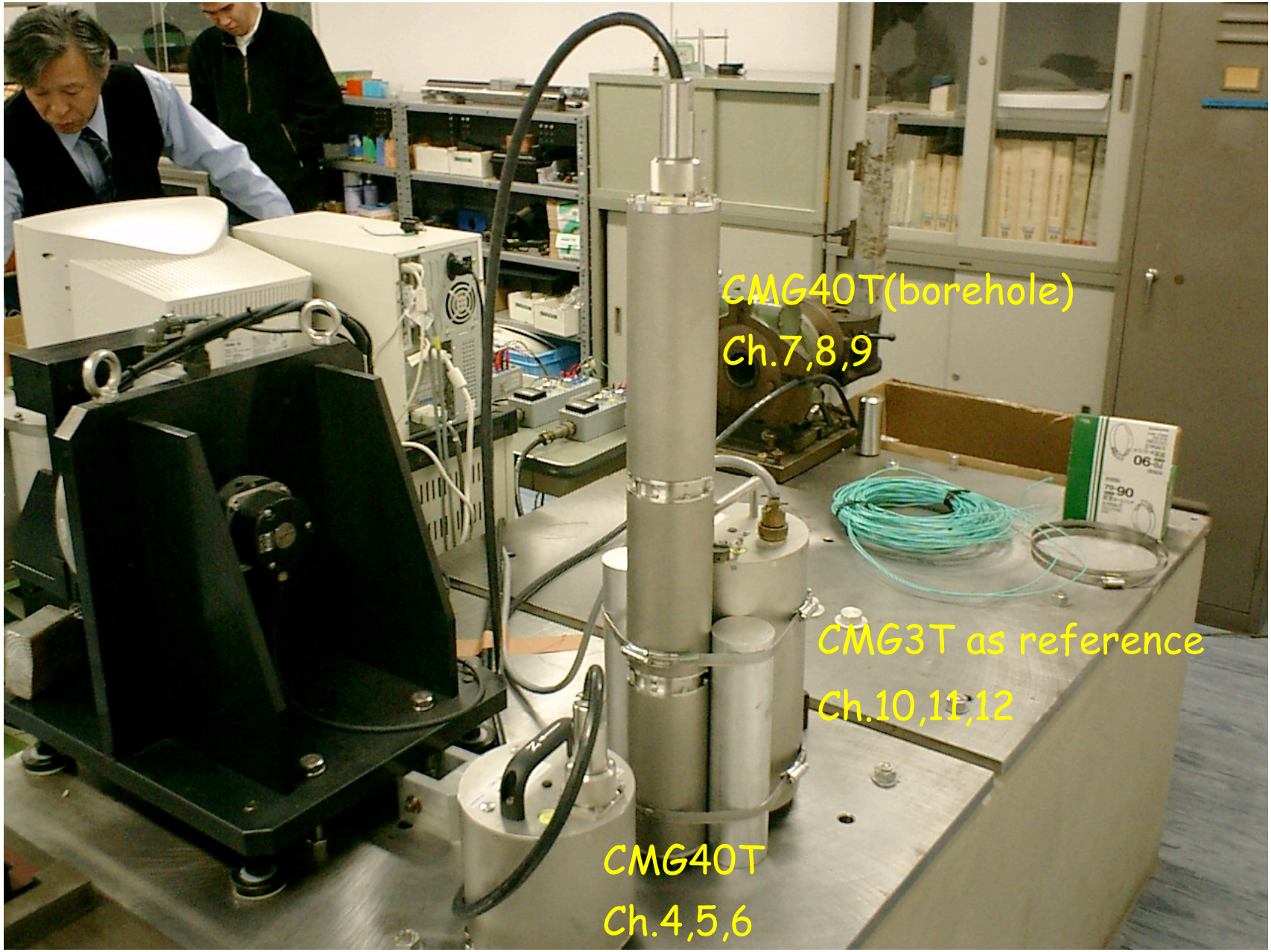
CMG3T (100 sec sensor)

Velocity Output: 2 x 750 V/m/s

Flat velocity: 0.01 to 50 Hz

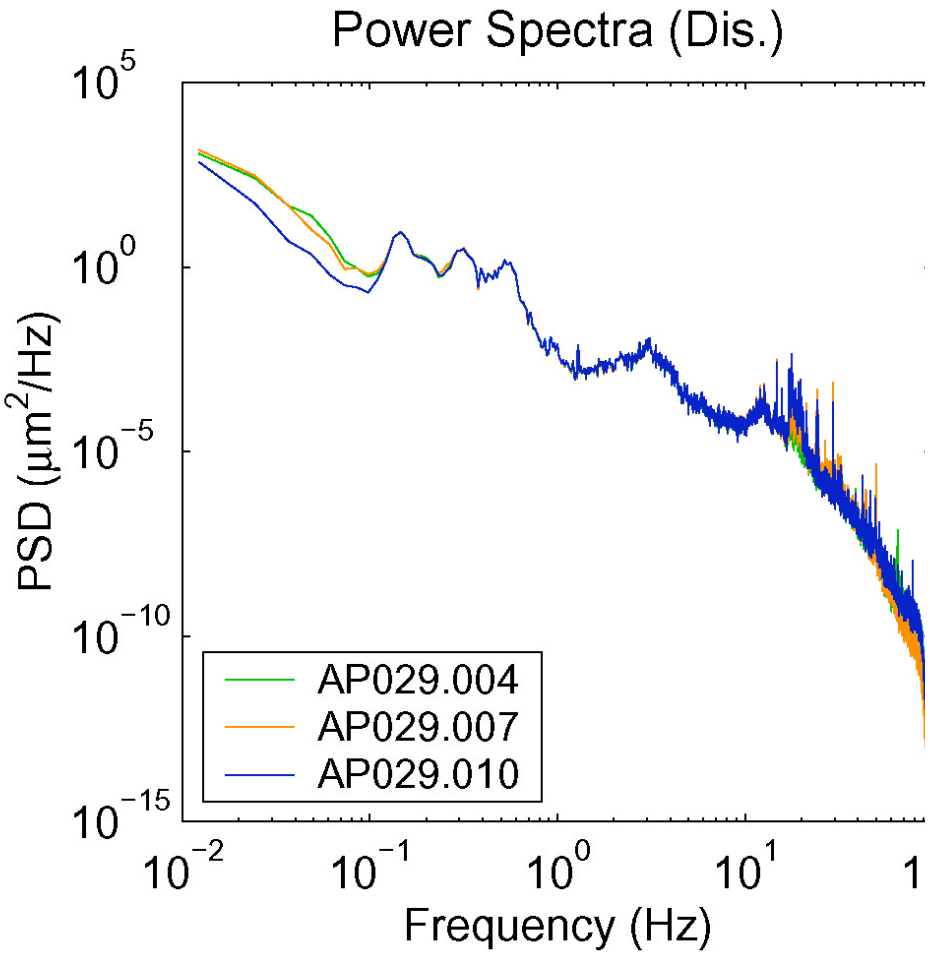
Huddle Test

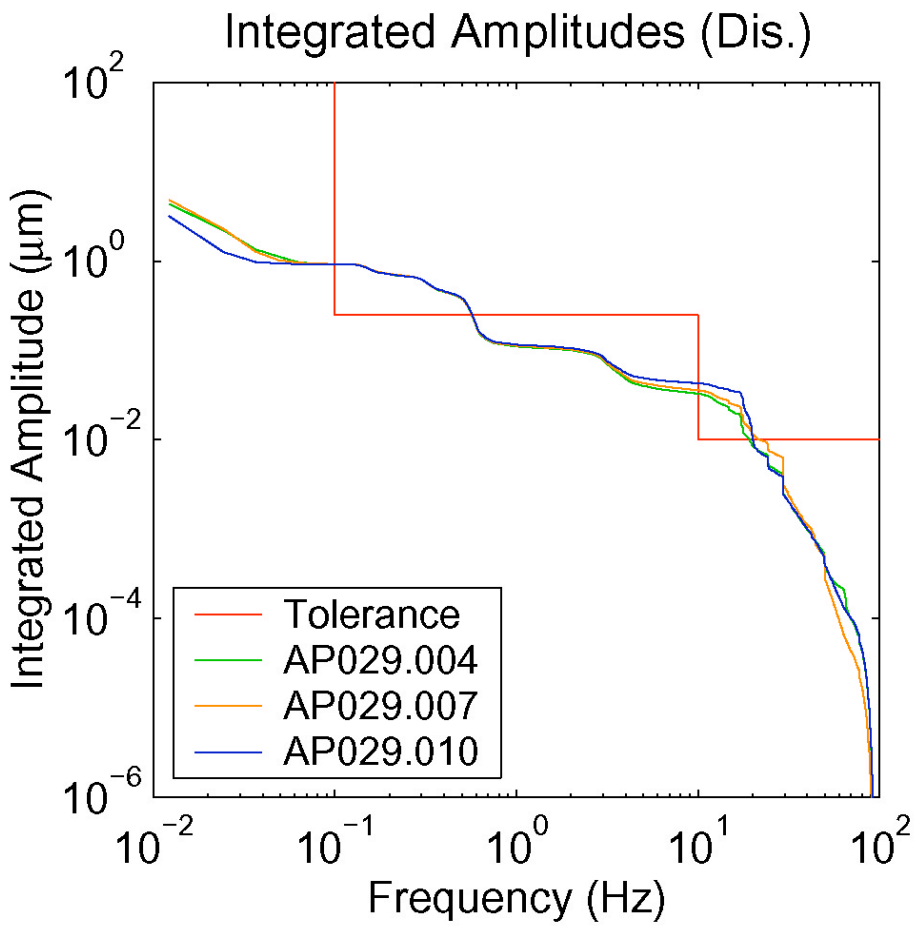
2003.3.10



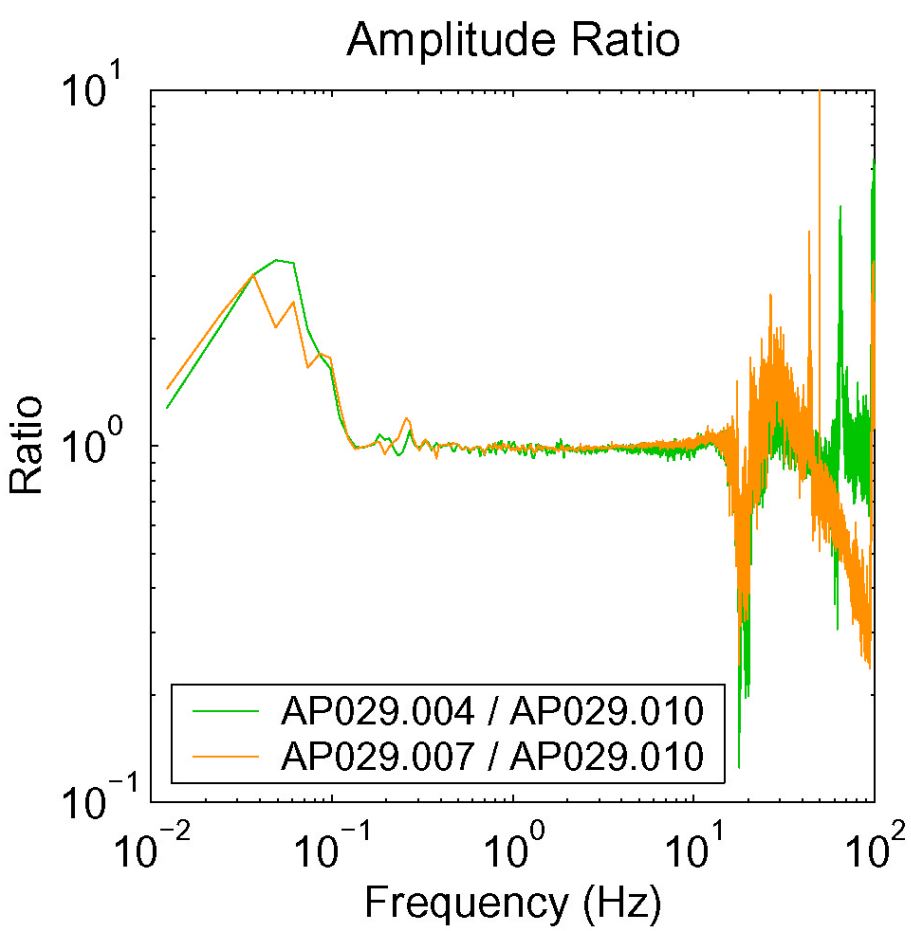
Results (1)

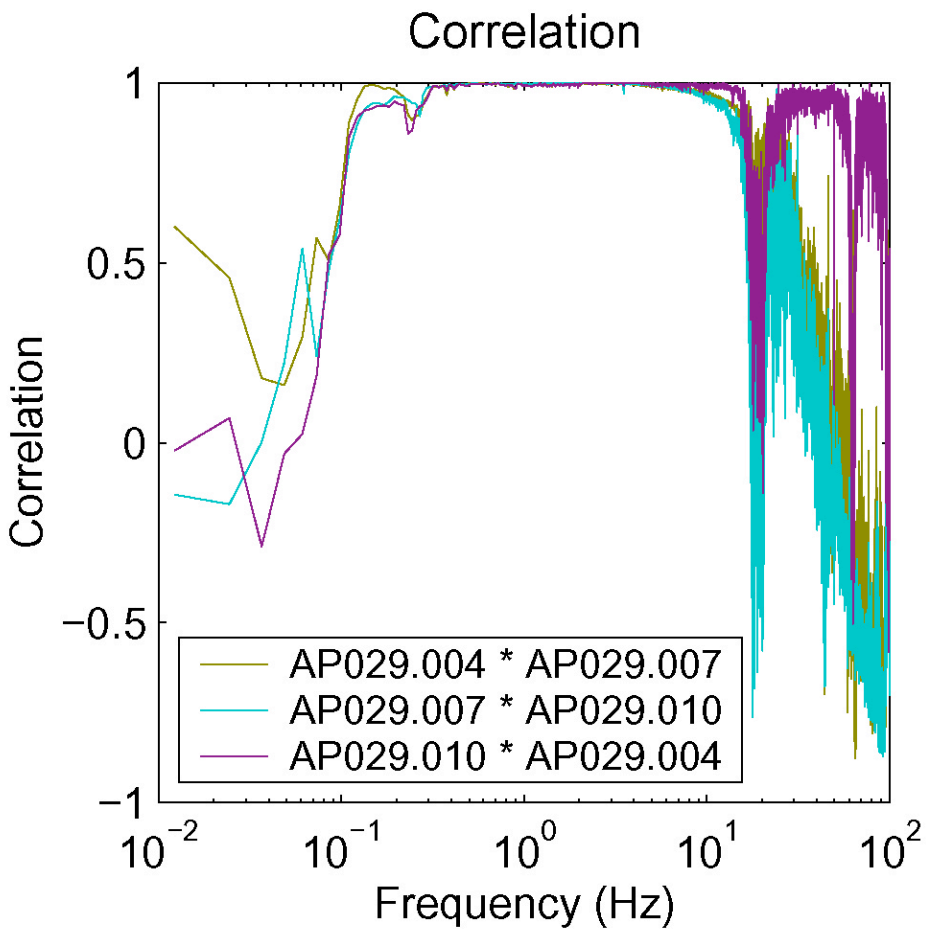
Gain constants are provided by GURALP.





Results (2)

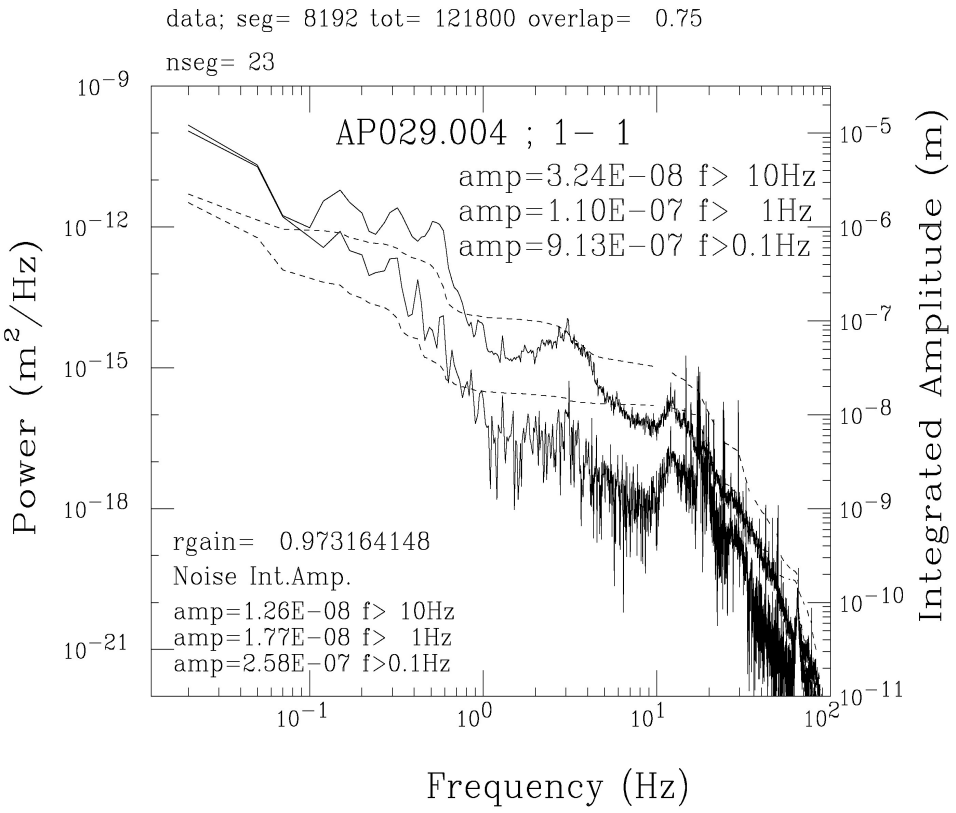

Amplitude Ratio
Ratio
Frequency (Hz)
AP029.004 / AP029.010
AP029.007 / AP029.010

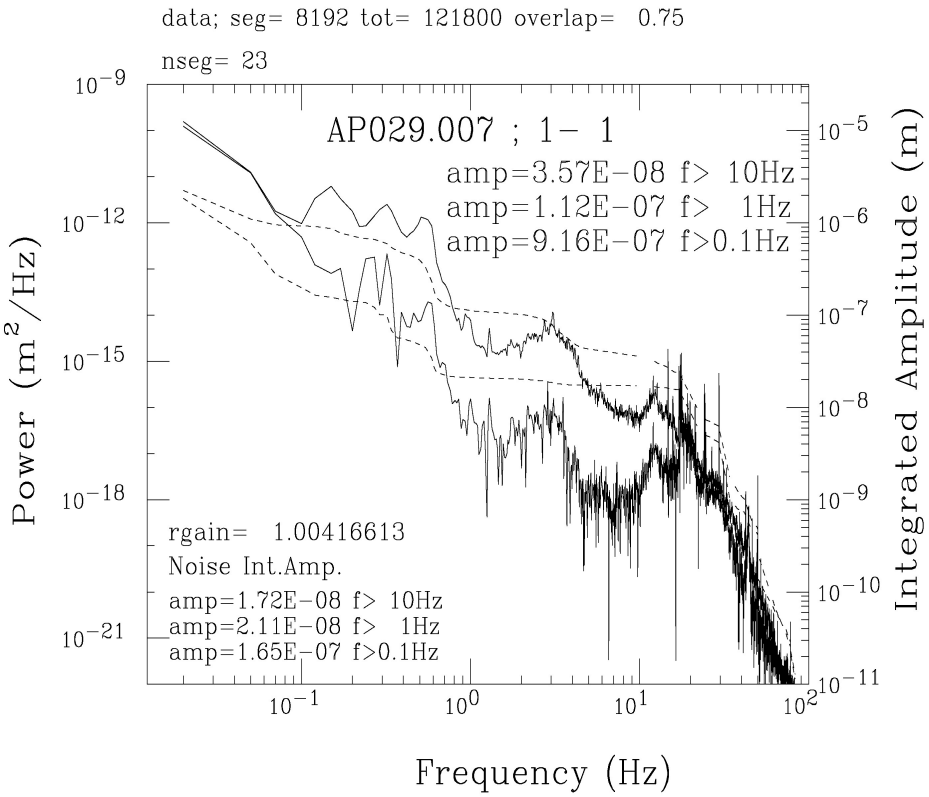

Correlation
Correlation
Frequency (Hz)
AP029.004 * AP029.007
AP029.007 * AP029.010
AP029.010 * AP029.004

Results (3)

"noise" estimation by PSD(1-C(PSDxPSD')$^{1/2}$), PSD'=ch10

, which is true for perfect gain constants, PSD=signal +noise.

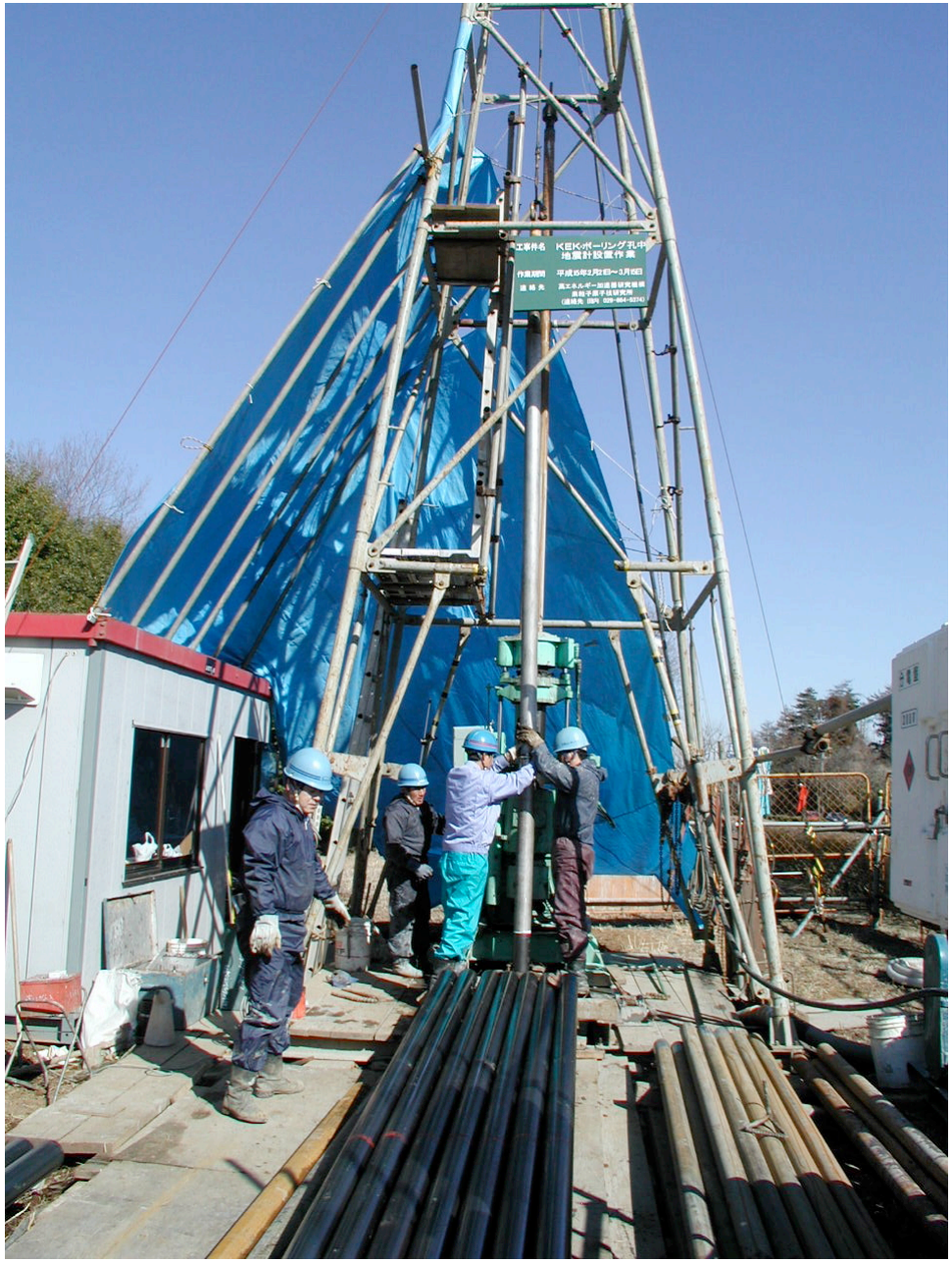




Boring Process(1)

Boring Process(2)

Boring machine NLC



Boring Process(3)

Installing glass beads to anchore the sensor.

Setting CMG40T at GL

The sensor is surrounded by sand, and thermal insulators fill the manhole (about 1m deep).

GM Measurement

Measurement began at 10pm on 17th April, 2003.

For the moment, 4 times per day at 4am, 10am, 4pm, 10pm.

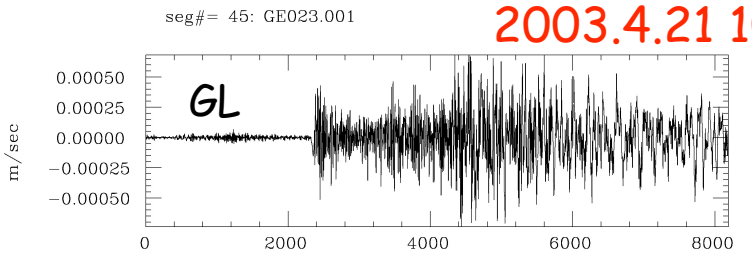
Data are taken for 30 minutes each at 200 Hz.

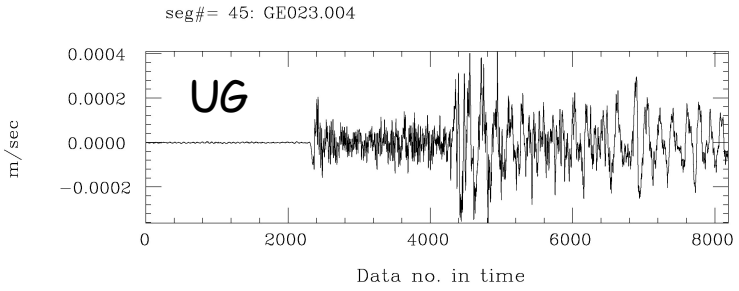
The data are segmented into 40.96 sec (8192 data points) for FFT analysis with 75% overlap and Hanning window function. So, there are 69 segments for 30 minutes.

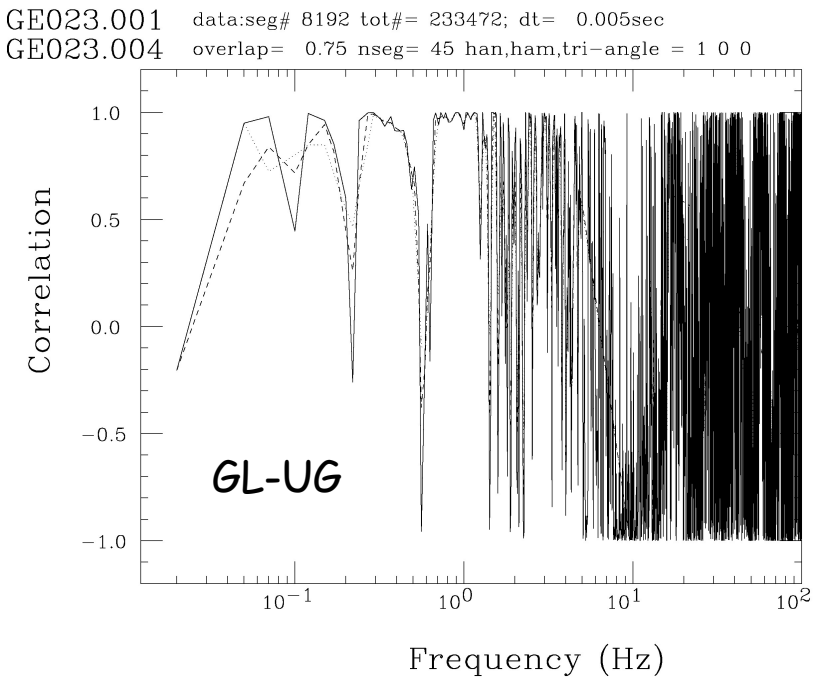
Power spectra, coherences and correlations are averages of the segments.

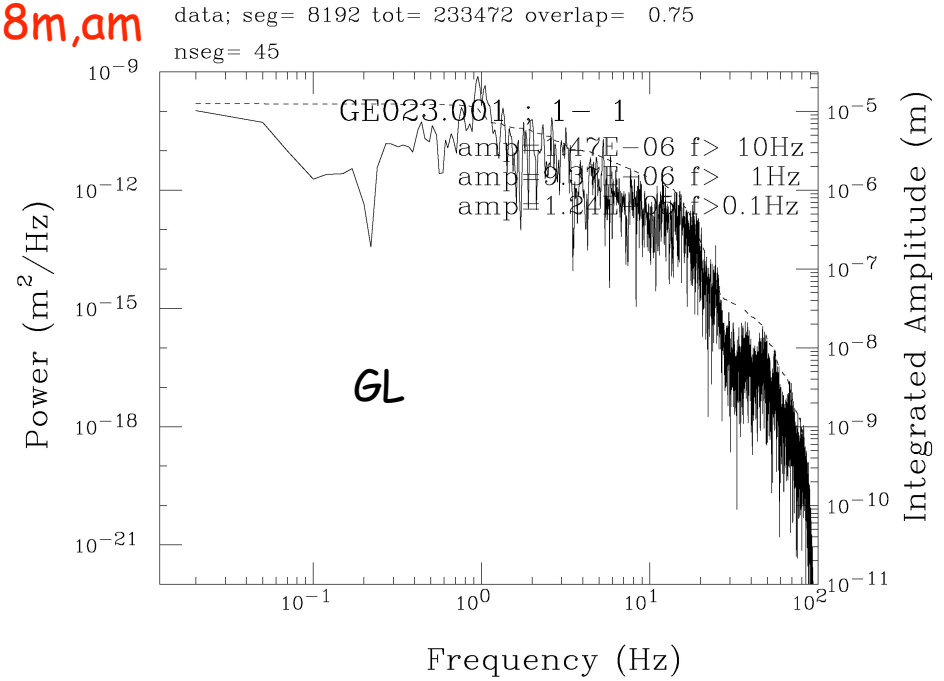
Observation of Earth Quake

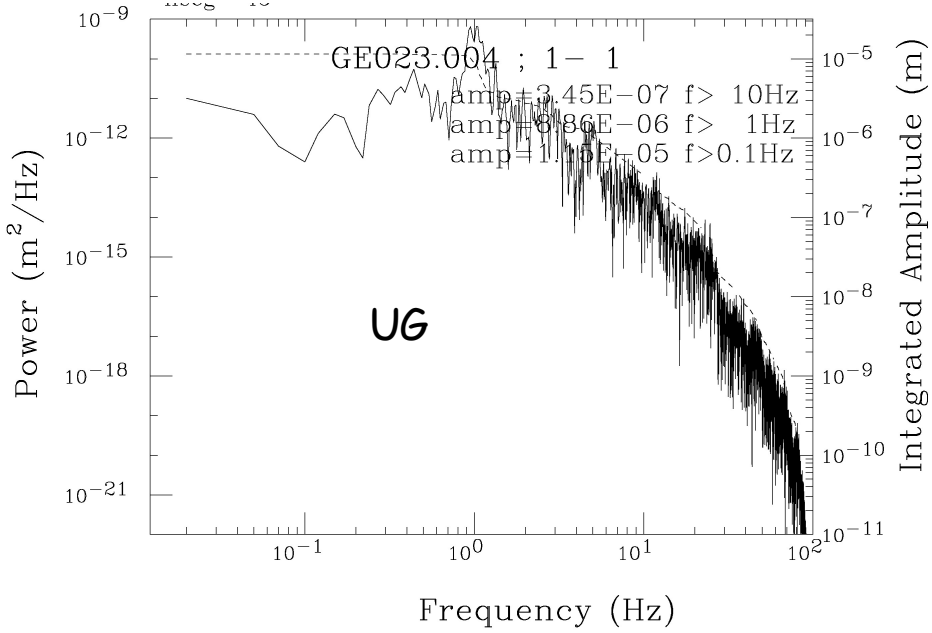
2003.4.21 10h18m,am



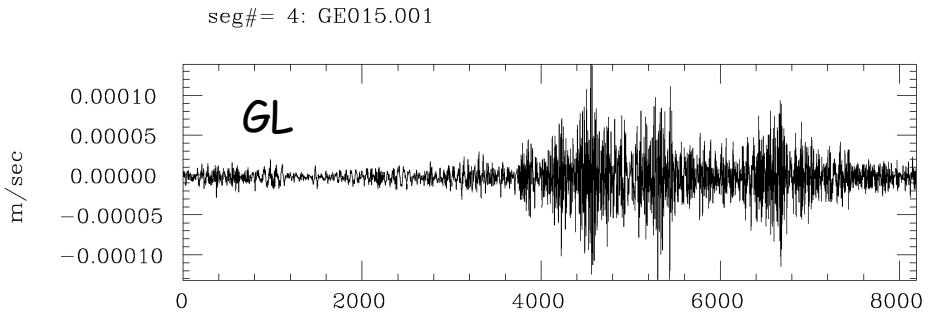


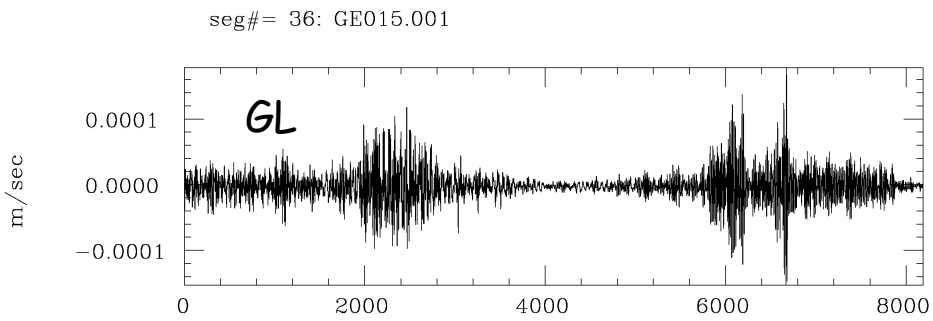


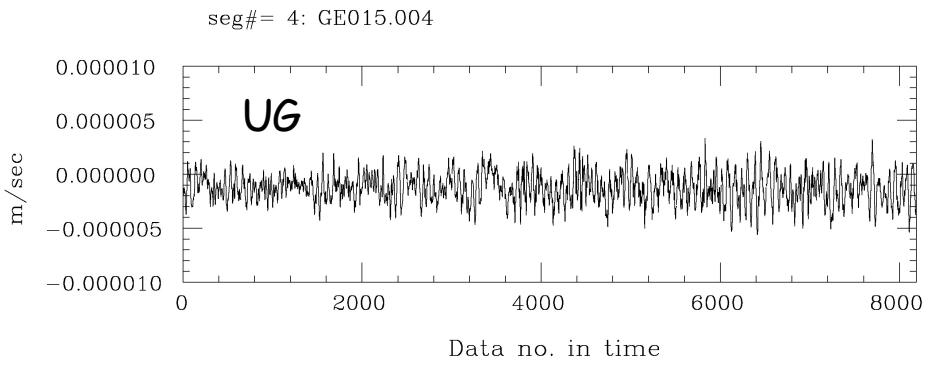


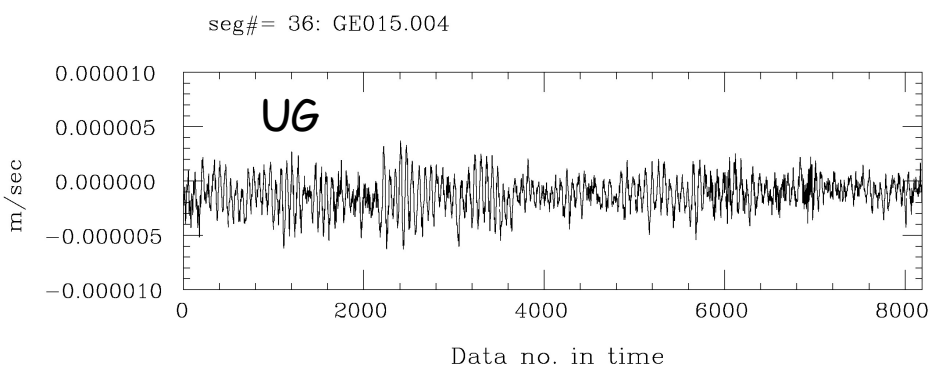


2003.4.19, 10am (1)

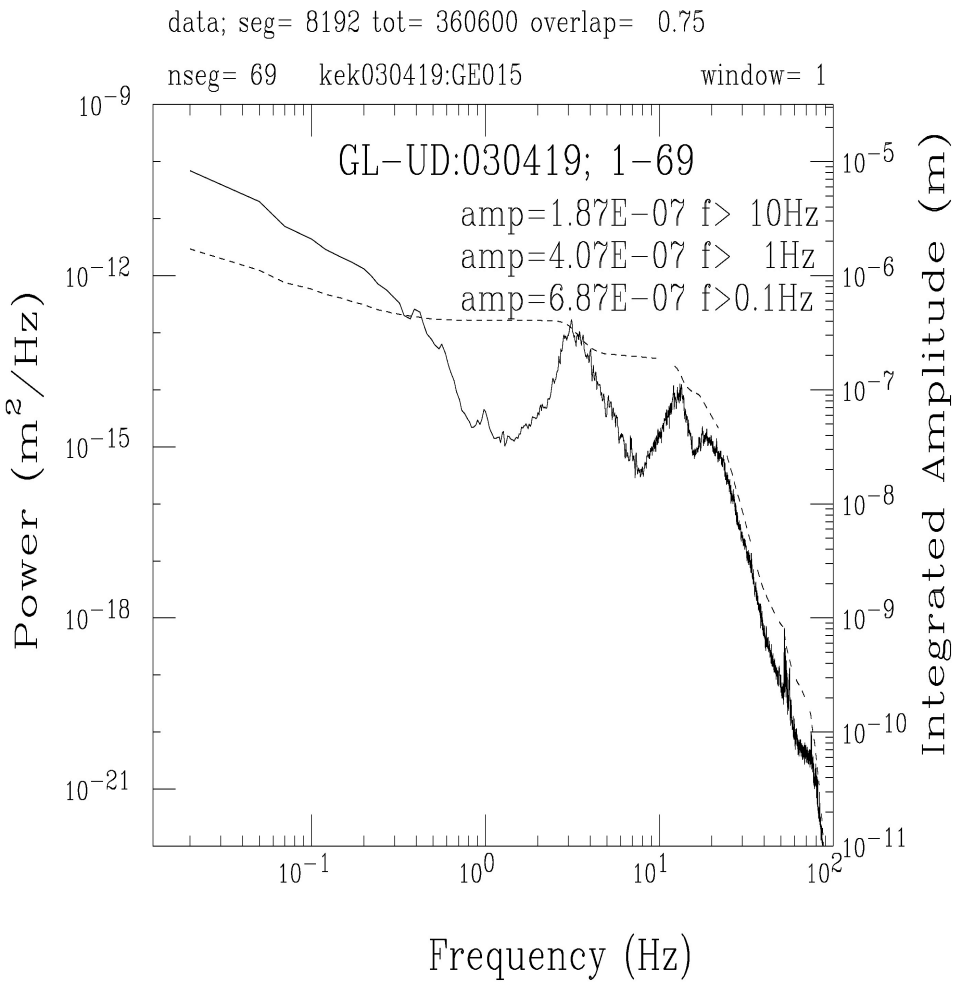


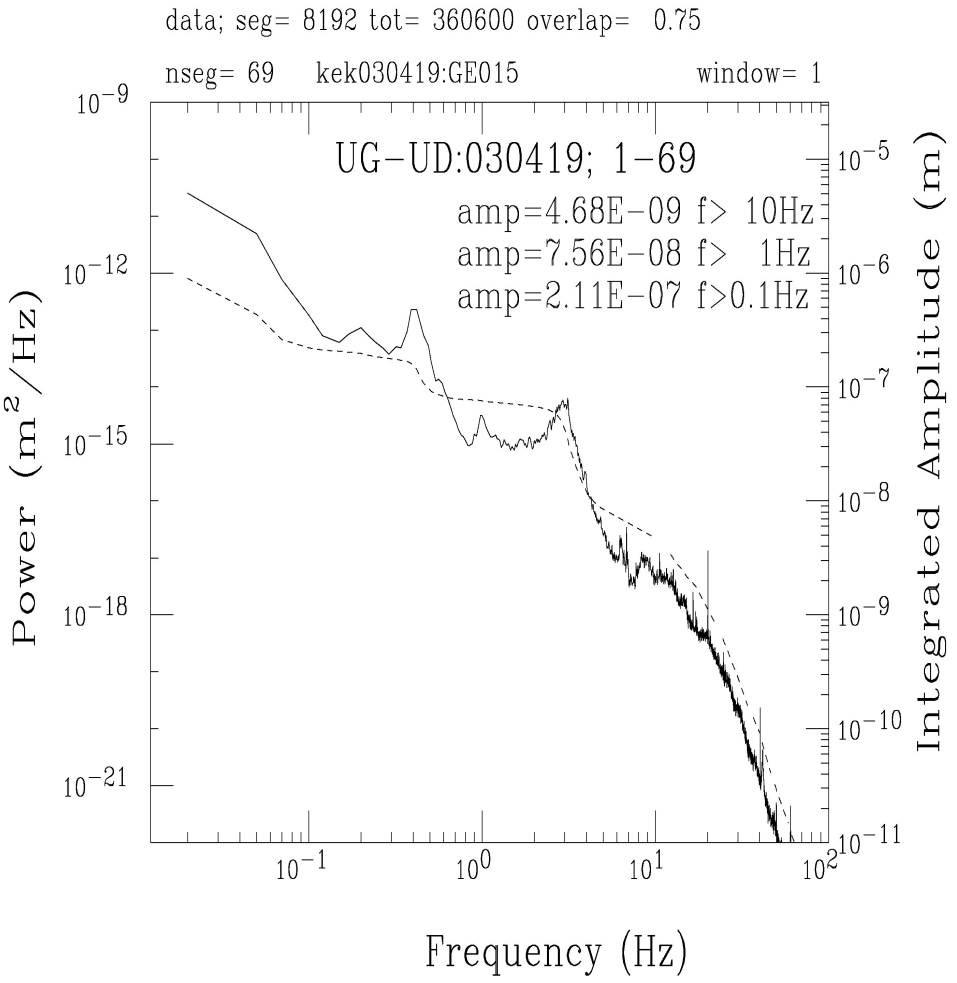




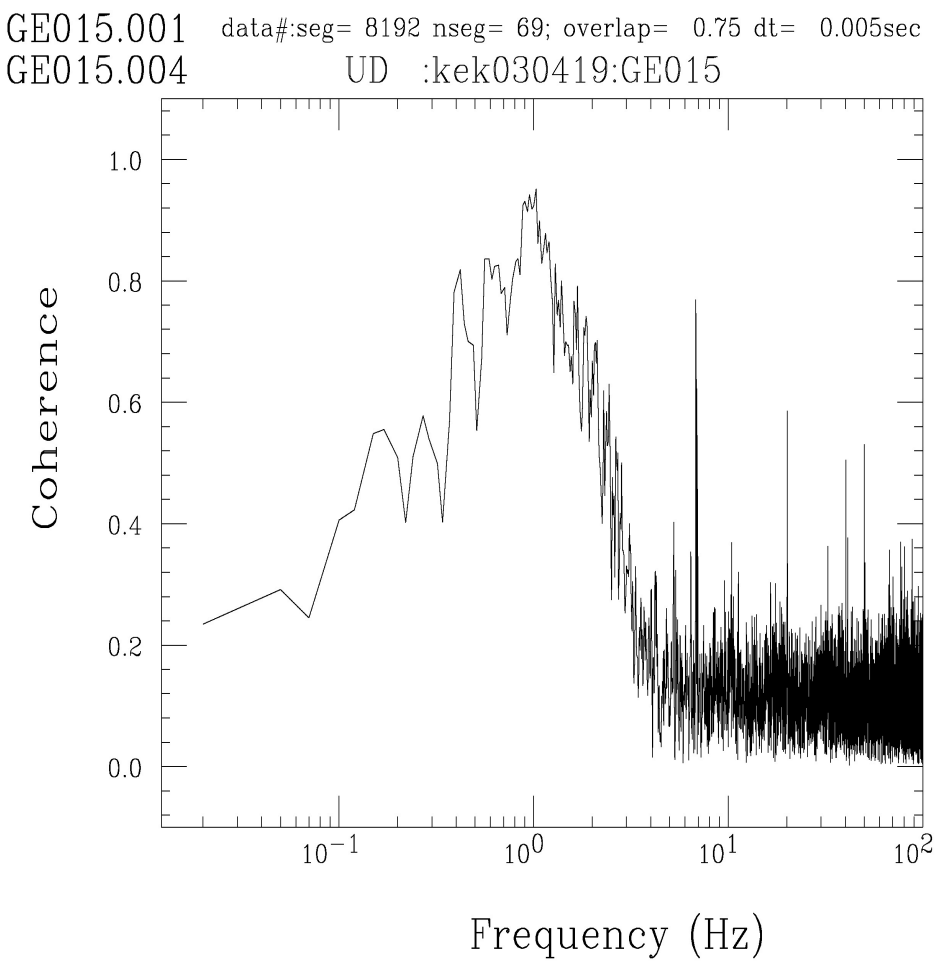


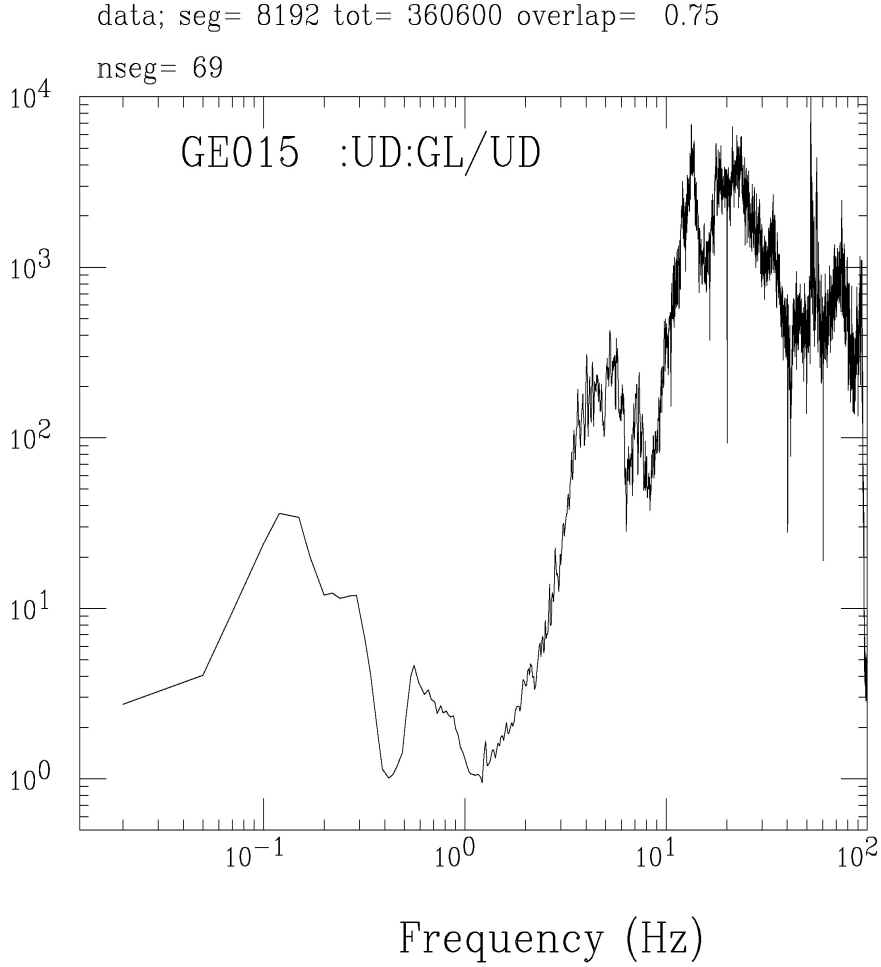
2003.4.19, 10am (2)



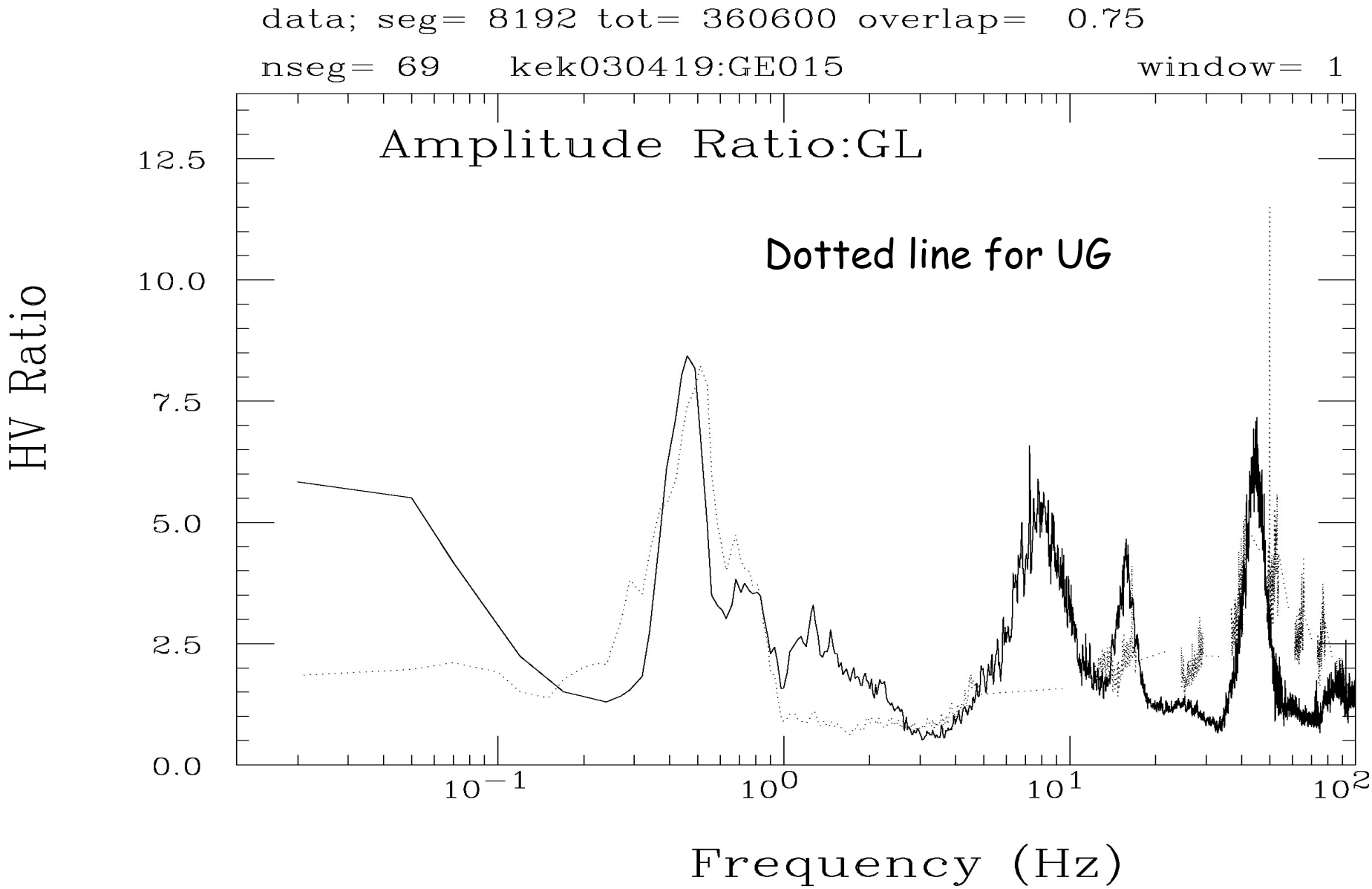


2003.4.19, 10am (3)



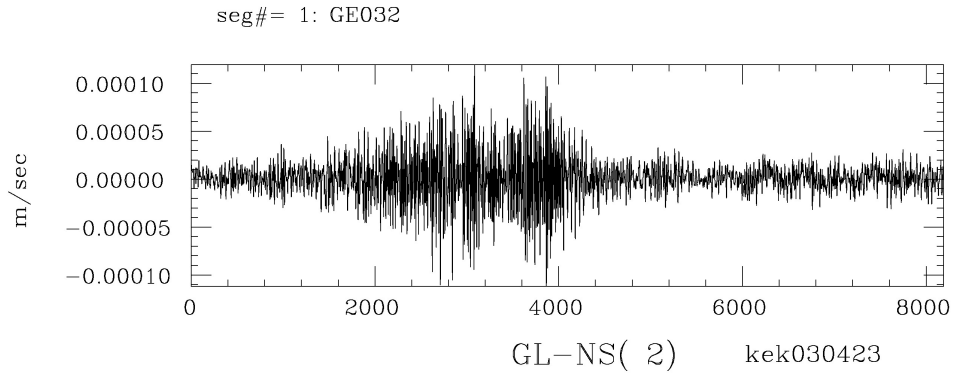


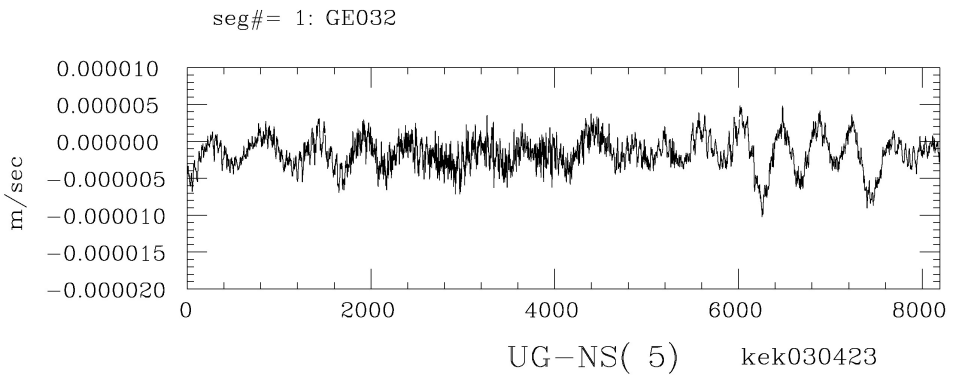
2003.4.19, 10am (4)

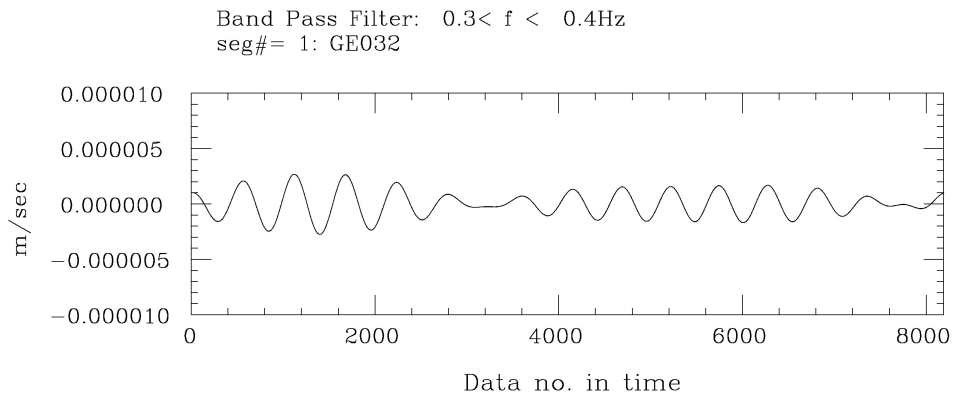


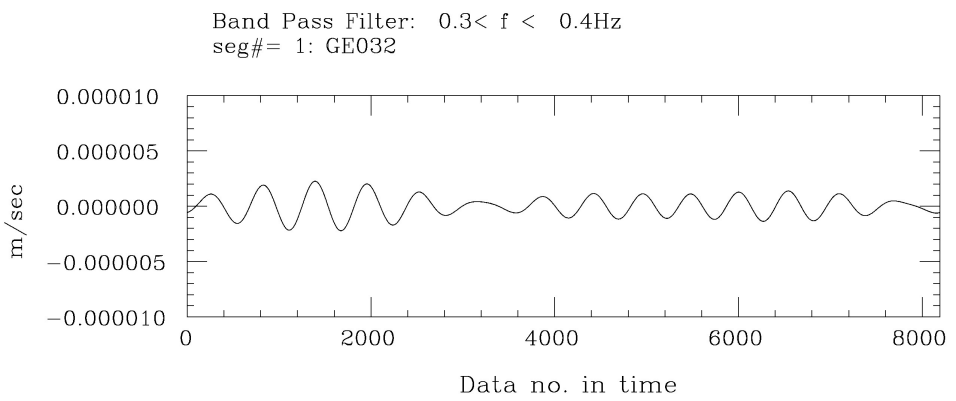
Peak at 0.3~0.4 Hz (1)

2003.4.23, 4pm





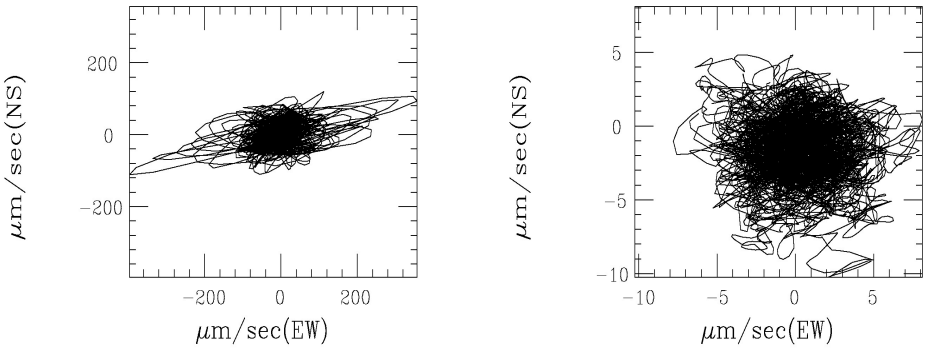




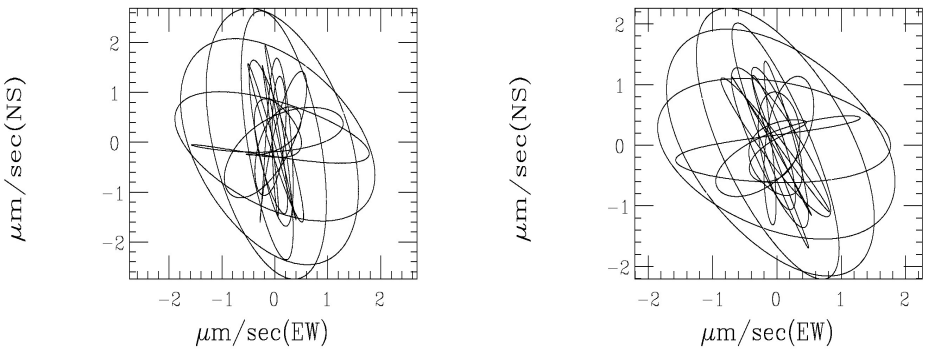
Peak at 0.3~0.4 Hz (1)

NS - EW

seg#= 1 1: kek030423:GE032

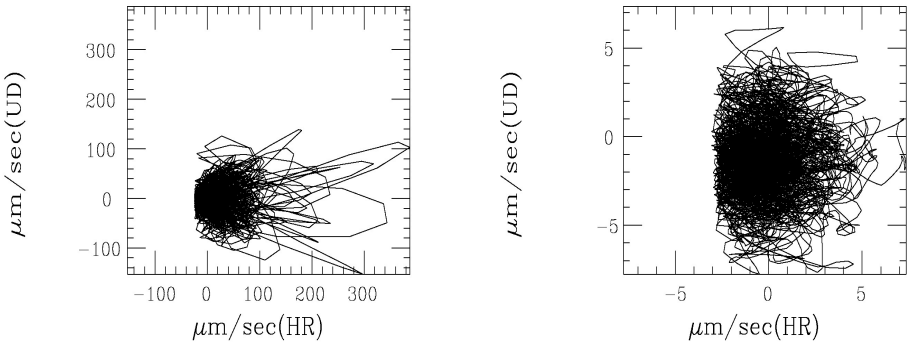


Band Pass Filter: 0.3< f < 0.4 Hz

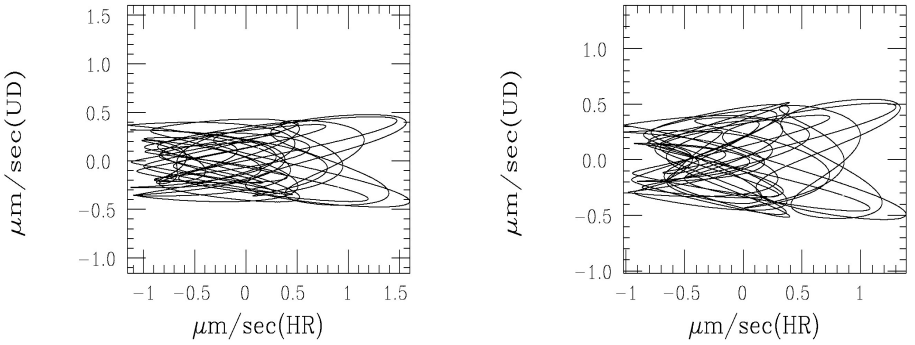


H - UD

seg#= 1 1: kek030423:GE032

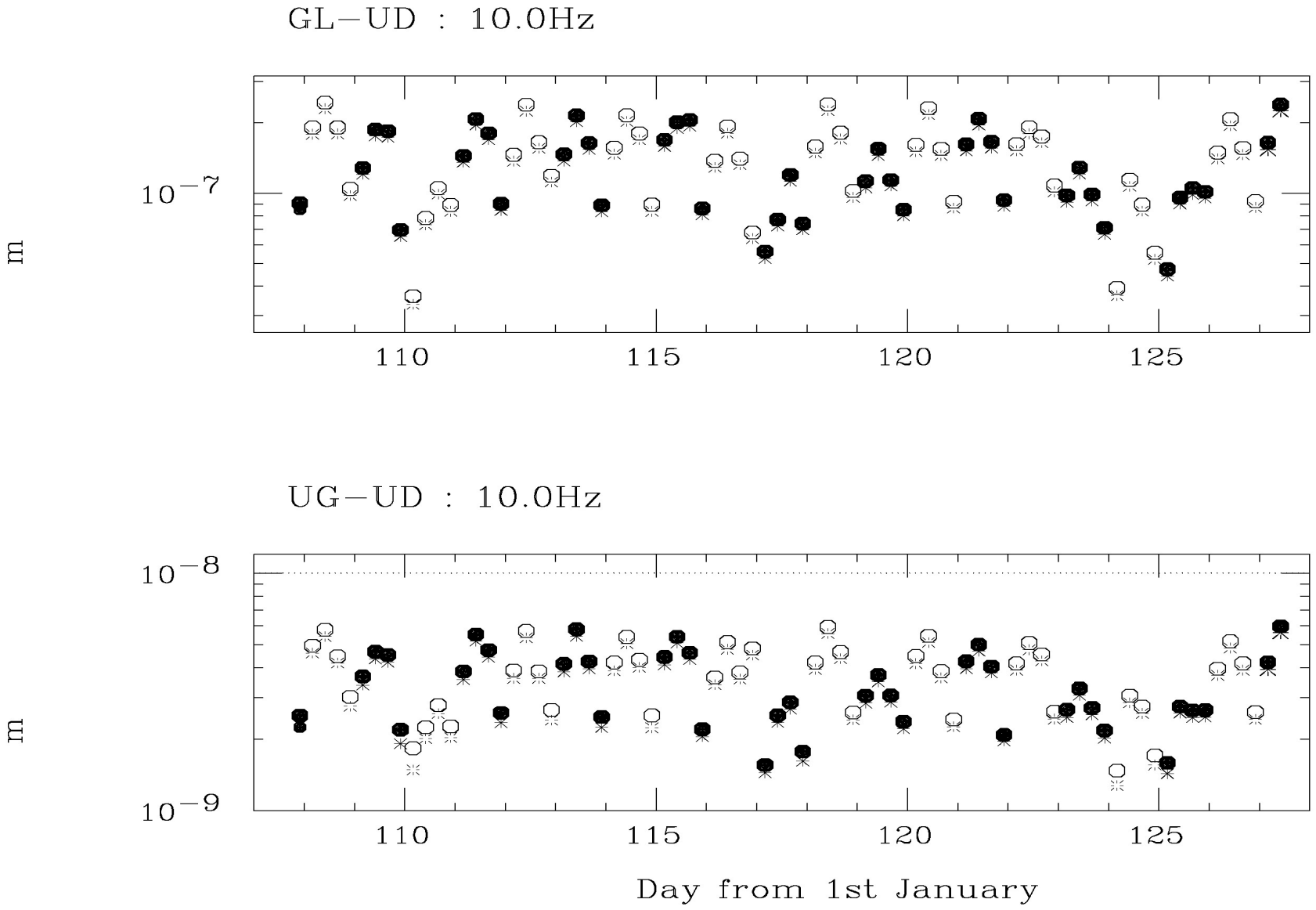


Band Pass Filter: 0.3< f < 0.4 Hz



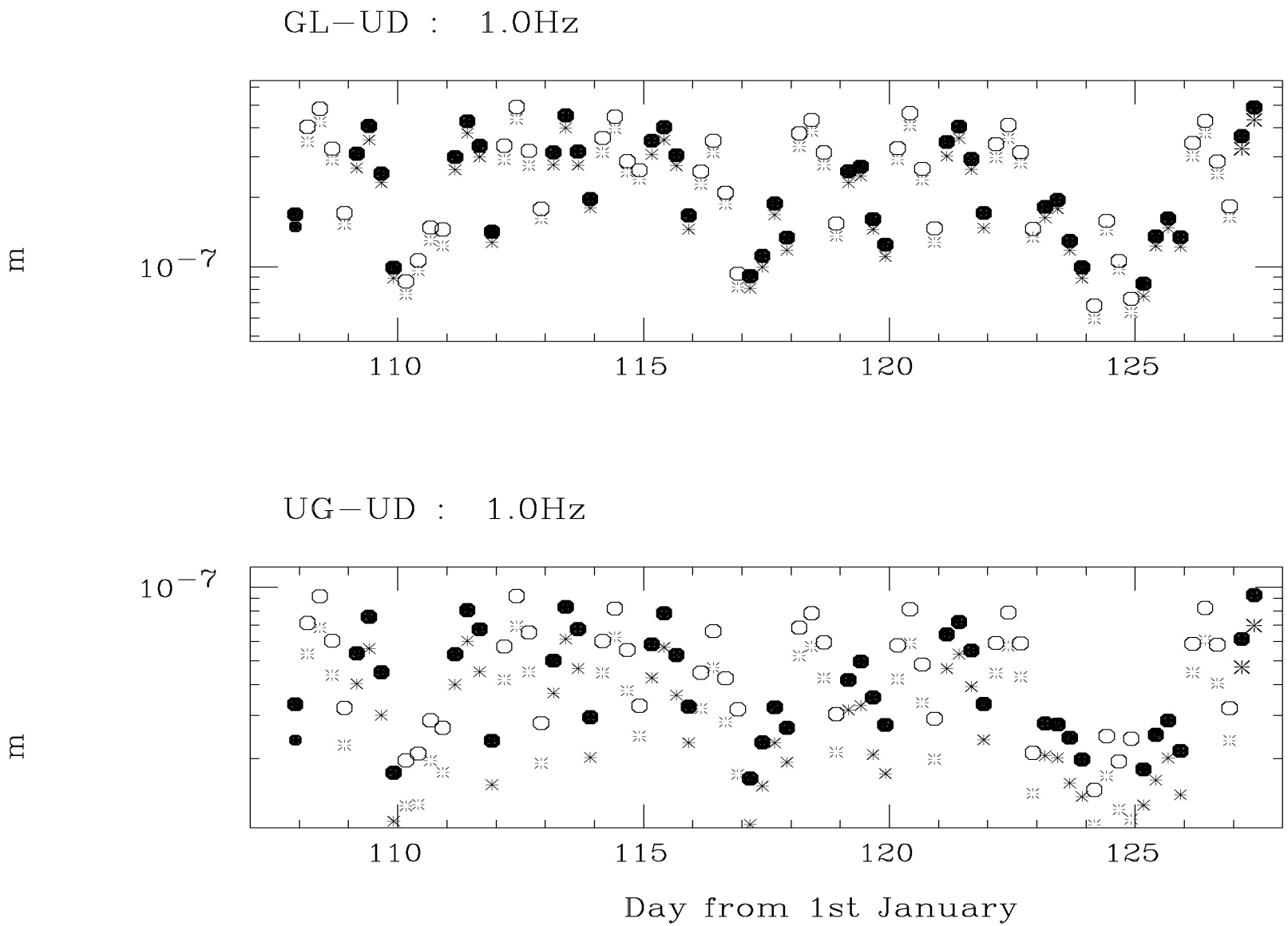
UD:Integrated Amplitude at f>10Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



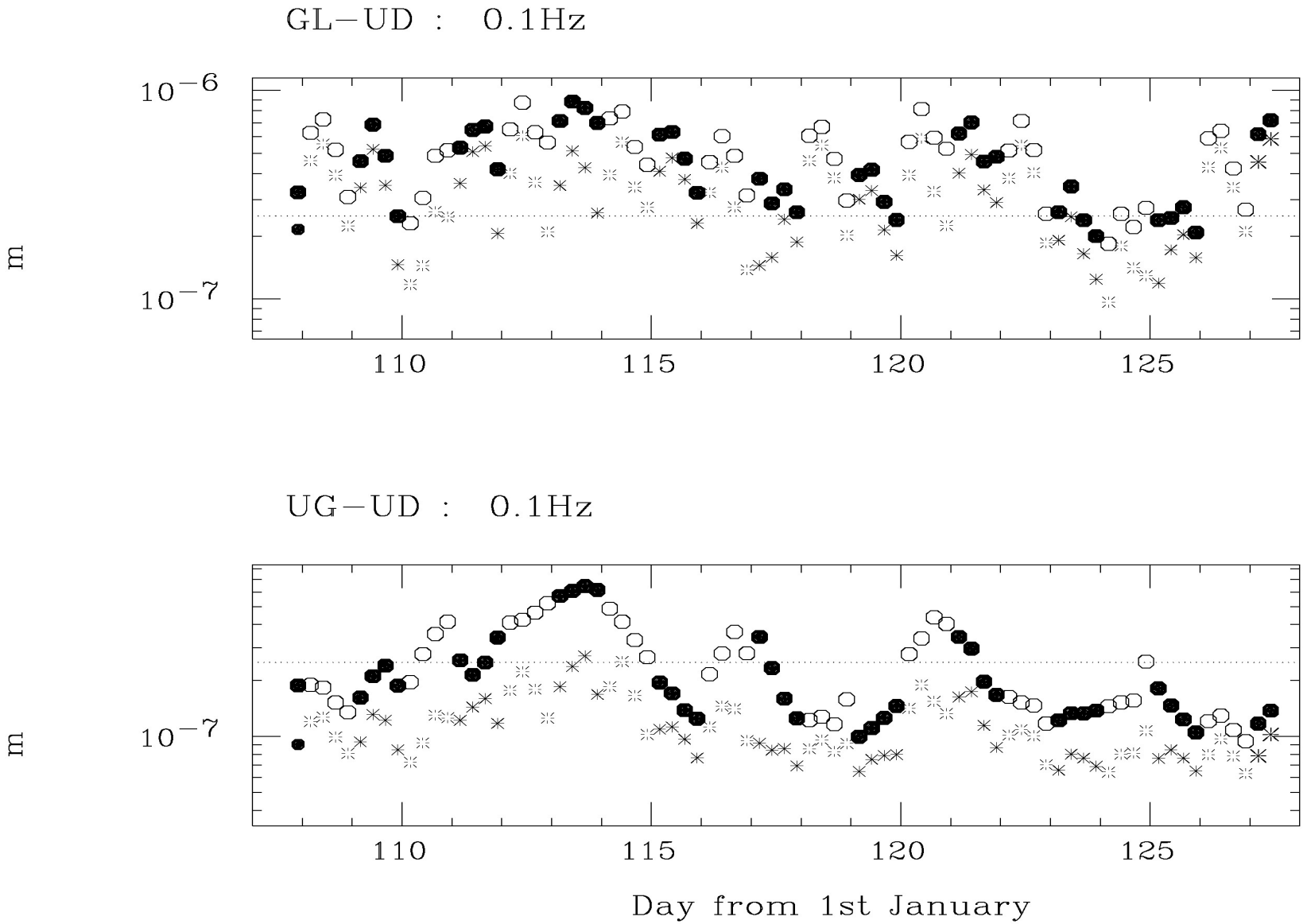
UD:Integrated Amplitude at f>1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



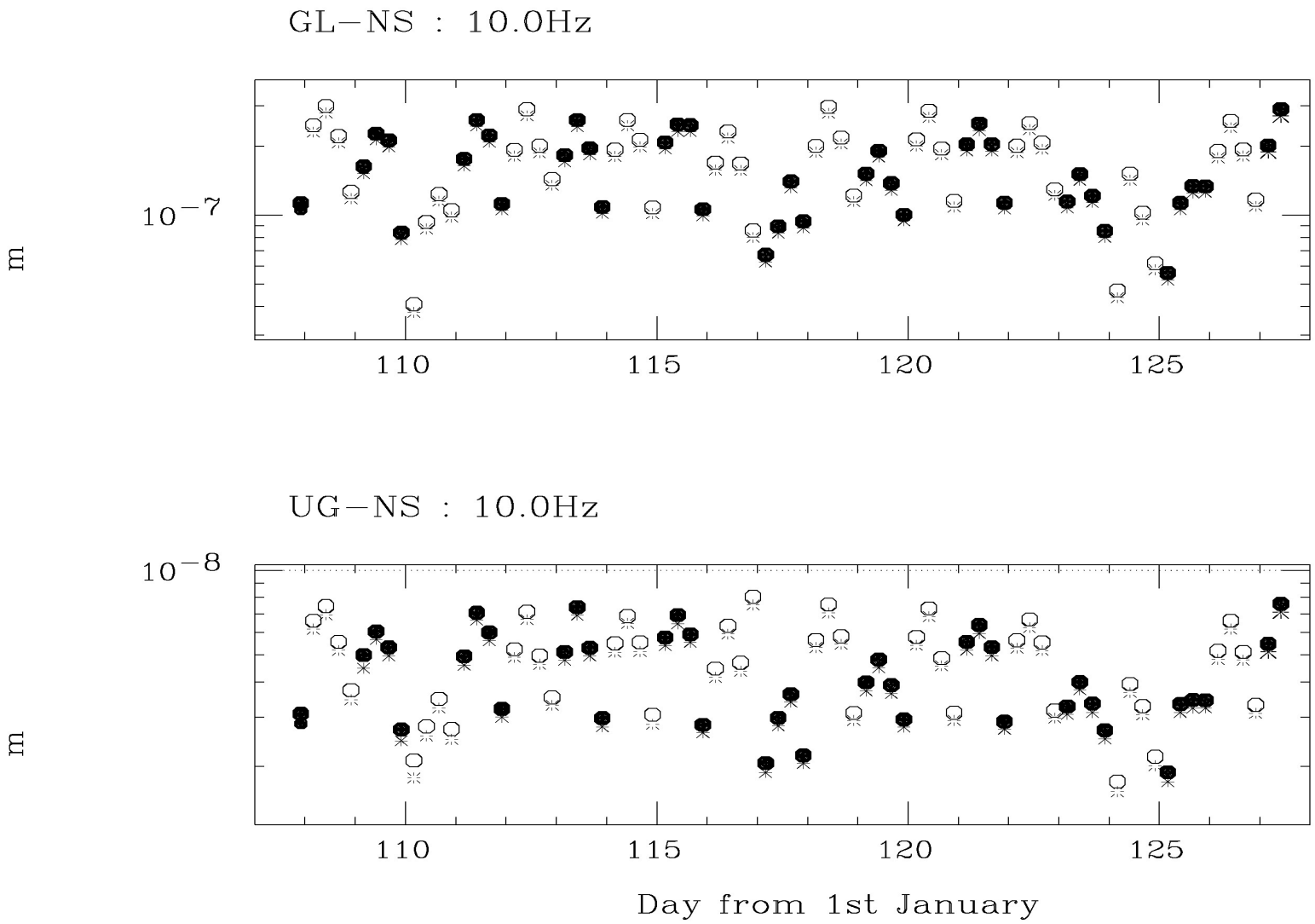
UD:Integrated Amplitude at f>0.1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



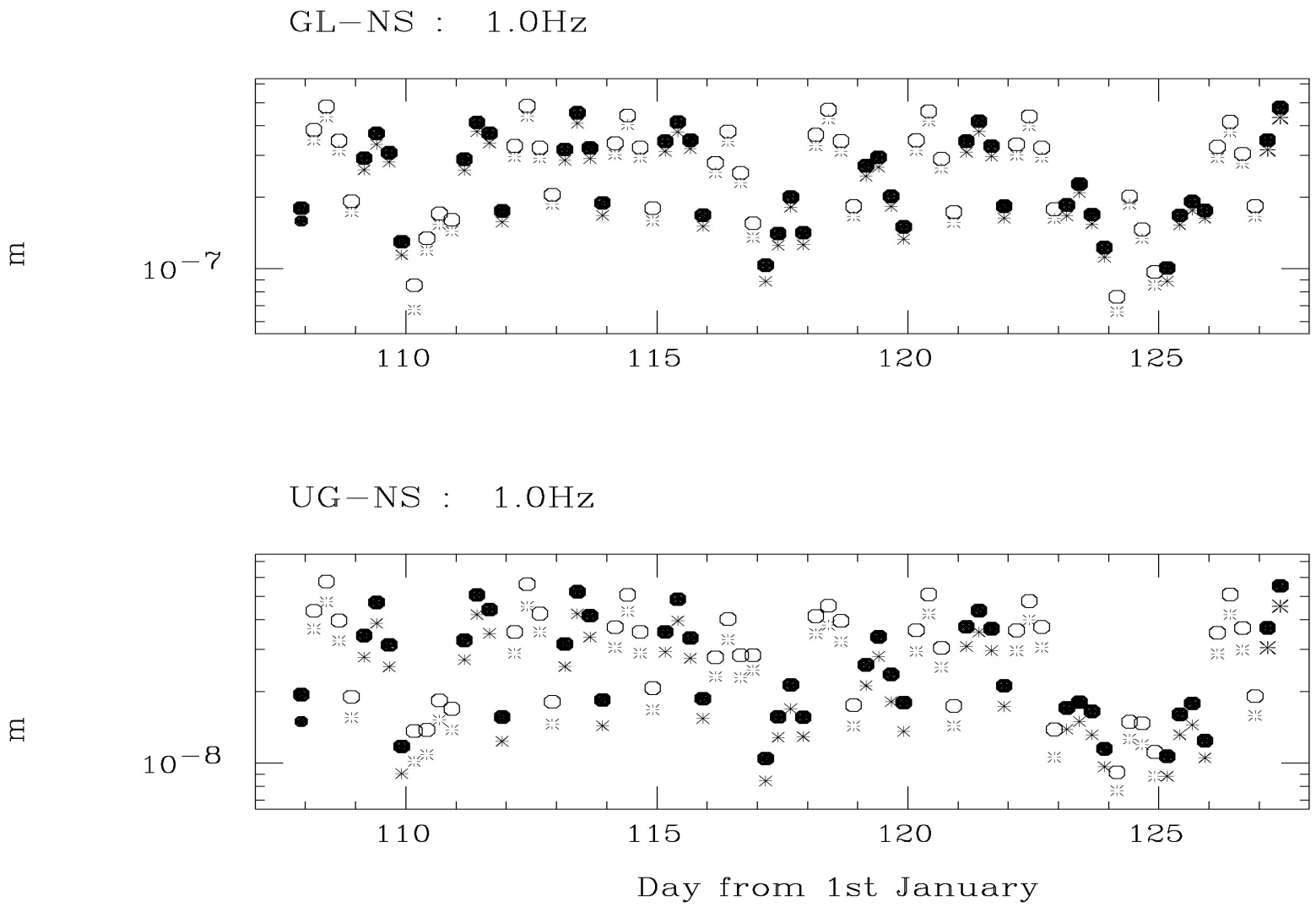
NS:Integrated Amplitude at f>10Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



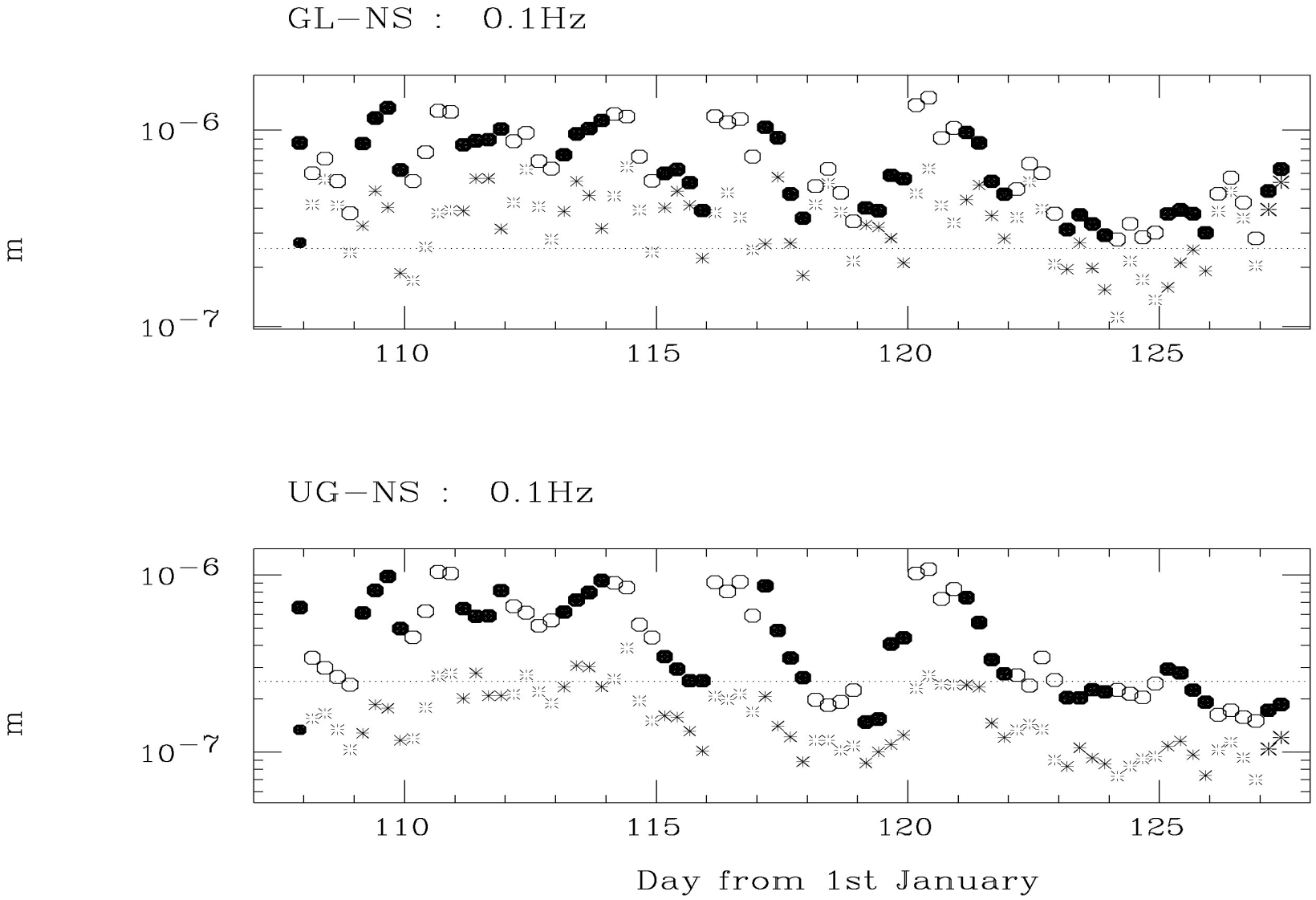
NS:Integrated Amplitude at f>1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



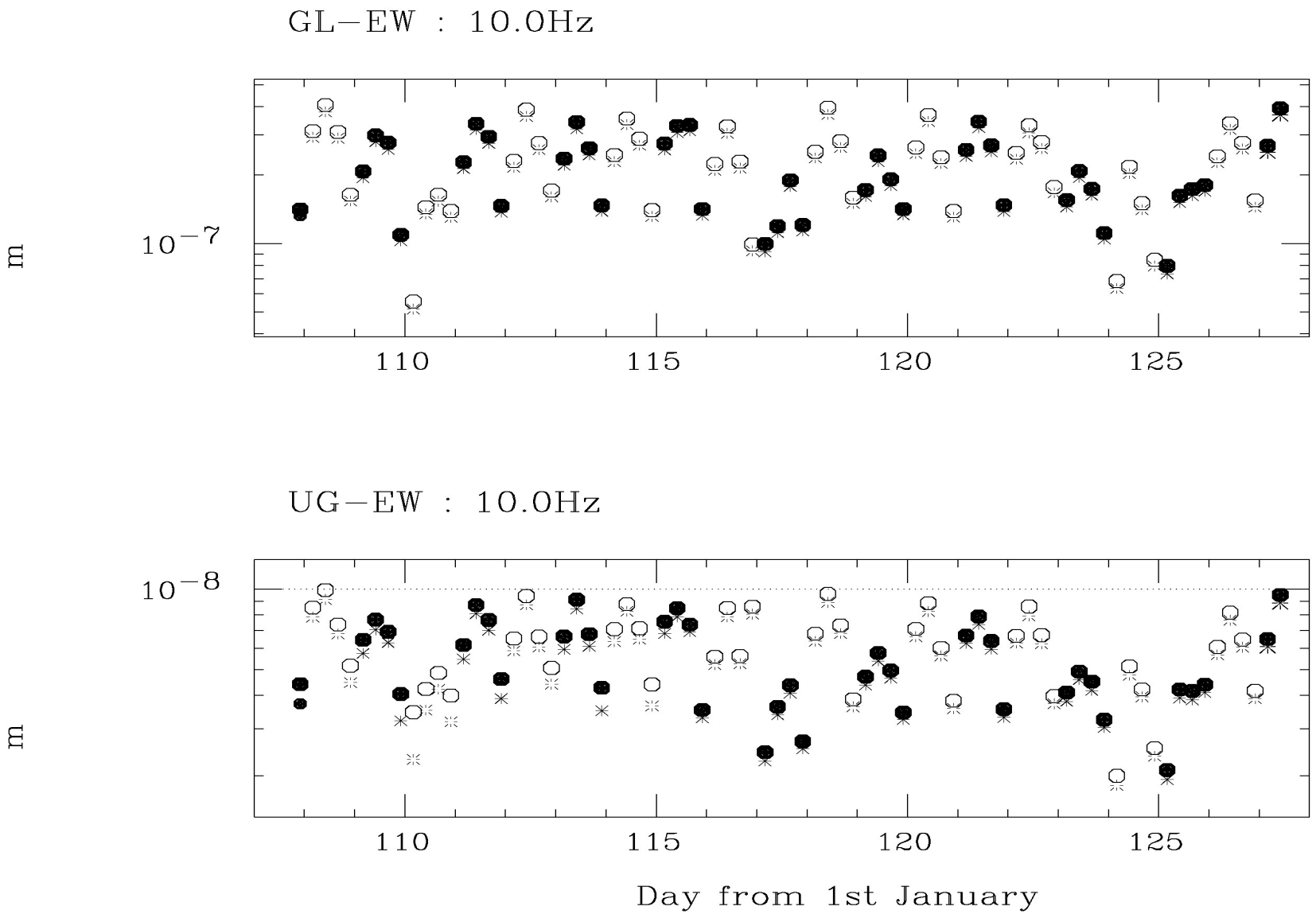
NS:Integrated Amplitude at f>0.1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



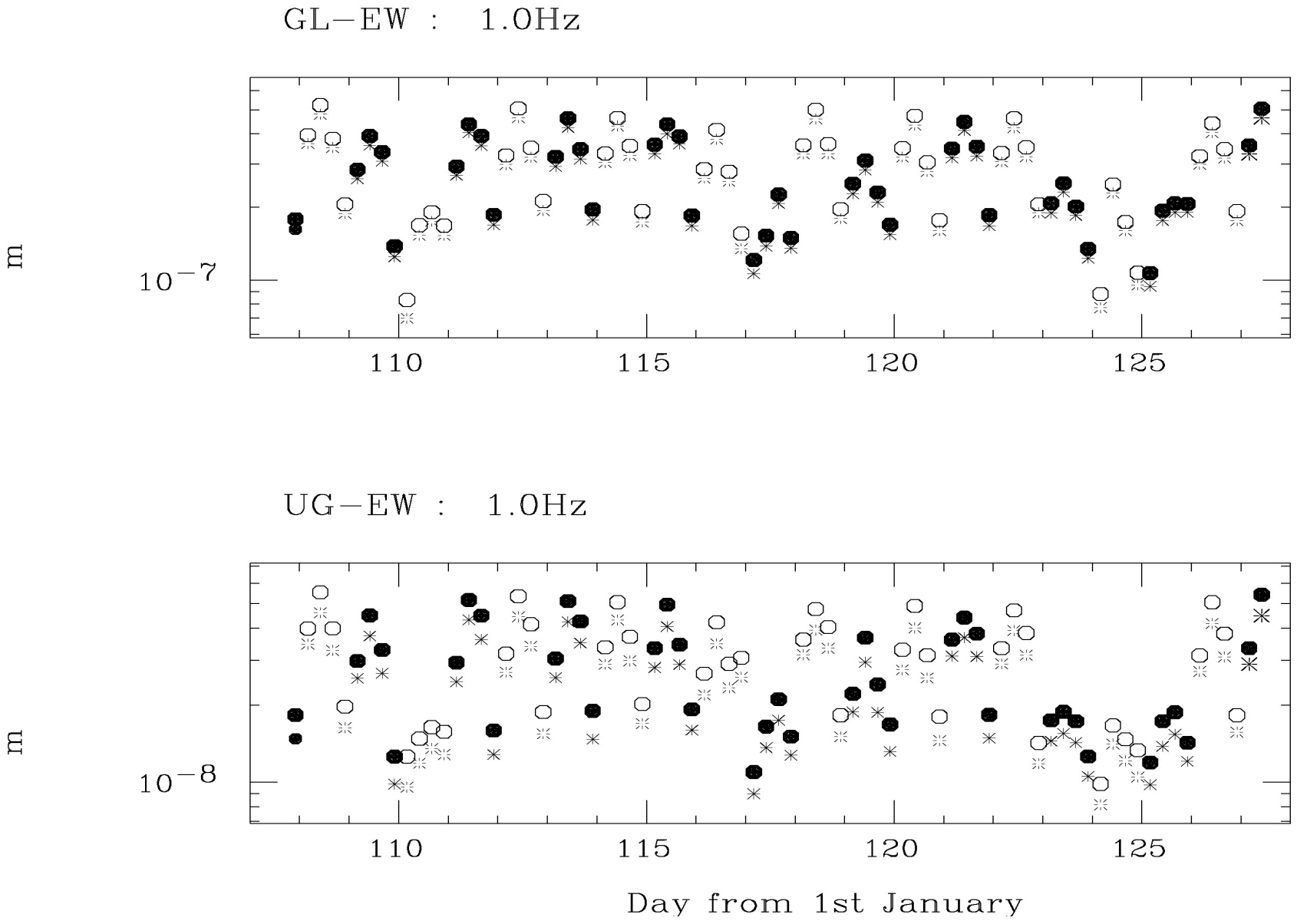
EW:Integrated Amplitude at f>10Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



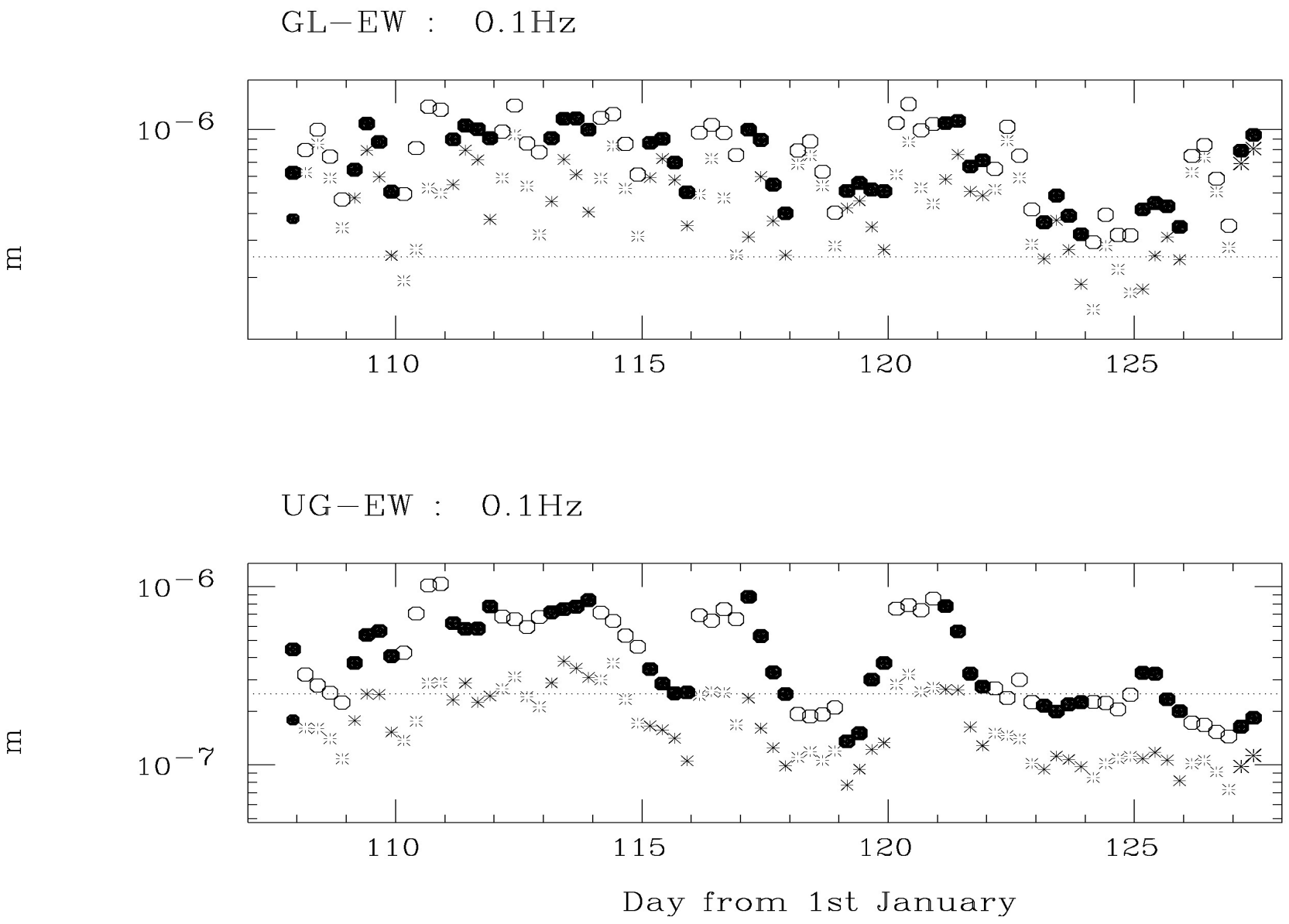
EW:Integrated Amplitude at f>1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



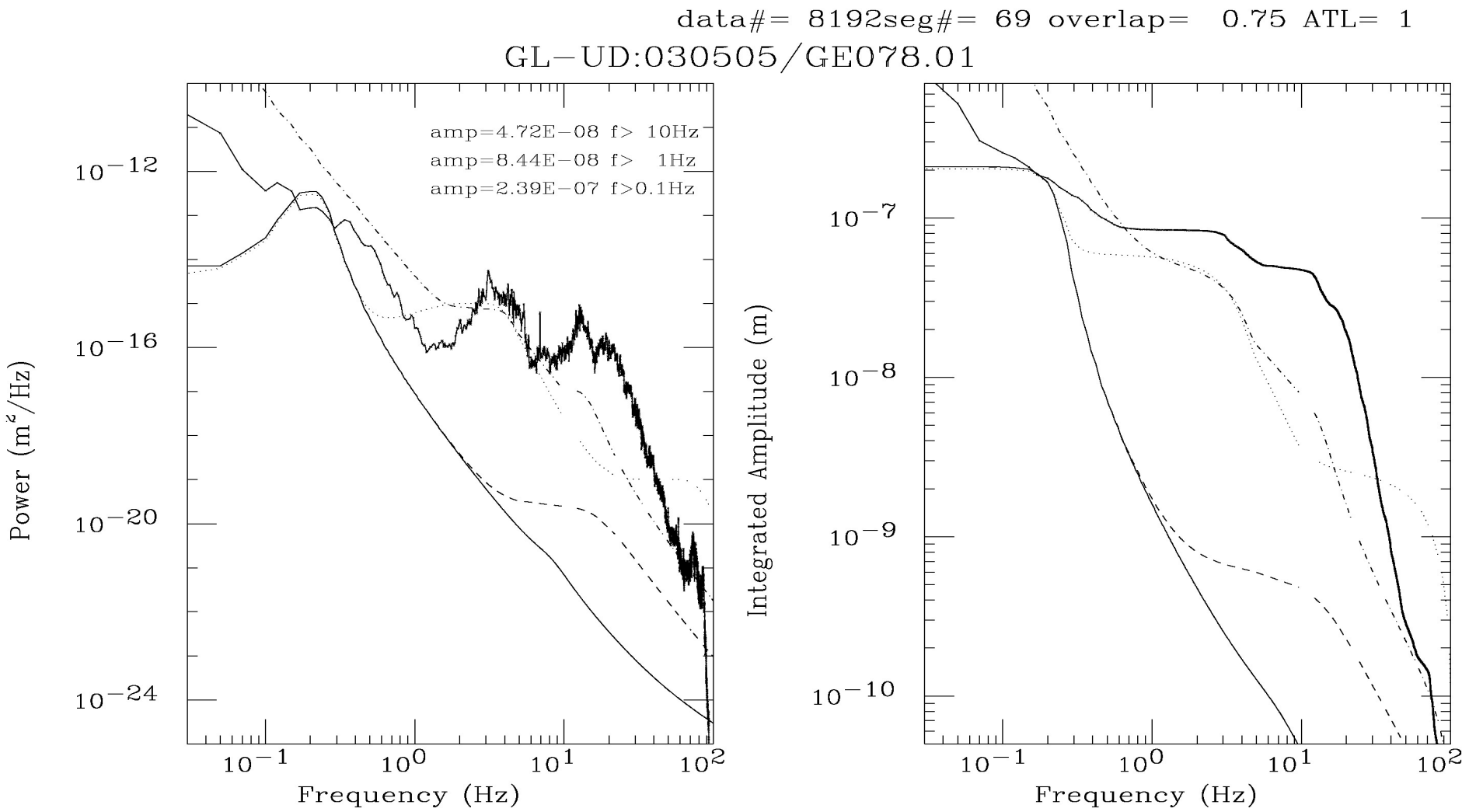
EW:Integrated Amplitude at f>0.1Hz

for 2003.4.17,10pm ~ 2003.5.7,10am



GM Models of A,B,C and -36m

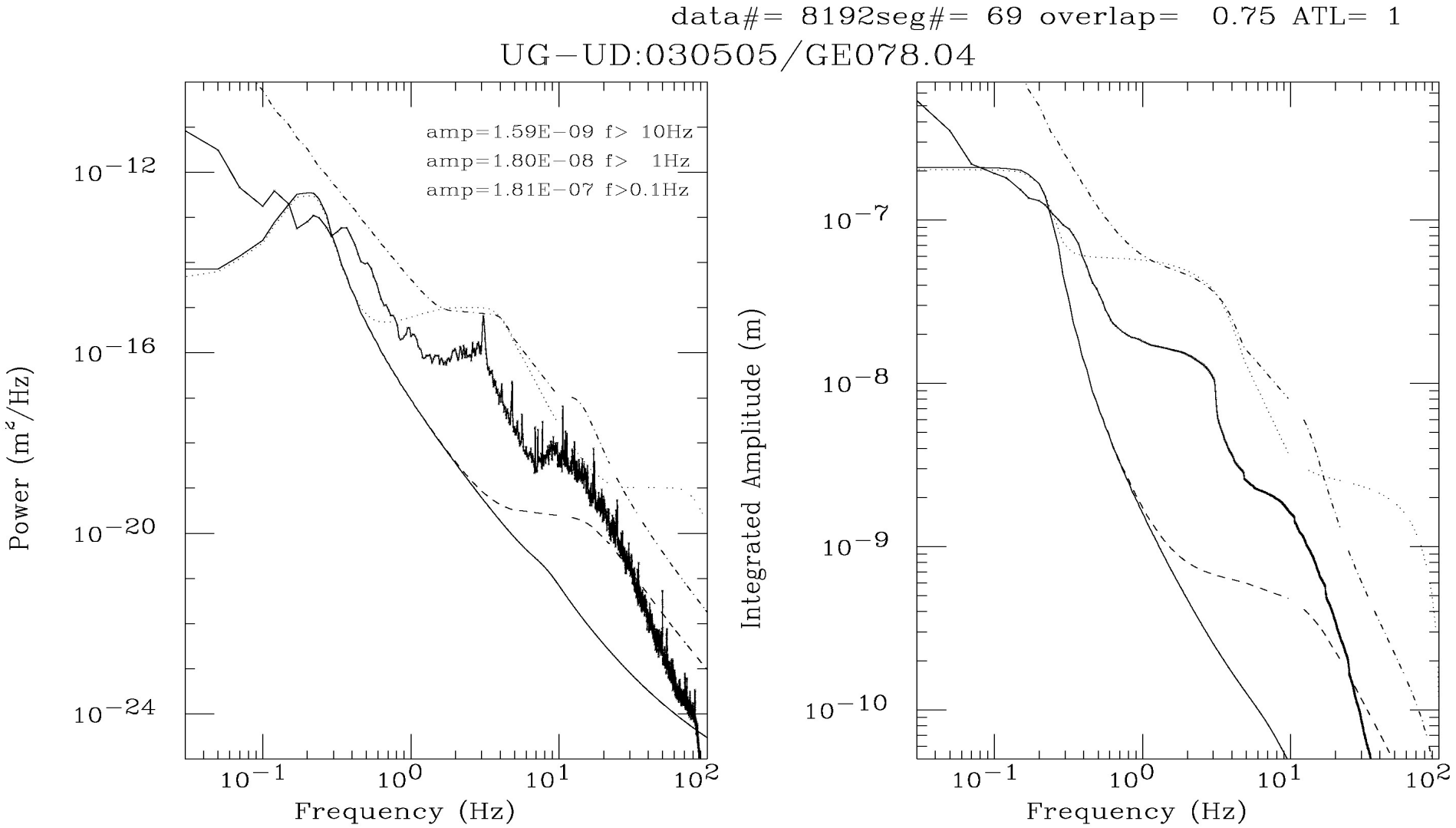
2003.5.5, 4am



GM Model A:10,1,0.1Hz= 4.5E-11 1.6E-09 2.1E-07
GM Model B:10,1,0.1Hz= 4.7E-10 1.7E-09 2.1E-07
GM Model C:10,1,0.1Hz= 3.6E-09 5.7E-08 2.0E-07
Konoike36m:10,1,0.1Hz= 7.8E-09 6.1E-08 1.1E-06

GM Models of A,B,C and -36m

2003.5.5, 4am



GM Model A:10,1,0.1Hz= 4.5E−11 1.6E−09 2.1E−07
GM Model B:10,1,0.1Hz= 4.7E−10 1.7E−09 2.1E−07
GM Model C:10,1,0.1Hz= 3.6E−09 5.7E−08 2.0E−07
Konoike36m:10,1,0.1Hz= 7.8E−09 6.1E−08 1.1E−06