

Floor Movement Measurement at ATF Ring

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Measured on October 31, 2006

oor movement was measured at the ATF ring on October 31, 2000
using two STS-2 seismometers of Streckeisen.

pec. of STS-2

Range in frequency

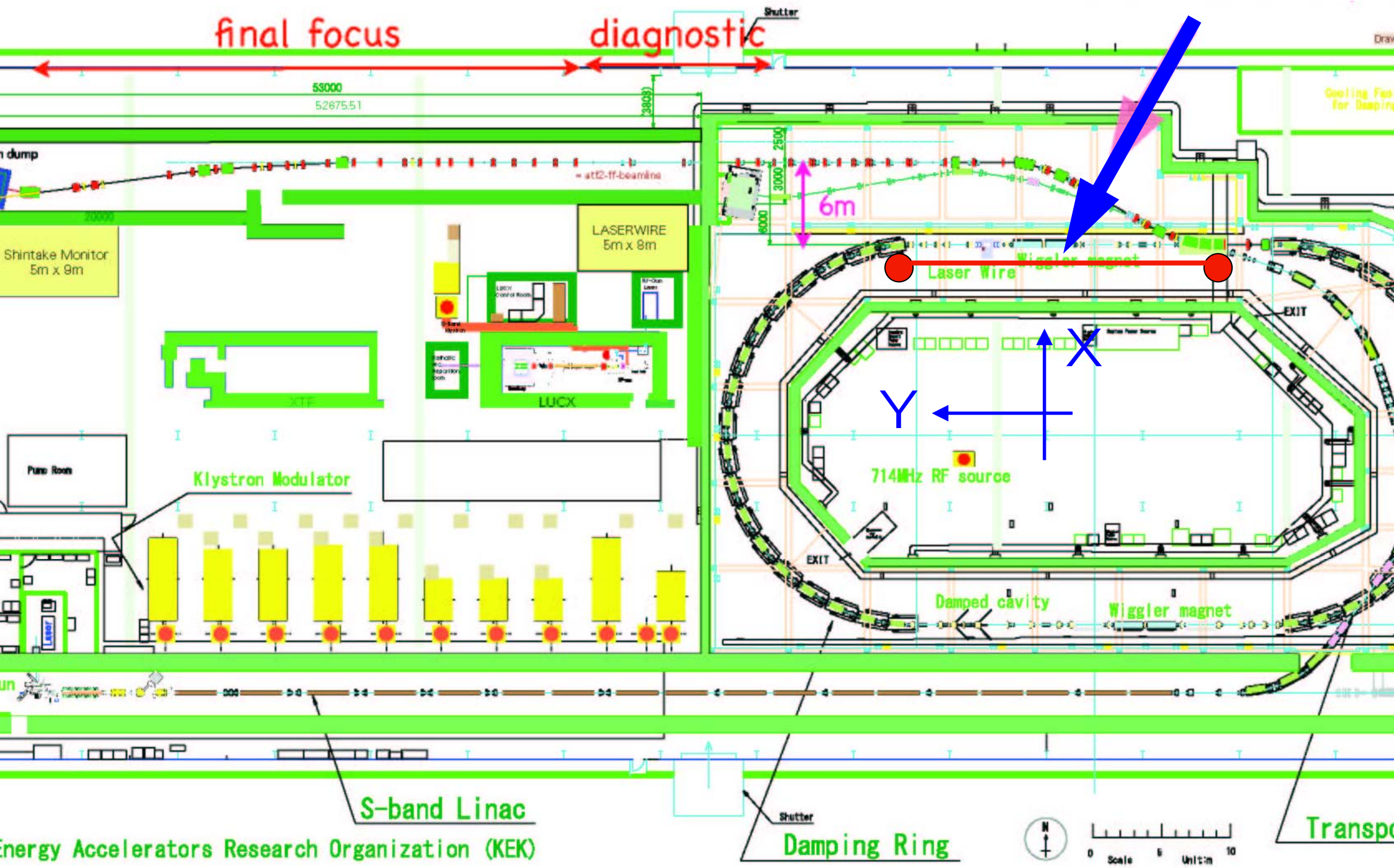
0.008 – 50 Hz

Sensitivity

15 V/kine
(* kine = cm/sec)



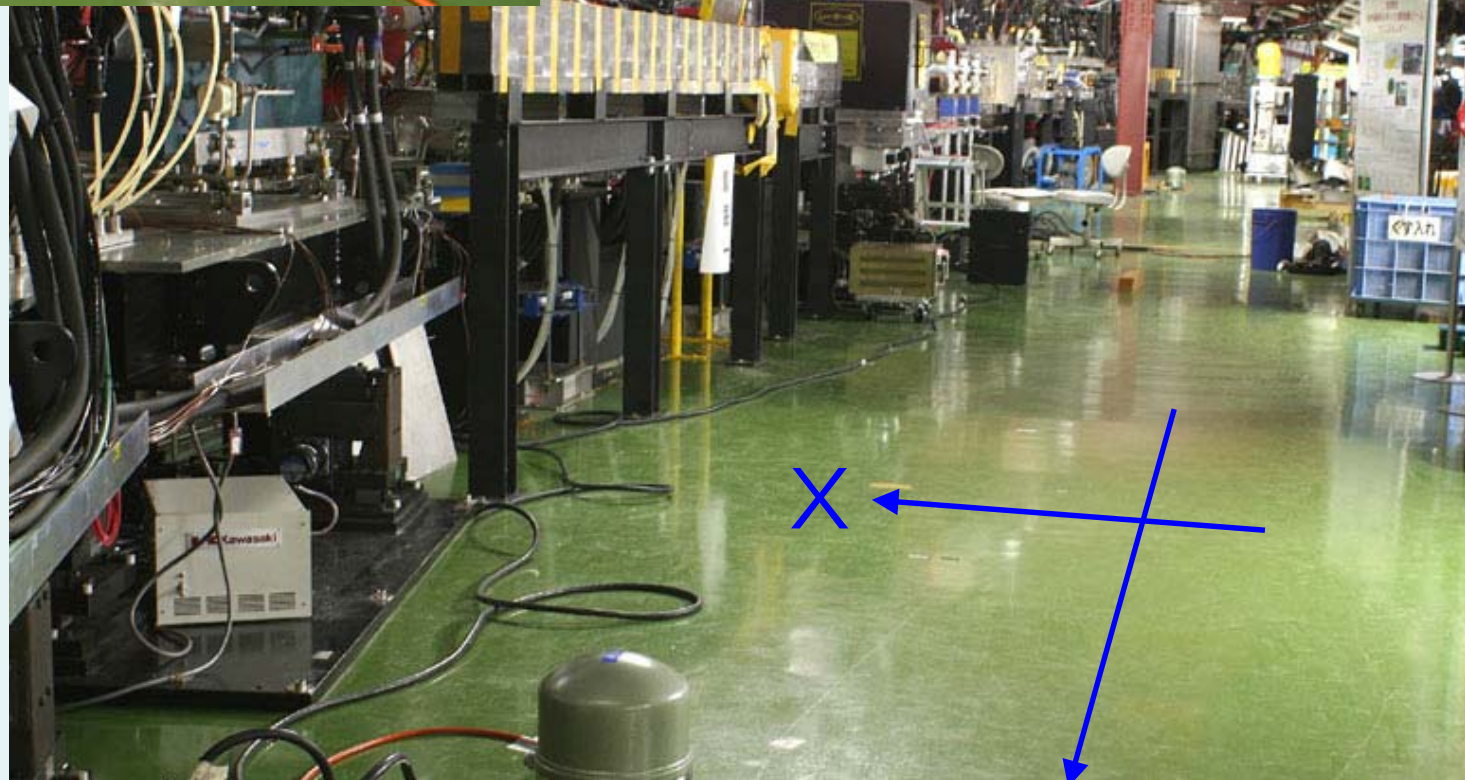
Measurement Area
(Max. L w/o exp. joint ~ 20m)



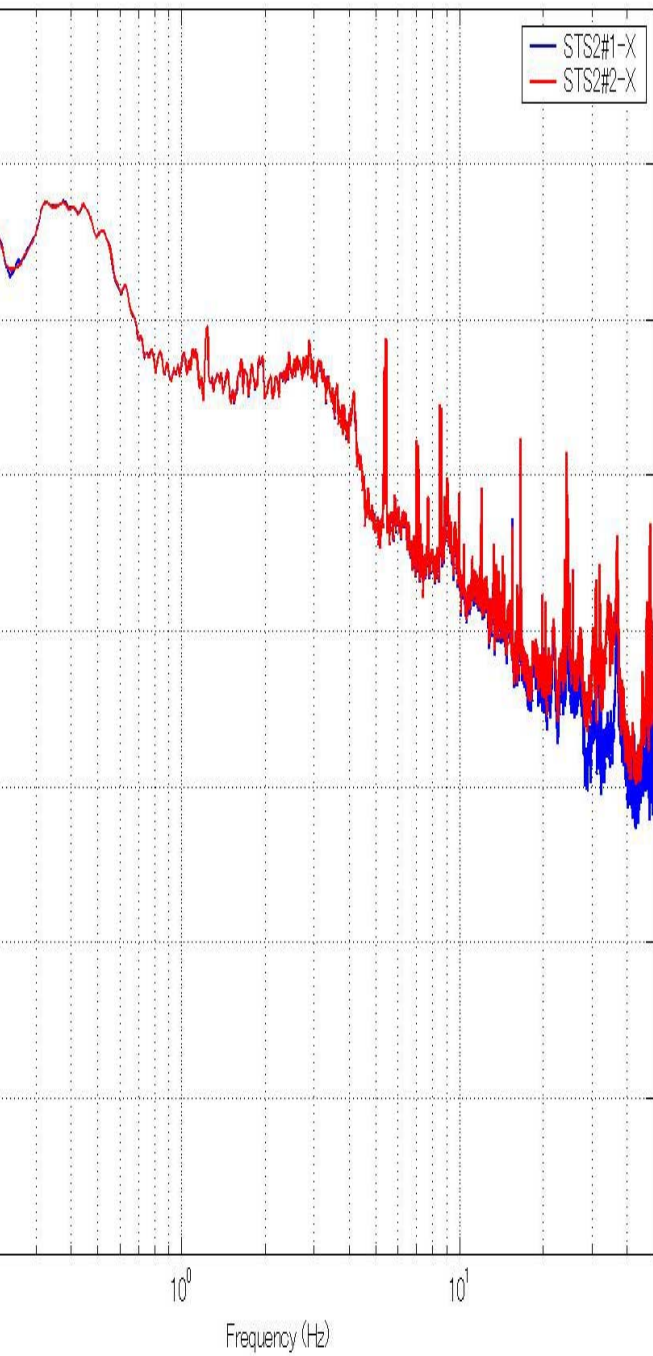


at ATF Ring

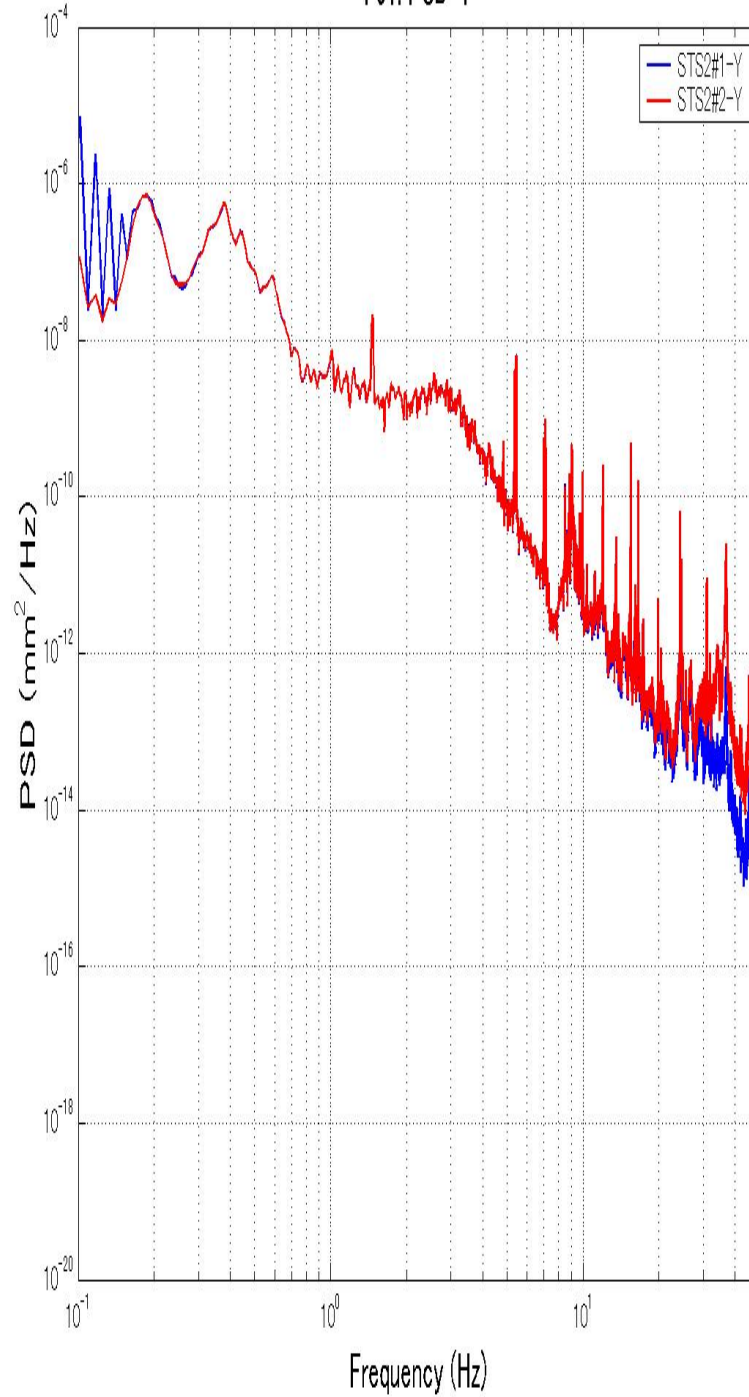
October 31, 2006



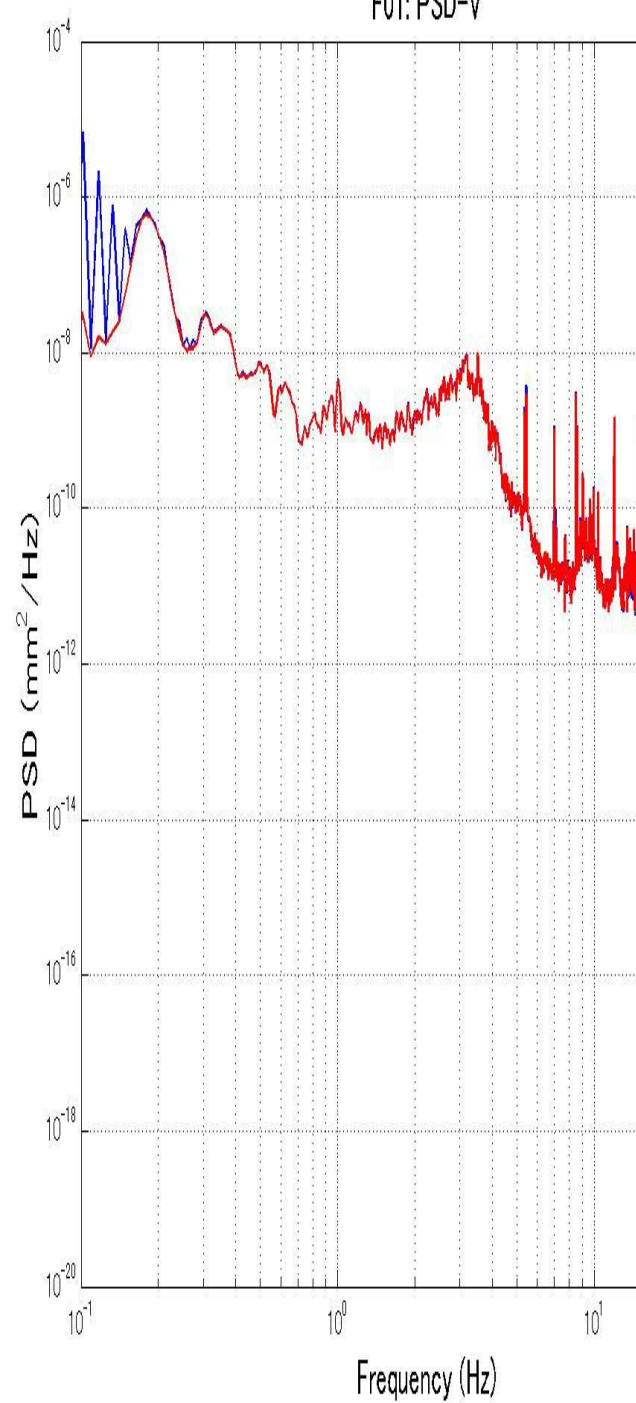
F01: PSD-X



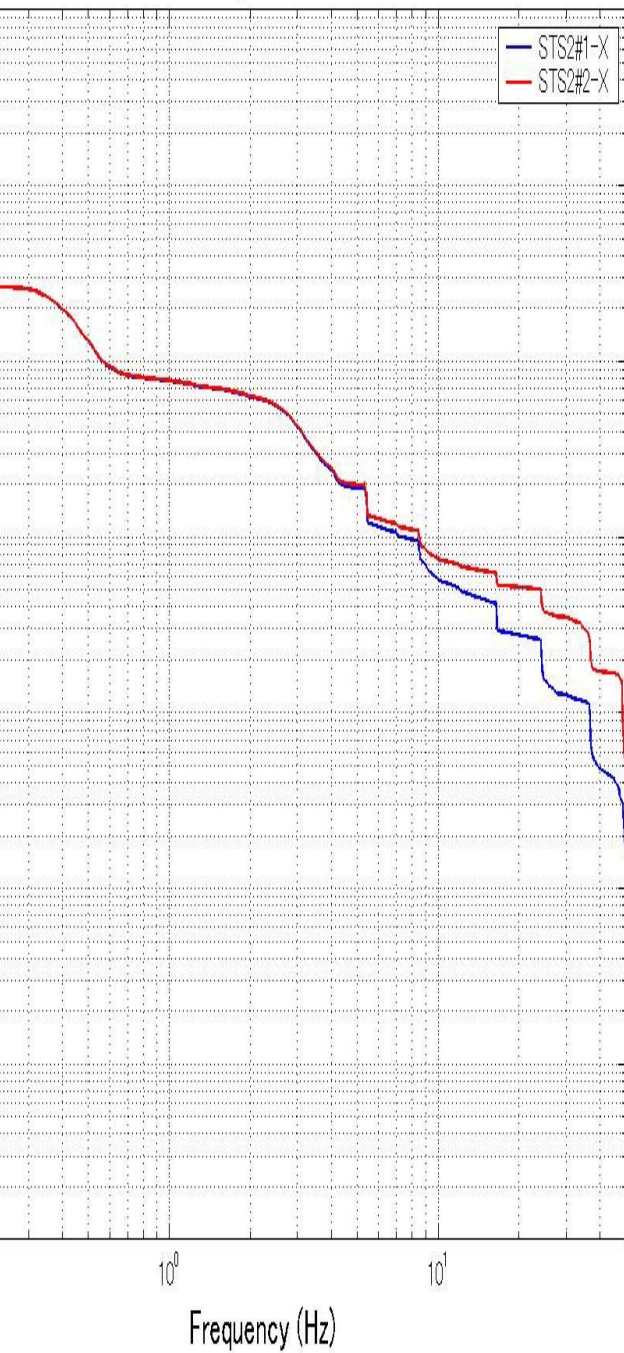
F01: PSD-Y



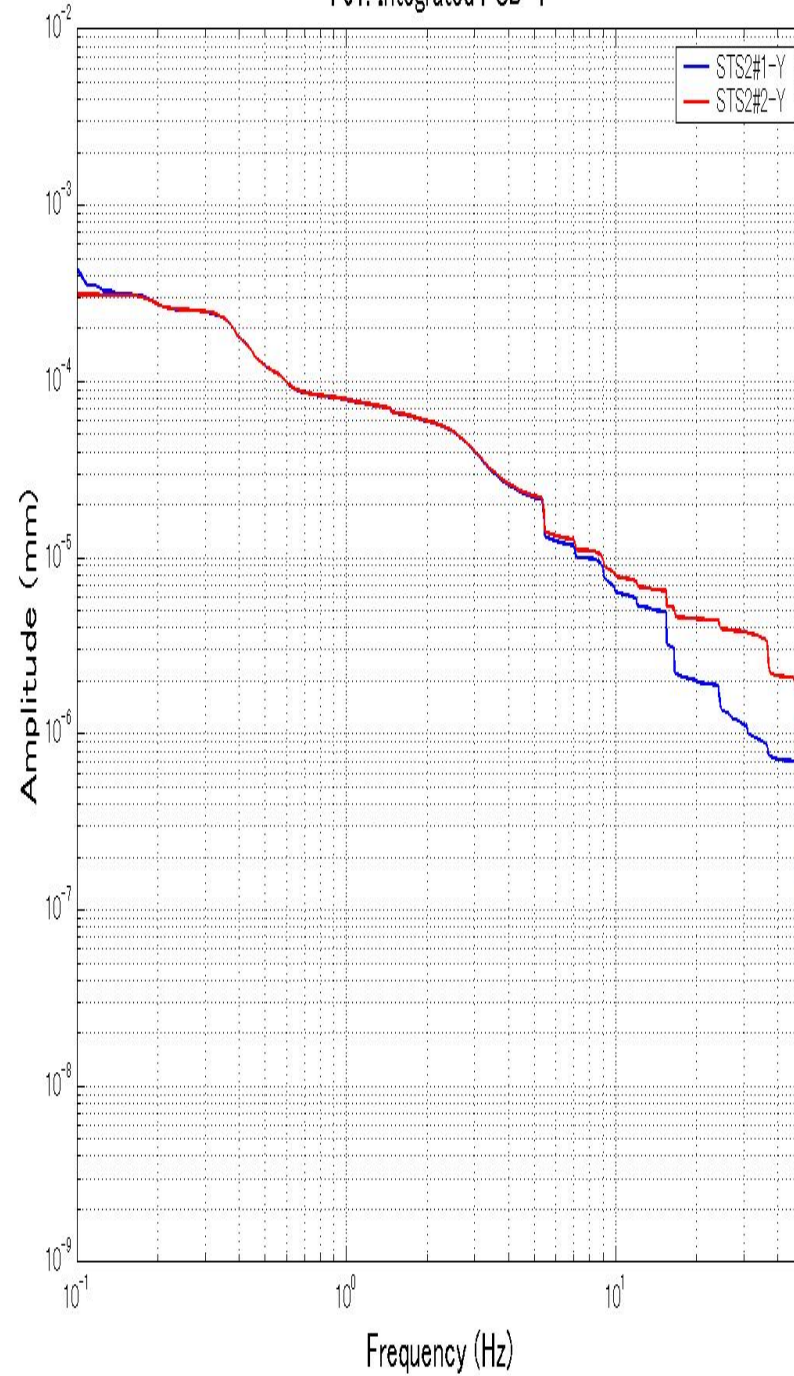
F01: PSD-V



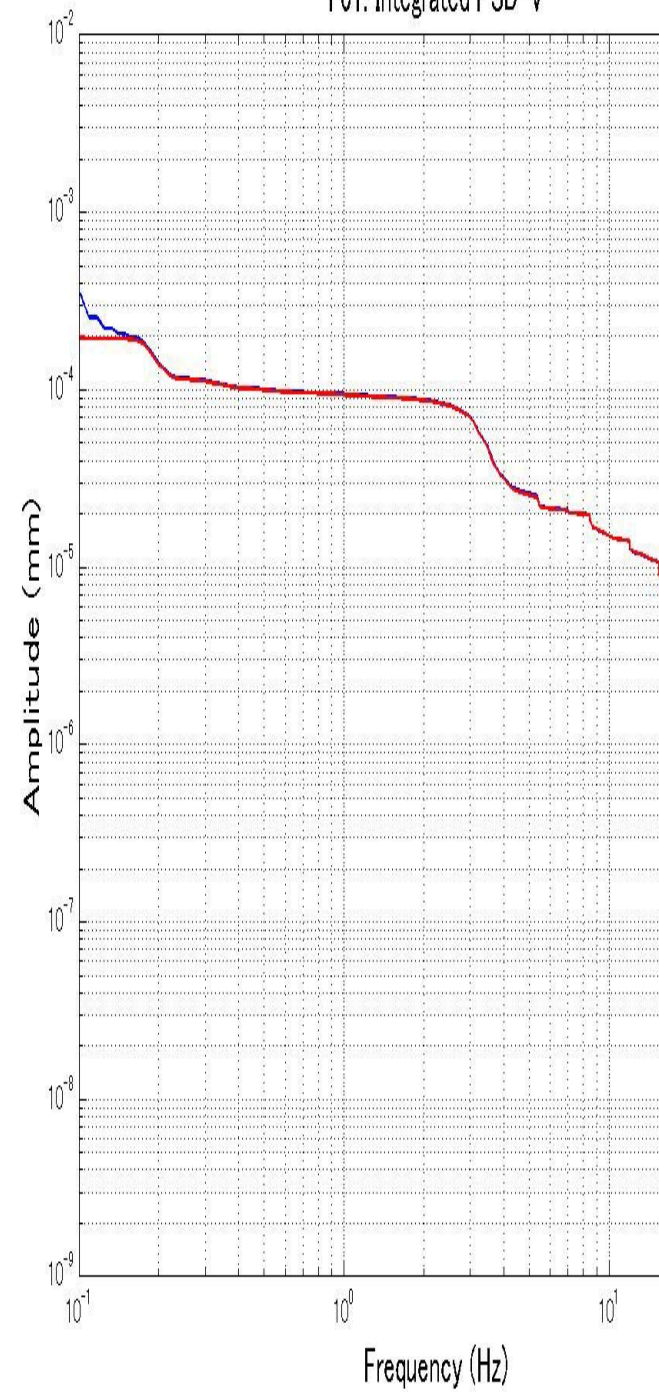
F01: Integrated PSD-X



F01: Integrated PSD-Y



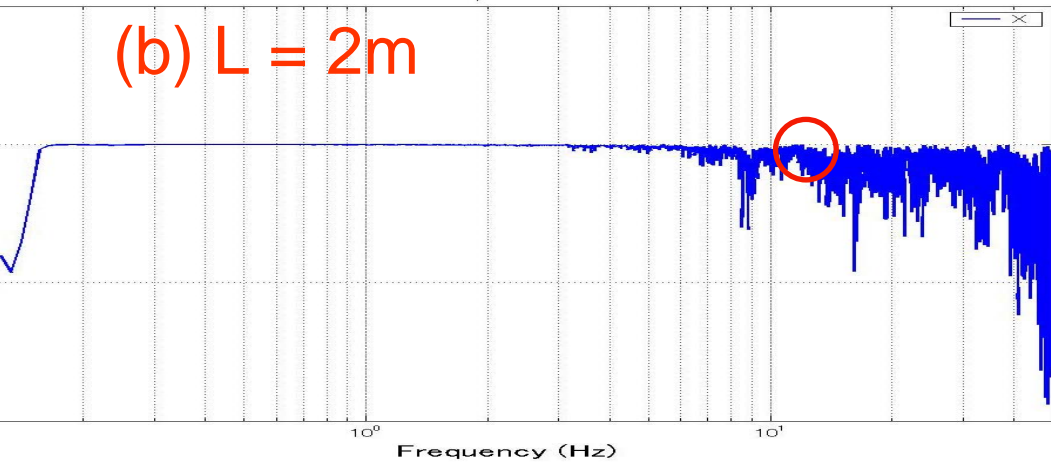
F01: Integrated PSD-V





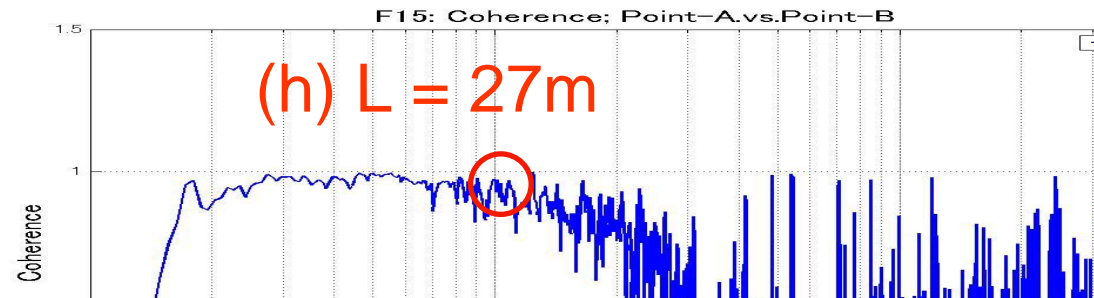
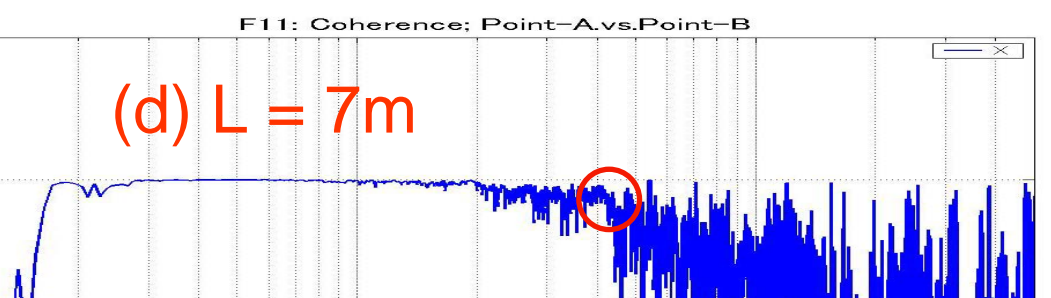
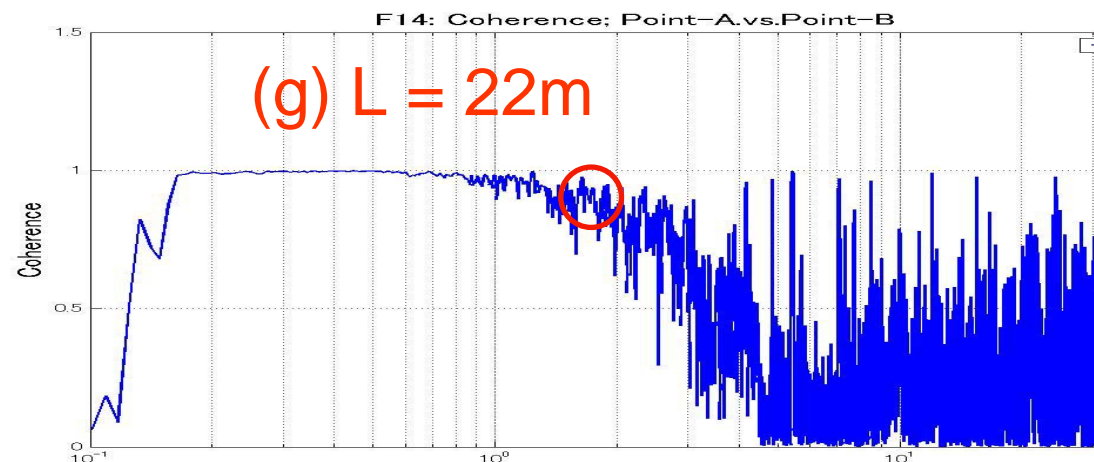
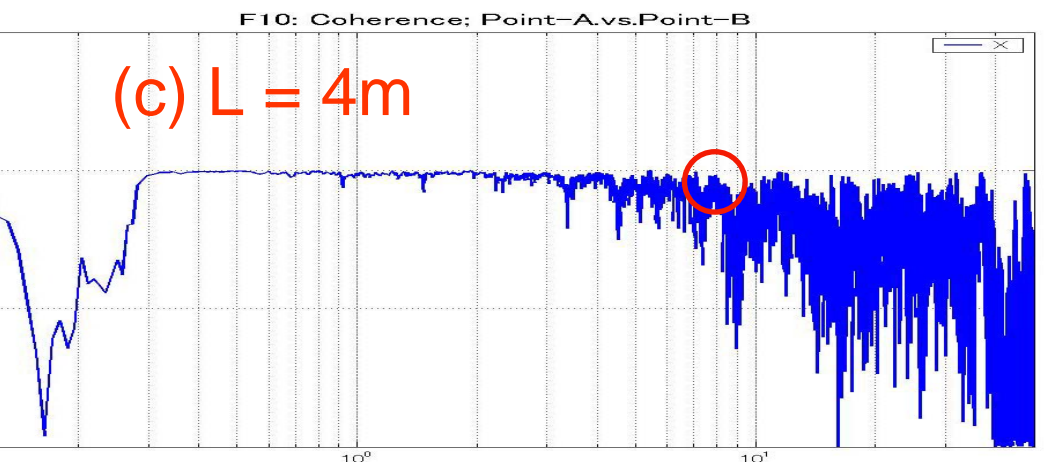
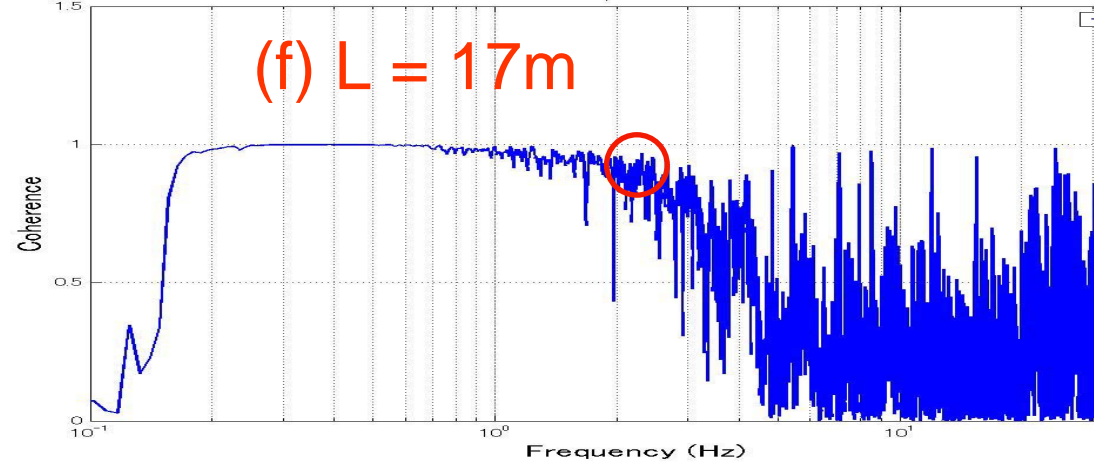
F09: Coherence; Point-A.vs.Point-B

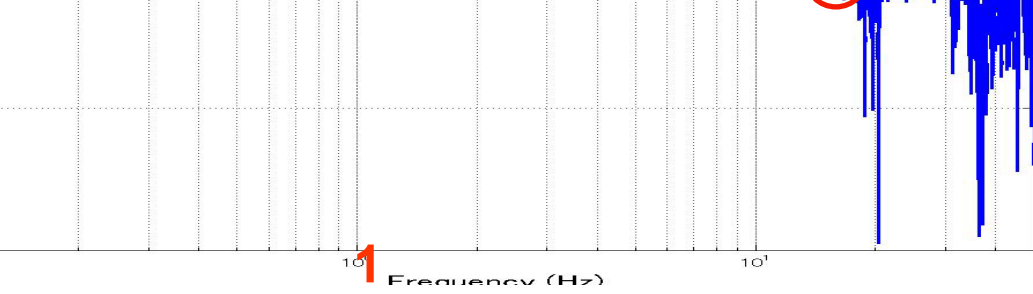
(b) $L = 2\text{m}$



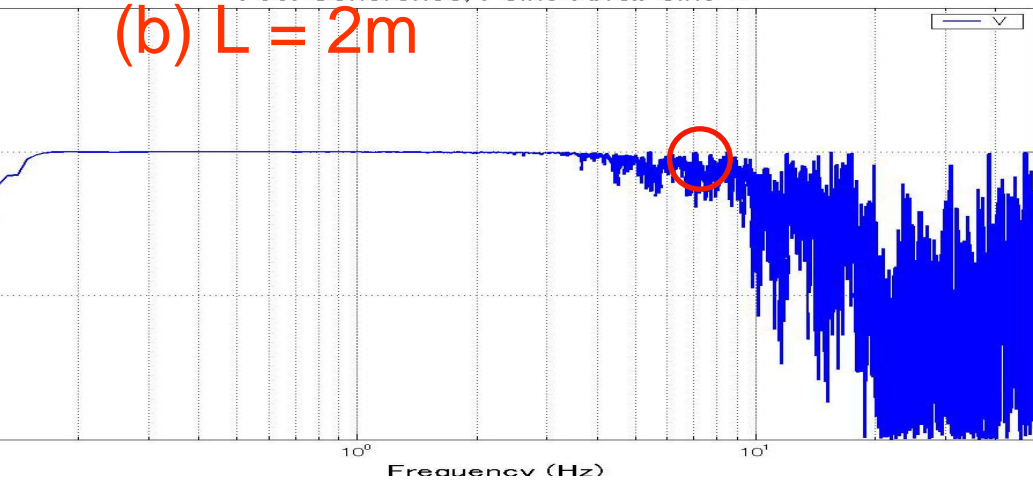
F13: Coherence; Point-A.vs.Point-B

(f) $L = 17\text{m}$

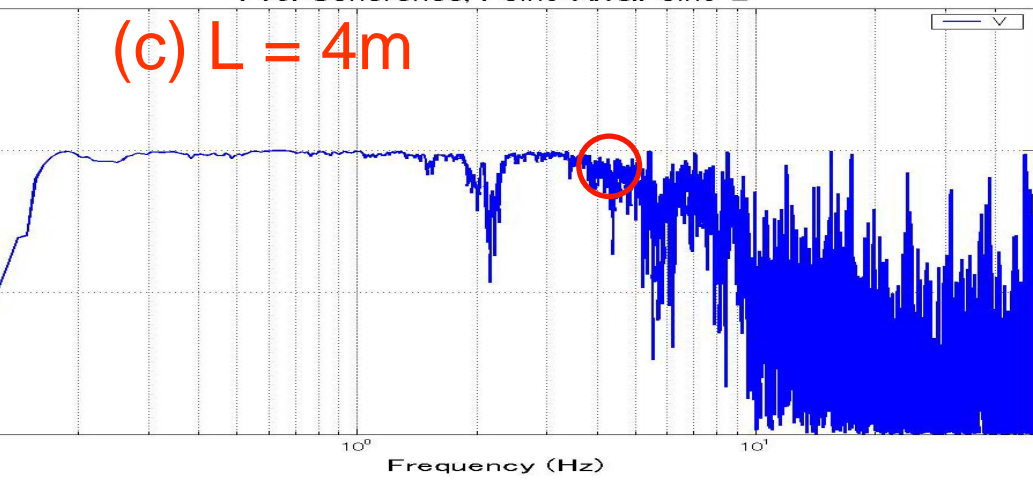




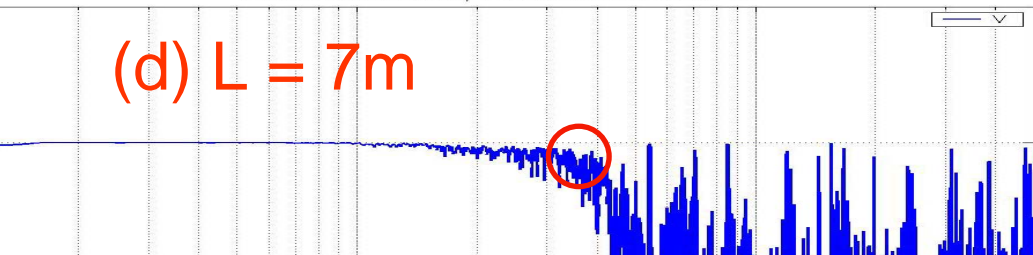
(b) $L = 2\text{m}$



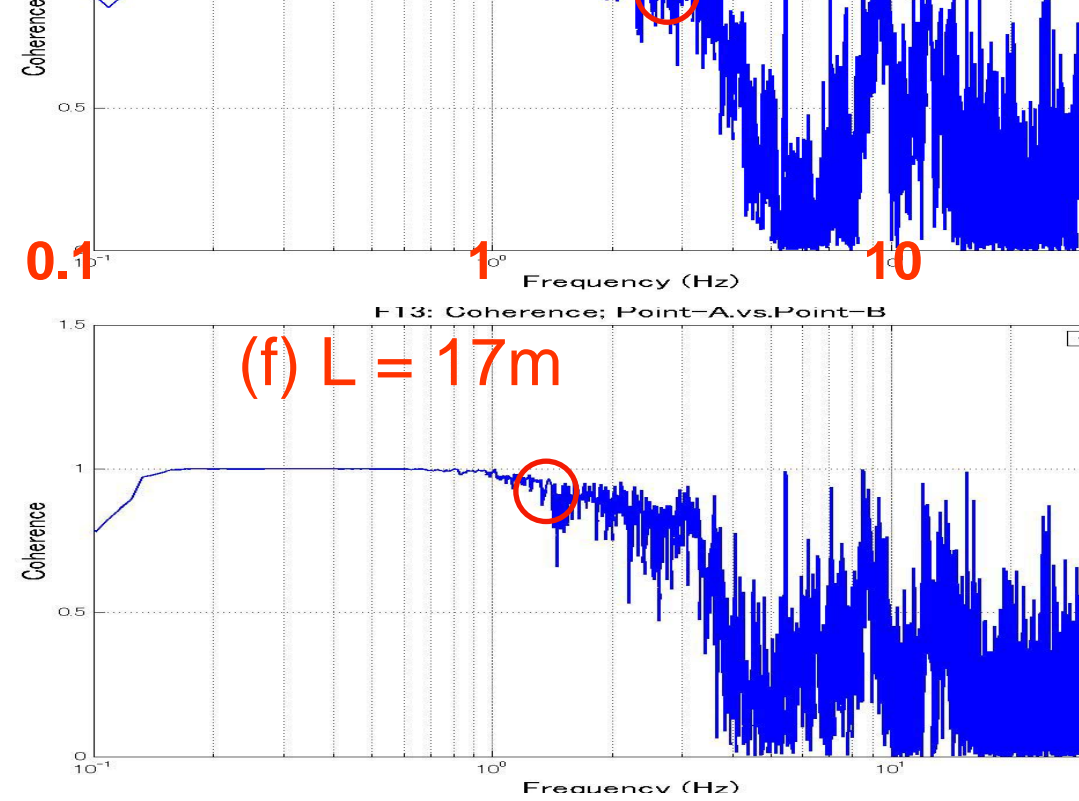
(c) $L = 4\text{m}$



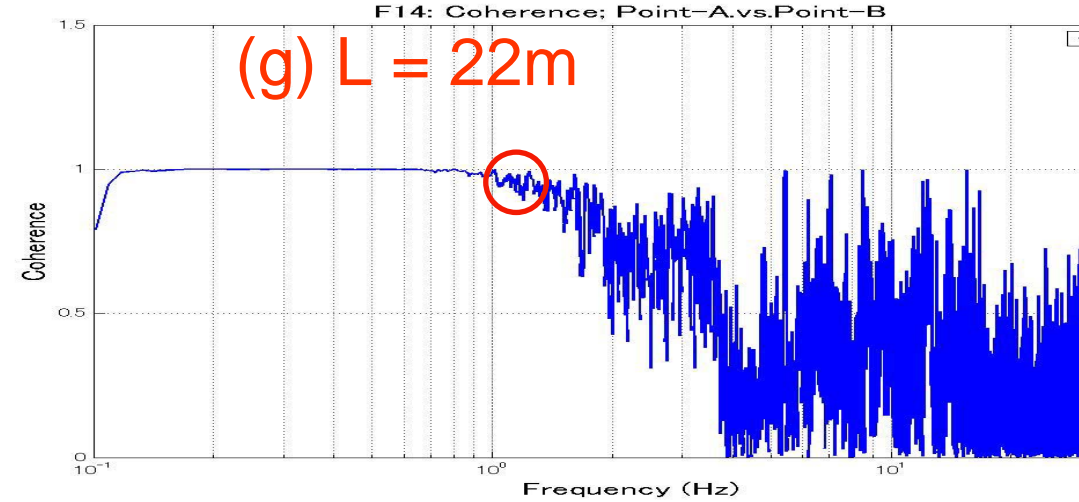
(d) $L = 7\text{m}$



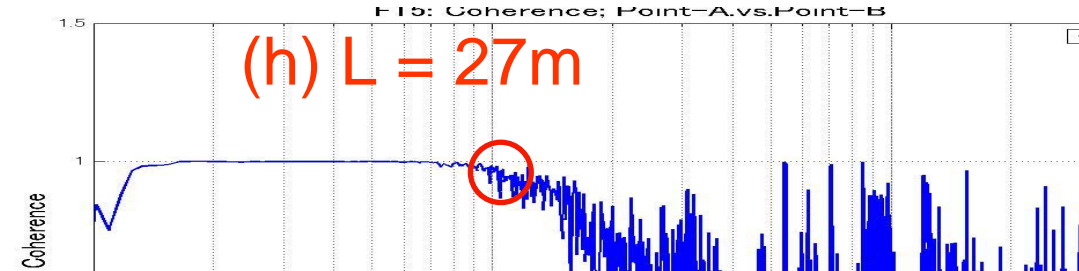
(f) $L = 17\text{m}$



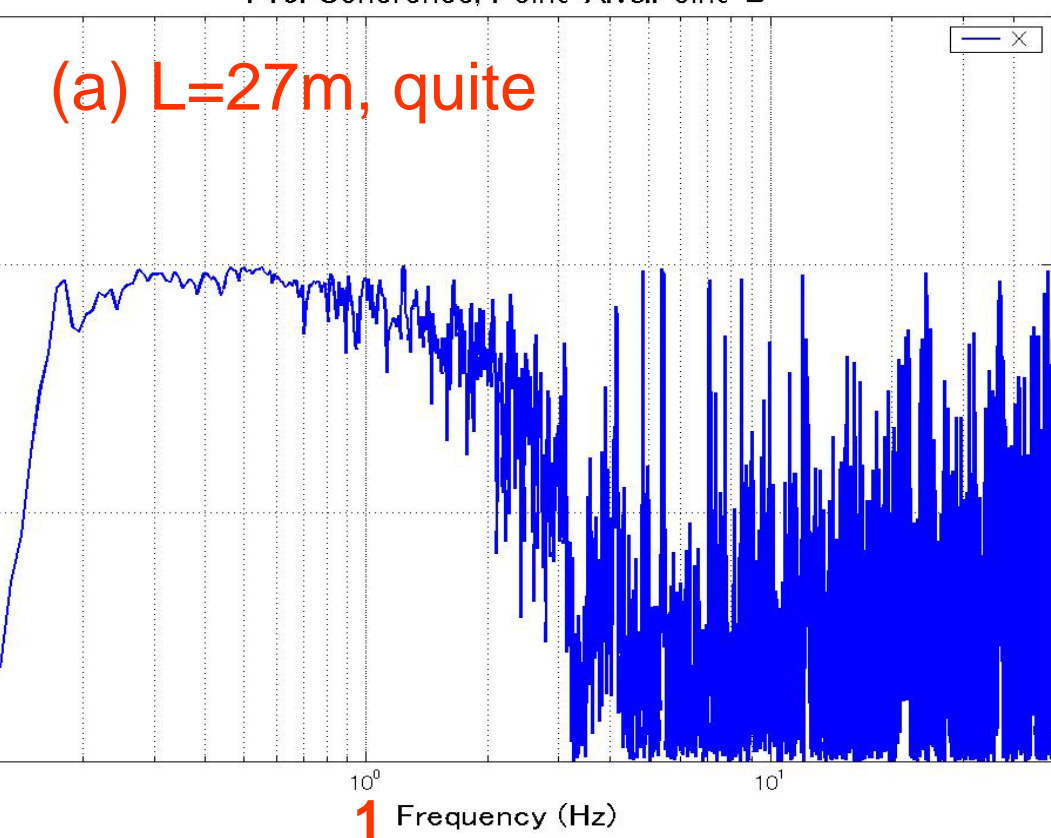
(g) $L = 22\text{m}$



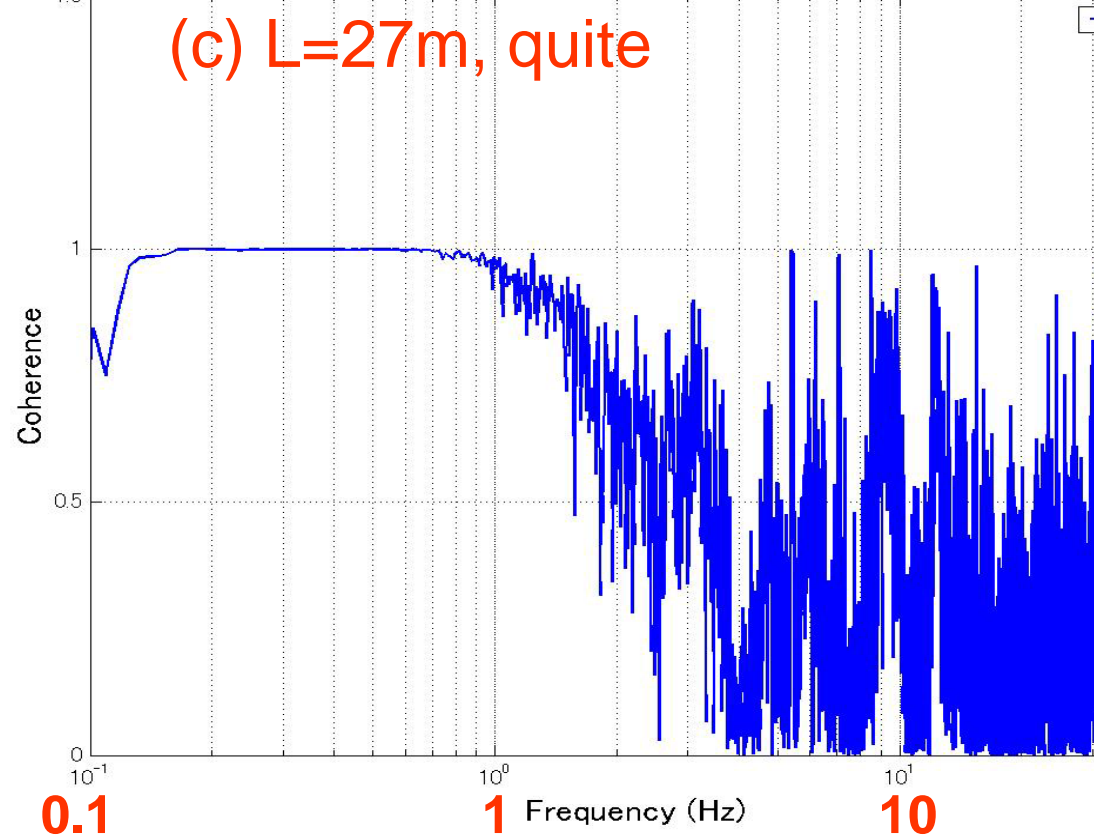
(h) $L = 27\text{m}$



(a) $L=27\text{m}$, quite

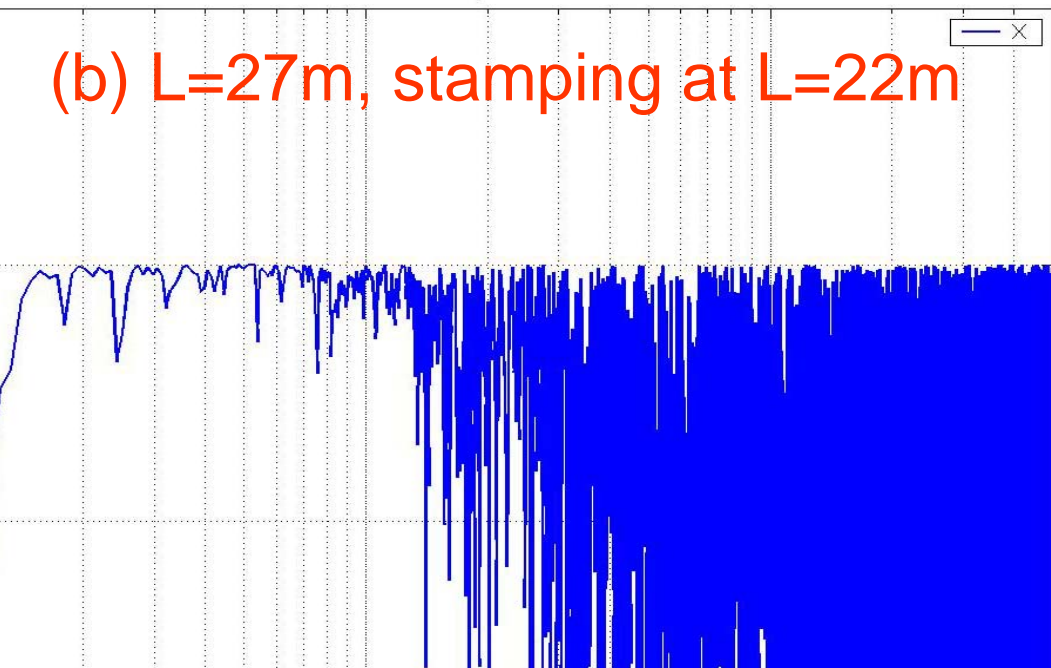


(c) $L=27\text{m}$, quite



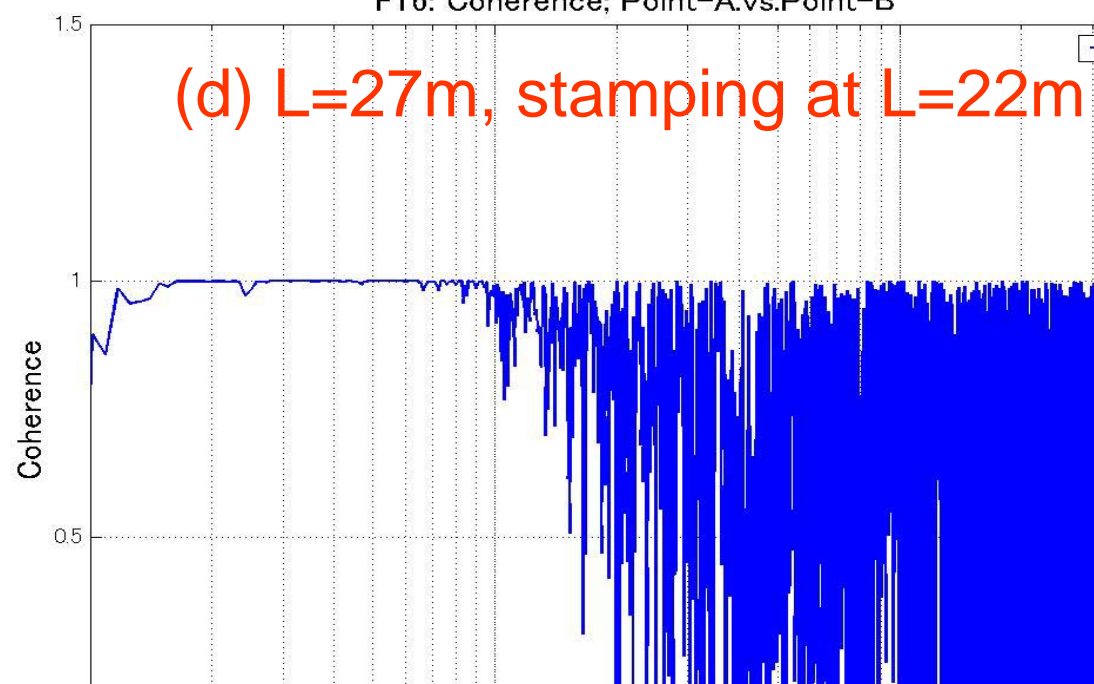
F16: Coherence; Point-A.vs.Point-B

(b) $L=27\text{m}$, stamping at $L=22\text{m}$



F16: Coherence; Point-A.vs.Point-B

(d) $L=27\text{m}$, stamping at $L=22\text{m}$



<X-direction>

1 Frequency (Hz)

(b) $L = 1\text{m}$

F03: Coherence; Point-A.vs.Point-B

(c) $L = 3\text{m}$

F05: Coherence; Point-A.vs.Point-B

(d) $L = 5\text{m}$

F06: Coherence; Point-A.vs.Point-B

<V-direction>

0.1

(f) $L = 1\text{m}$

F03: Coherence; Point-A.vs.Point-B

(g) $L = 3\text{m}$

F05: Coherence; Point-A.vs.Point-B

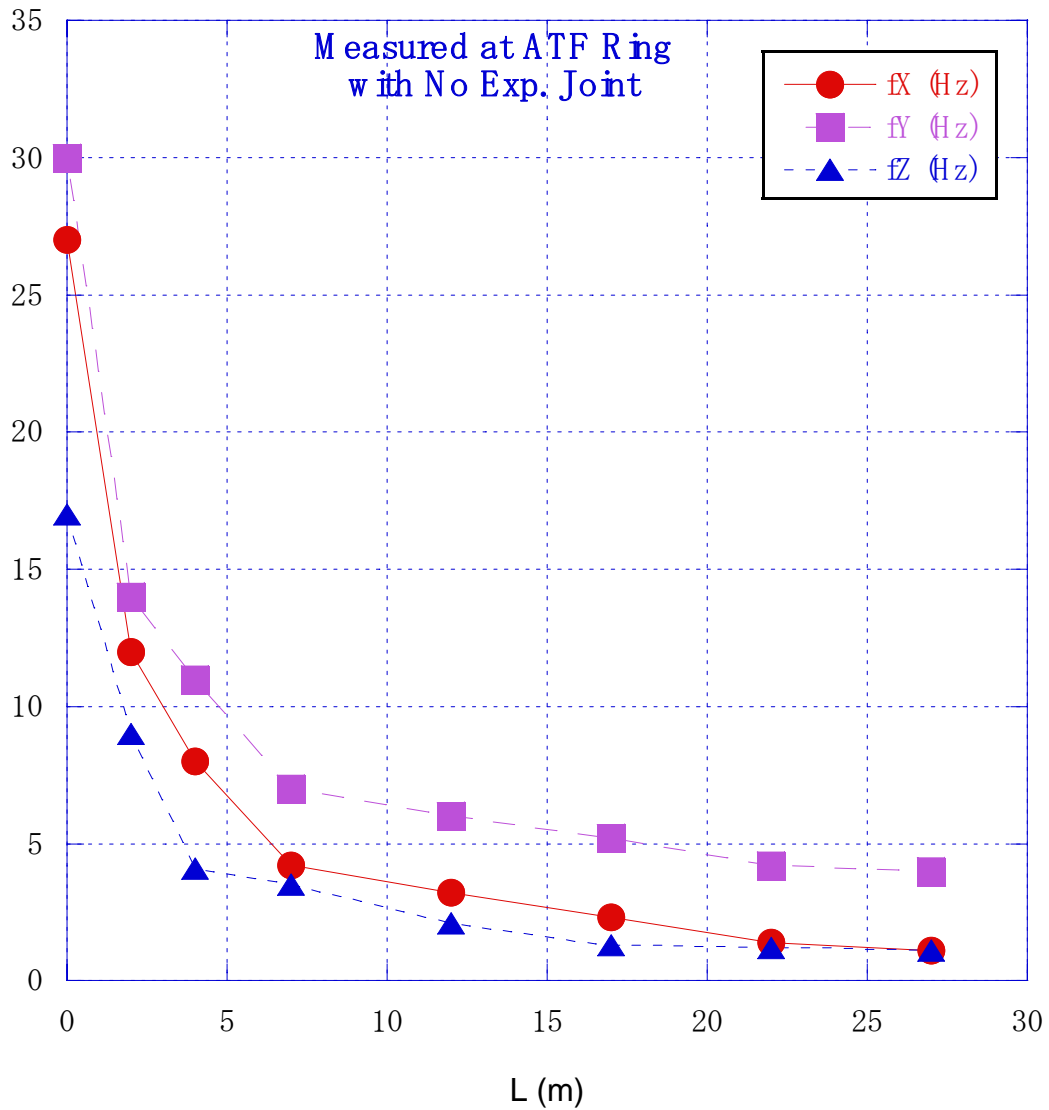
(h) $L = 5\text{m}$

F06: Coherence; Point-A.vs.Point-B

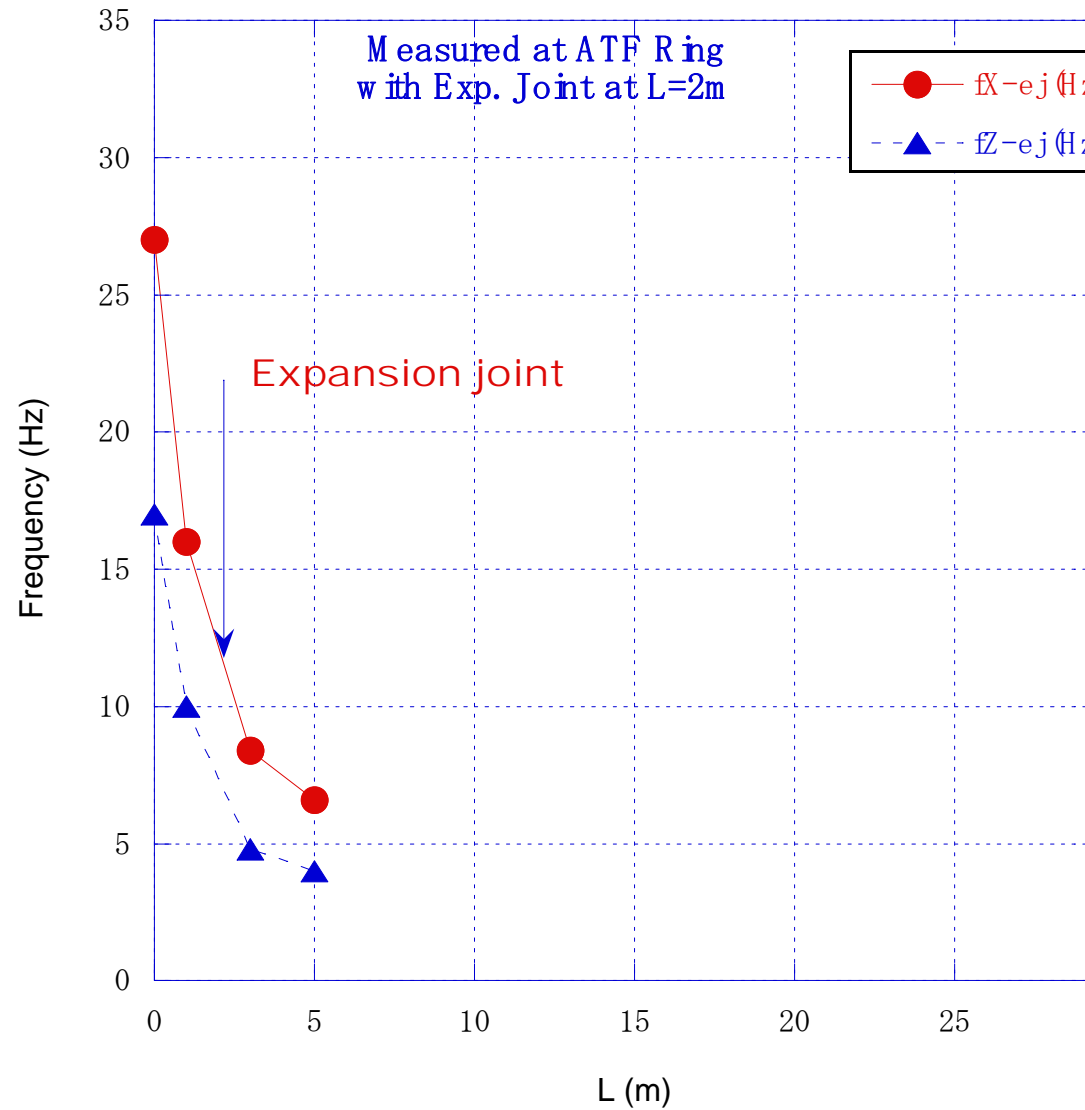
=== Expansion joint ===

Estimated Frequency Area of Coherence versus Distance, L

Coherency Length

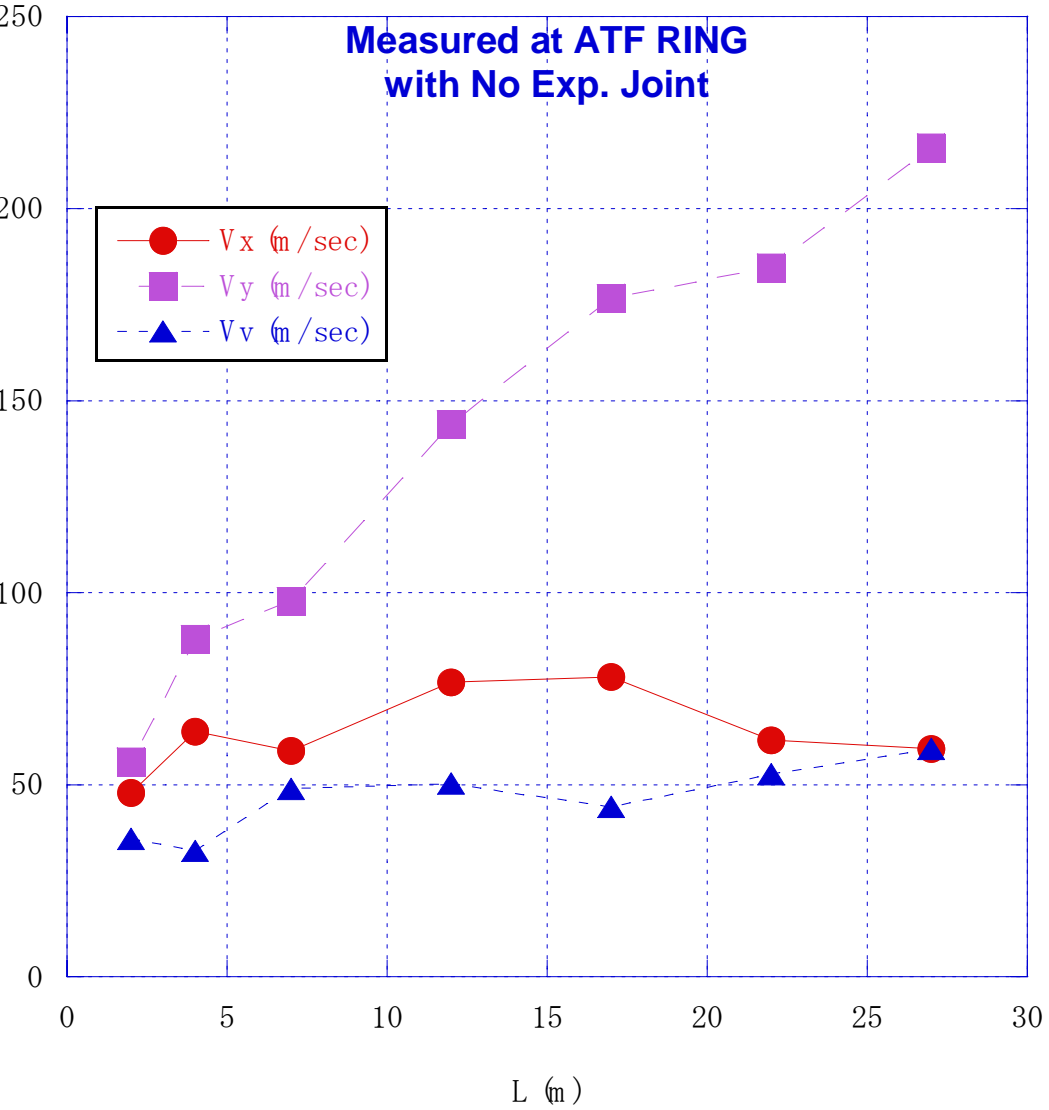


Coherency Length

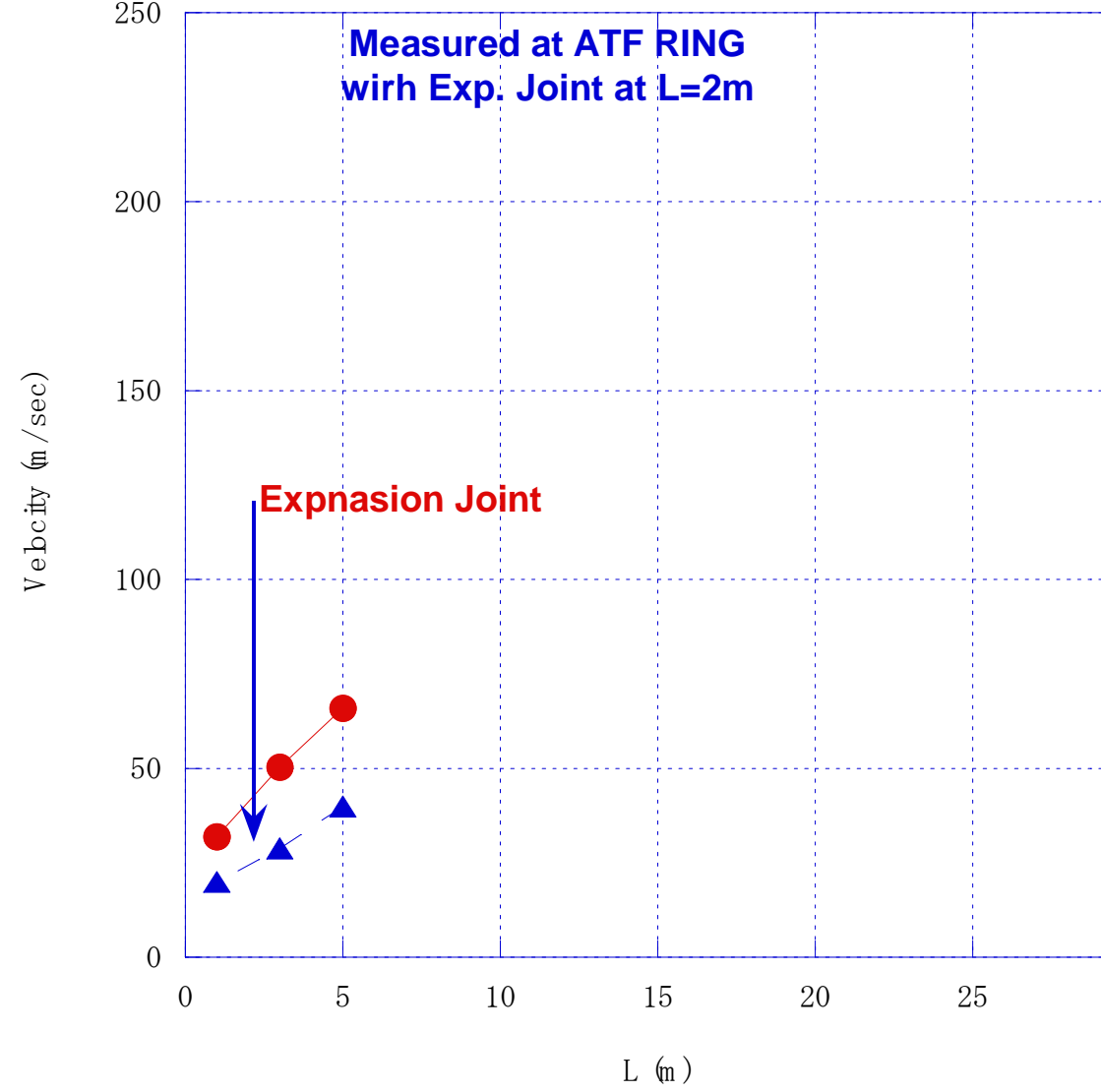


Estimated Wave Velocity of Floor Motion

Velocity of GM Wave



Velocity of GM Wave



Assuming: wave length $\sim 2 \cdot L$

Velocity $\sim 0.1 \cdot f$

Floor movement was measured at ATF ring with two STS-2 seismometers. Measurement was made at two points with various distances and coherence between two points was analyzed.

Coherent area in frequency was roughly estimated and plotted as a function of distance.

Assuming a distance (L) is a half of wave length, the velocity of the propagating wave was estimated. The velocity looks independent of L in X and vertical direction, and looks proportional to L in Y direction.

What does this mean?

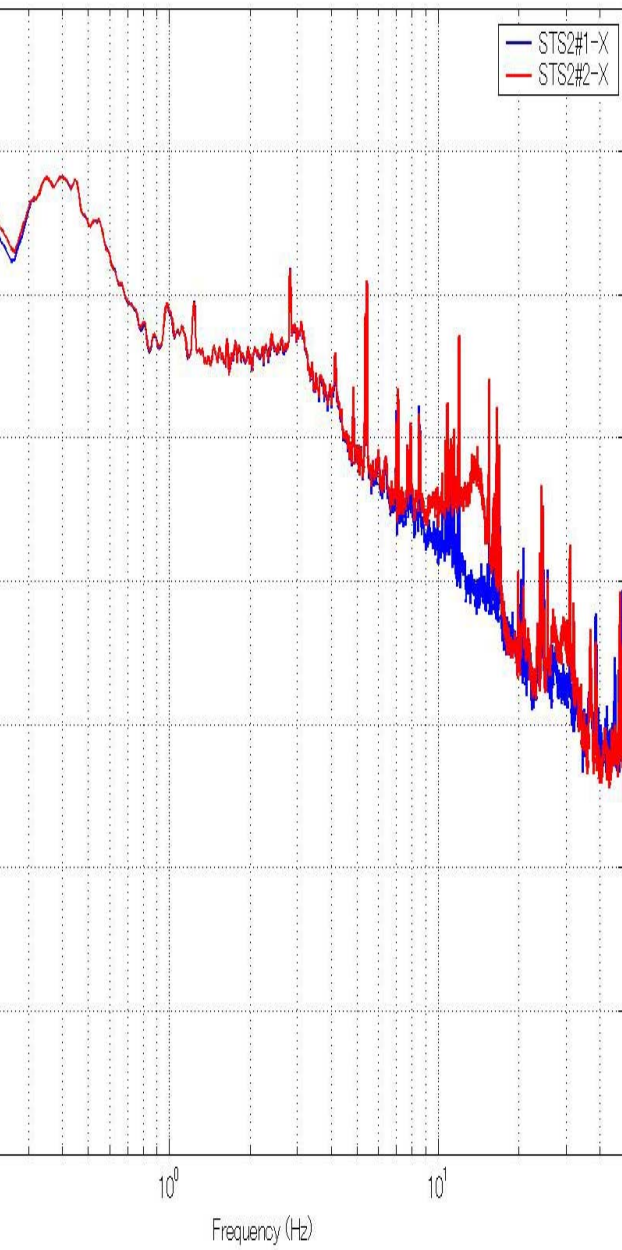
Coherency was also measured crossing an expansion joint of the floor.

Plot of coherent area in frequency versus distance looks almost the same to that for measurement without crossing expansion joint. So the main source of the floor movement is speculated to be a motion of the earth, not the surface wave propagating the floor.

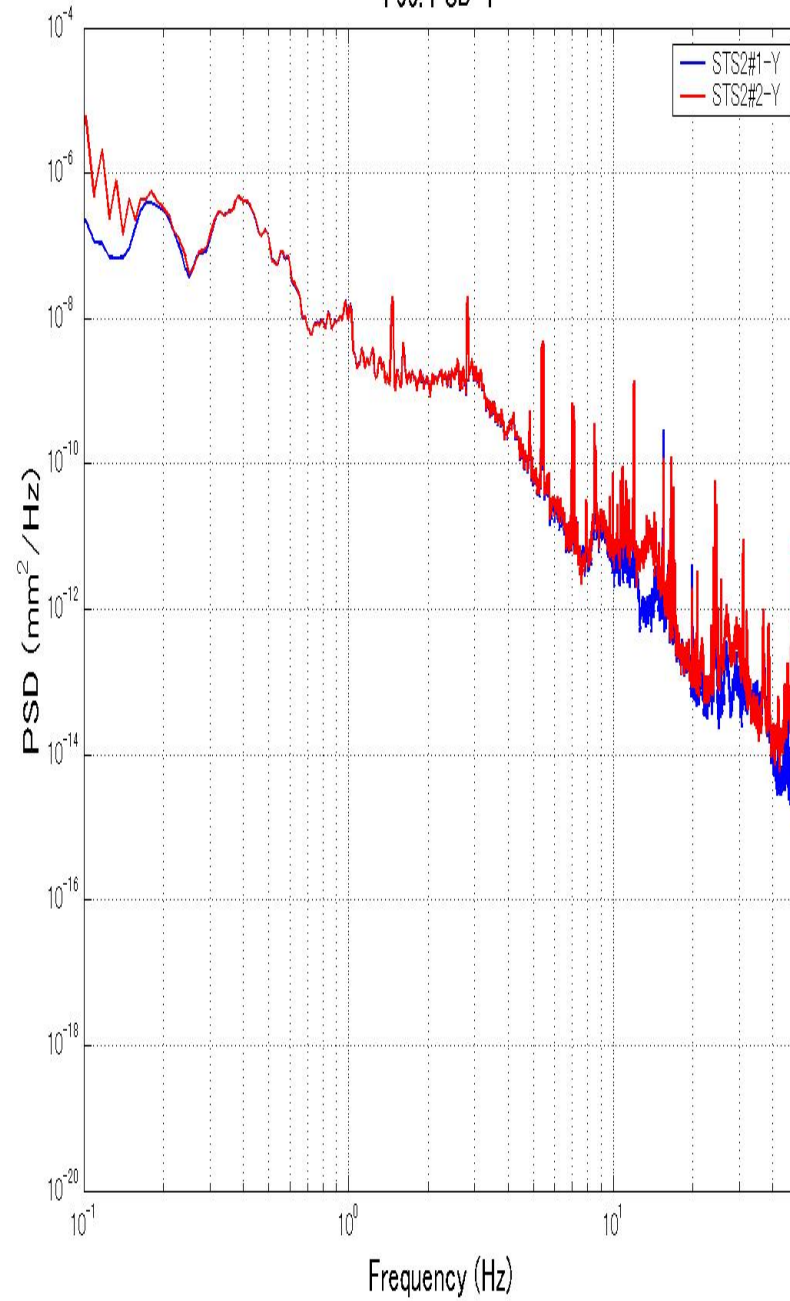
<<< --- >>>

L=3m across an expansion joint

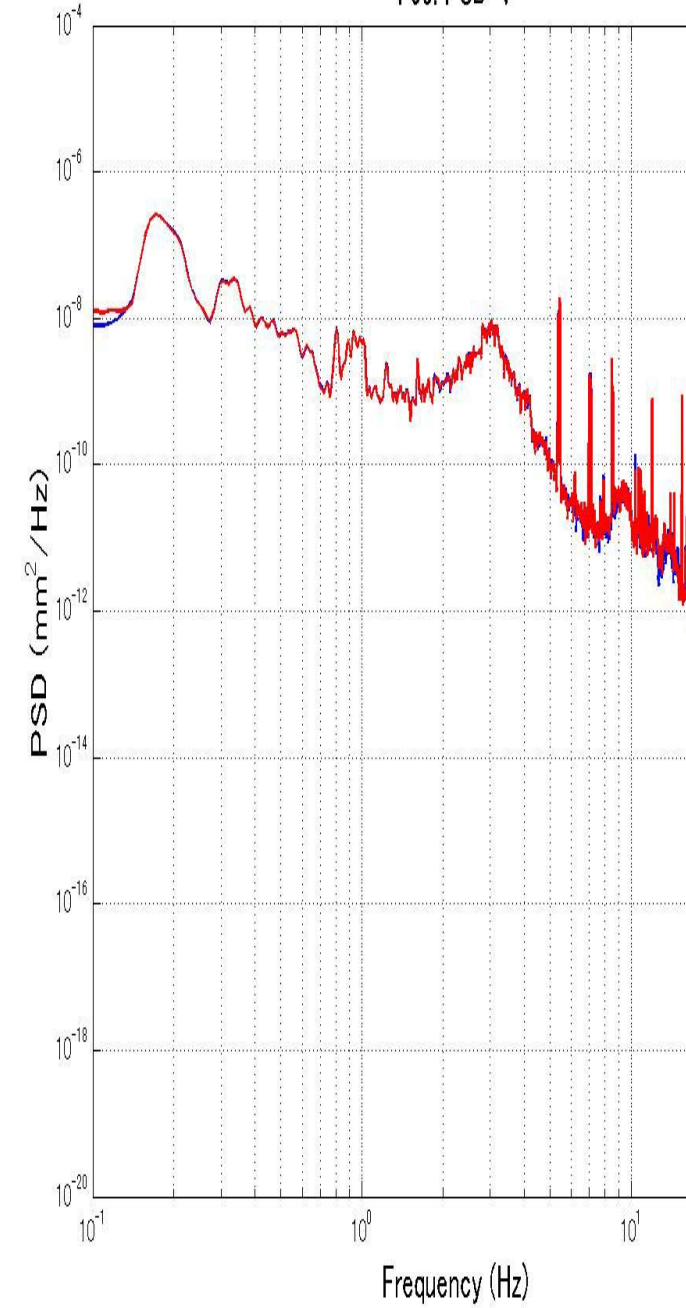
F05: PSD-X



F05: PSD-Y

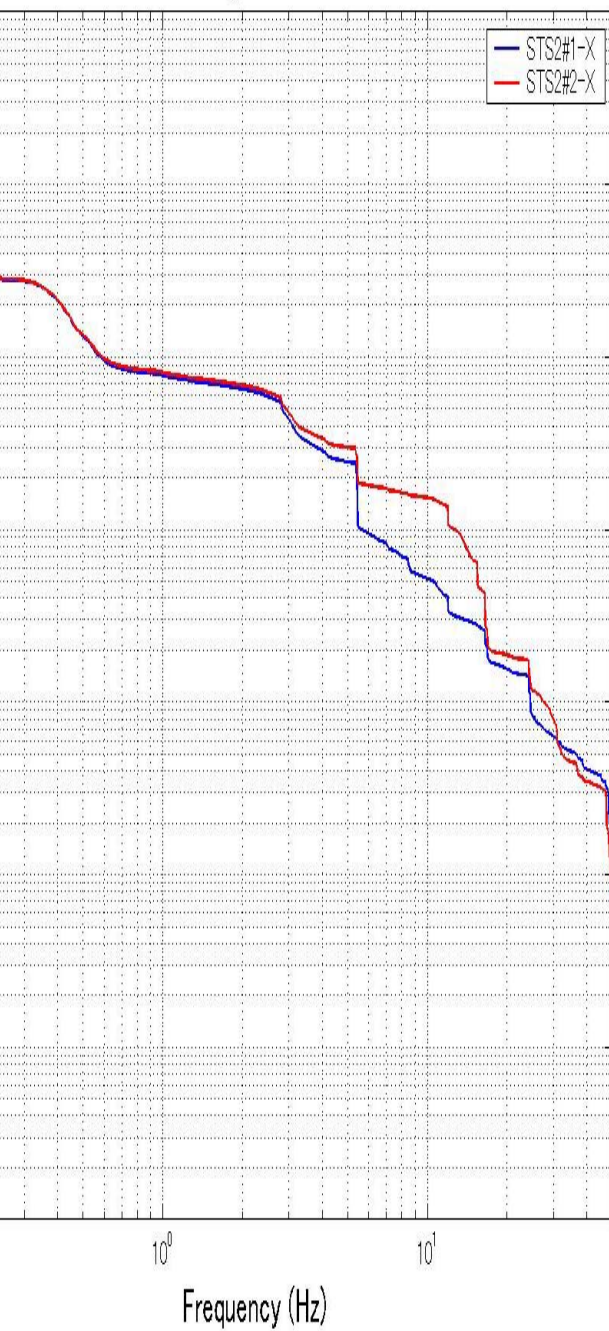


F05: PSD-V

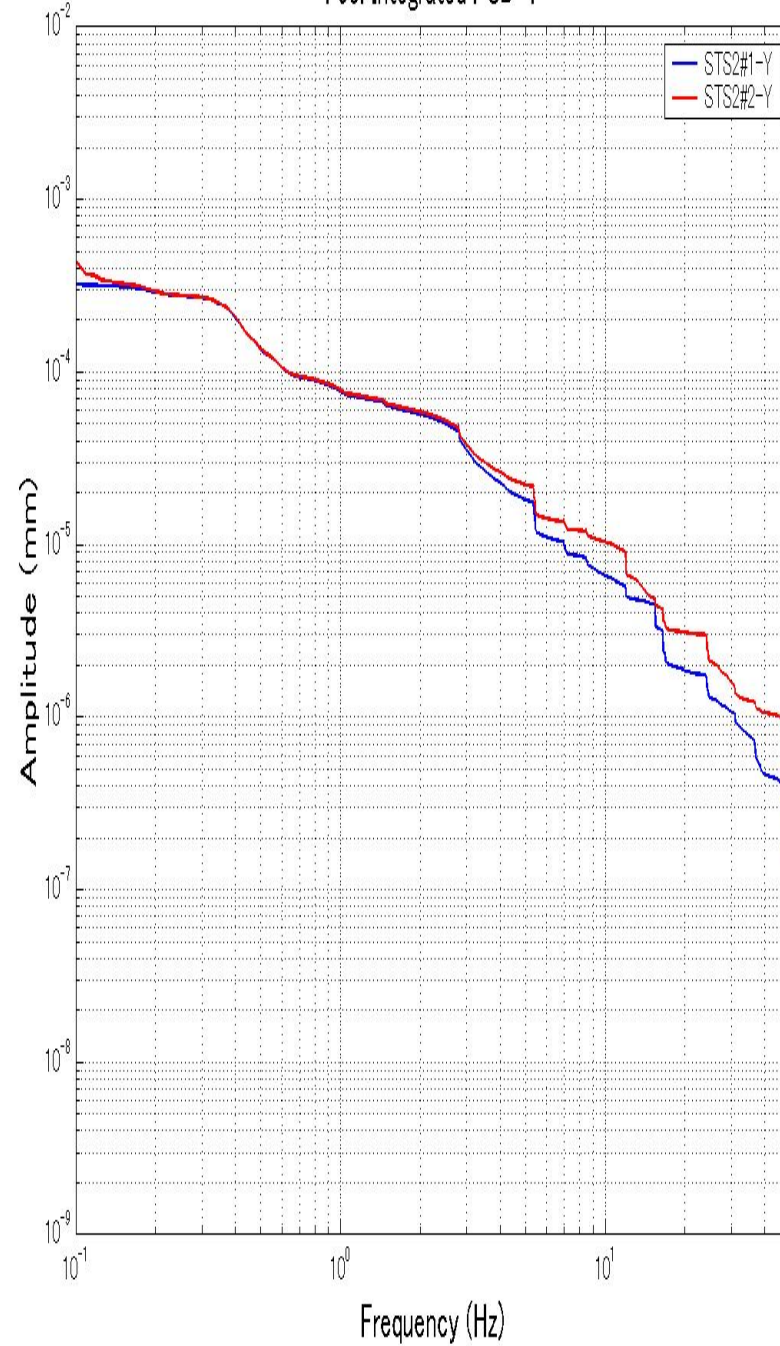


L=3m across an expansion joint

F05: Integrated PSD-X



F05: Integrated PSD-Y



F05: Integrated PSD-V

