
Environmental Disturbances

E5, E6 and E7 Investigations



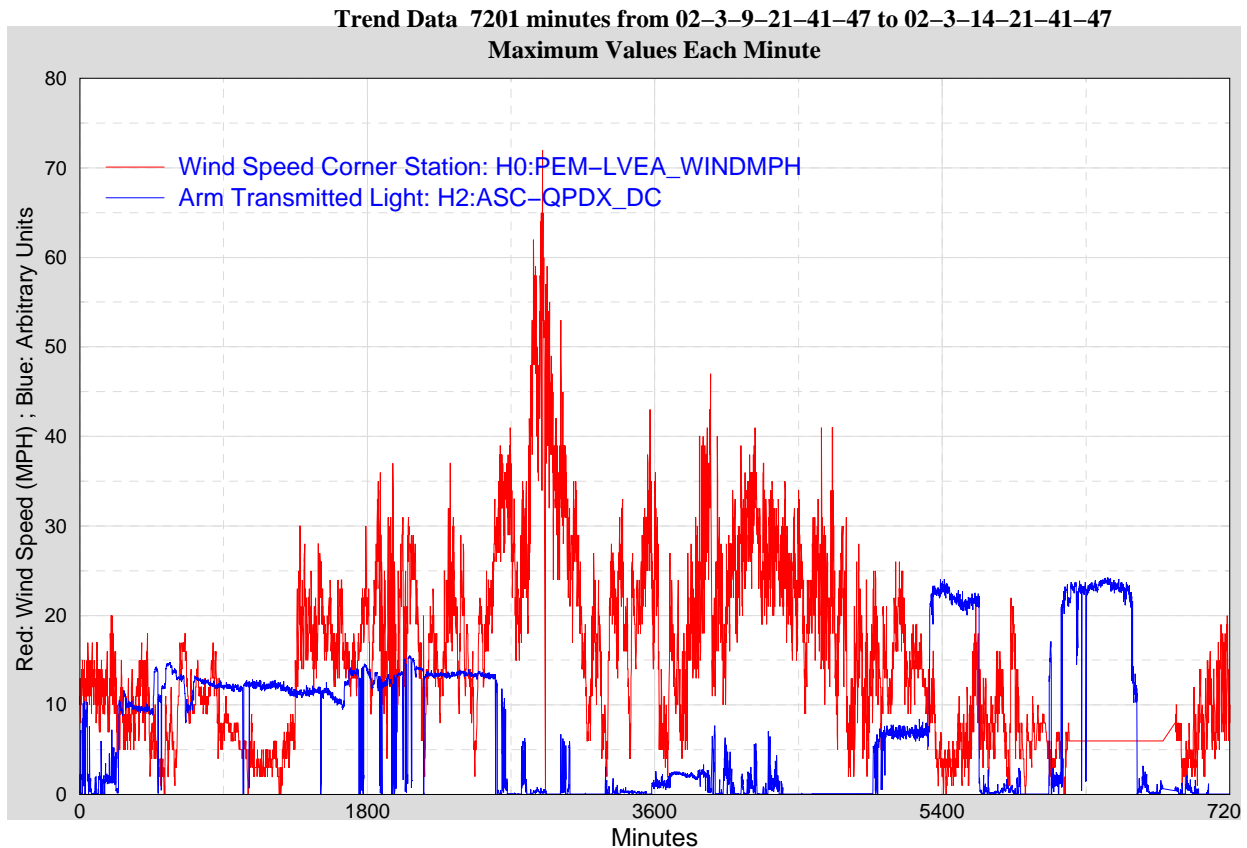
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Locking Difficulties in High Wind

LHO 2k March 12, 2002 wind storm

Fully recycled, with common-mode servo and 1 WFS.



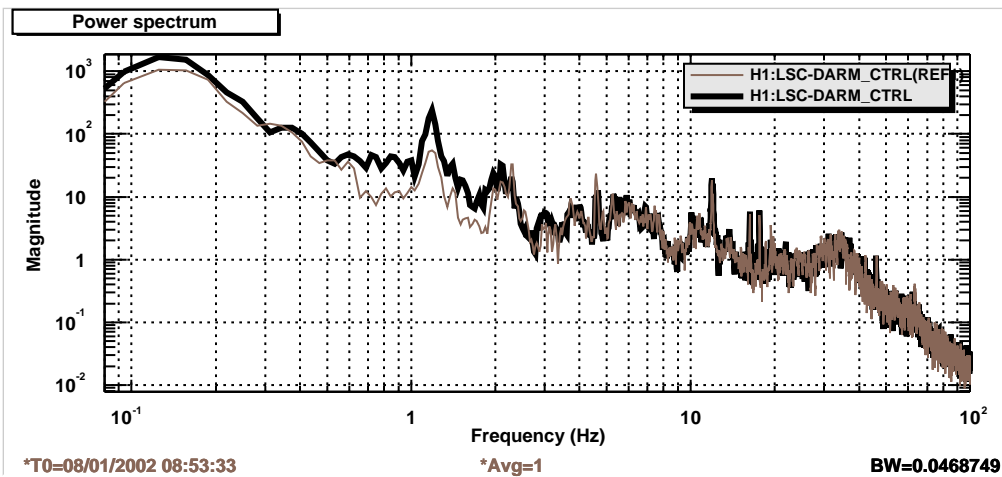
Difficulties regaining or holding lock when corner station wind speeds exceeded 25 or 30 mph

This was also the rough threshold during E7 for the LHO 4k in recombined mode (elog 1/11/02).

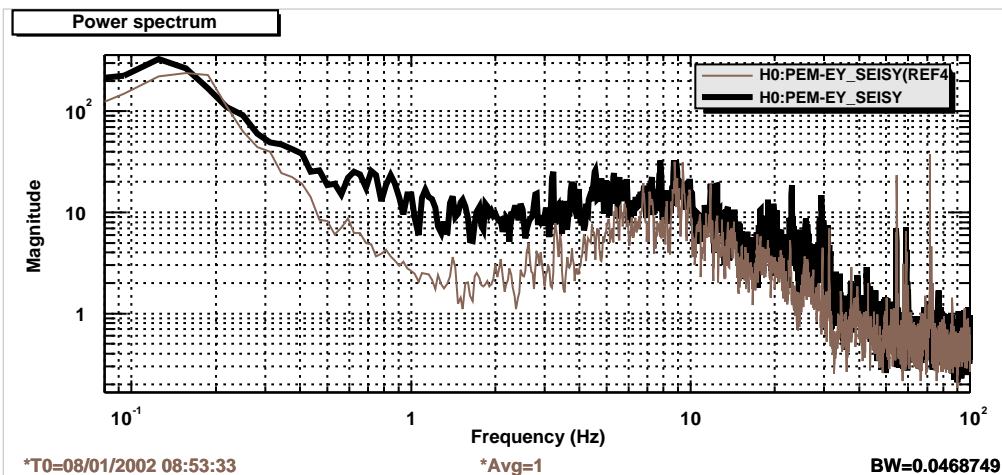
BSC Coupling: 33 MPH Y-end Wind

Lower wind speed elsewhere (X-end: 16 mph; Corn.: 18 mph)

Differential Arm Control (thin reference line: 12 mph)



Y-end seismometer

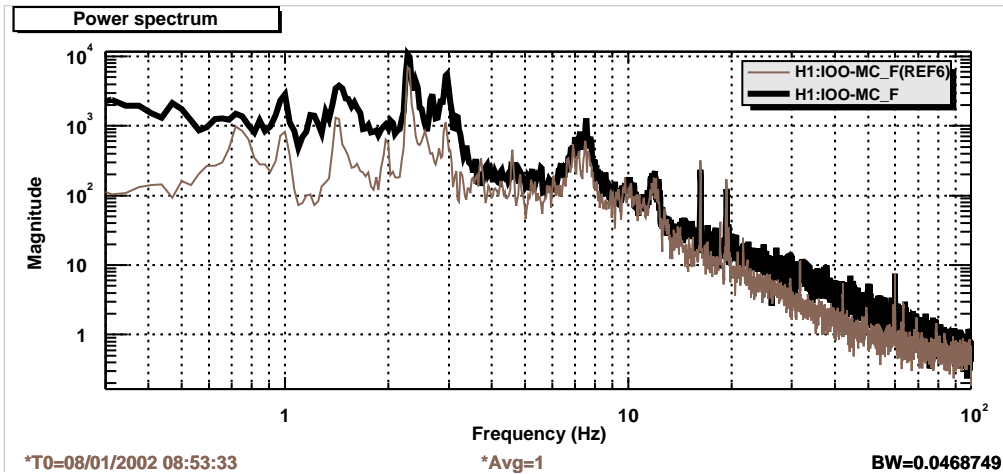


~1.2 Hz BSC modes

MC_F and seismometers at other stations deviated little from reference spectra (elog: 01/11/02)

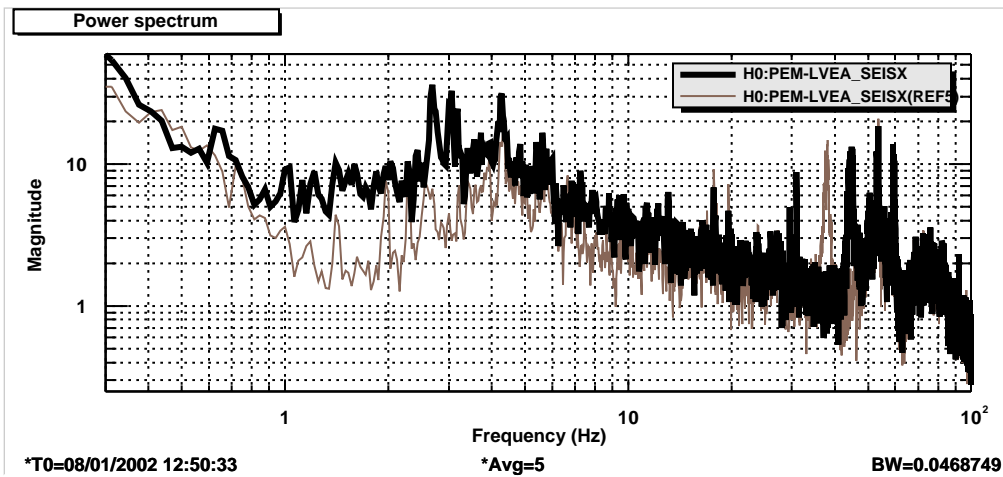
HAM Coupling: 40 MPH Corner Station Wind

Mode cleaner control (thin reference line: 5 mph)



Difference above 10 Hz does not appear in 2k MC and is consistent with signal distortion.

LVEA seismometer



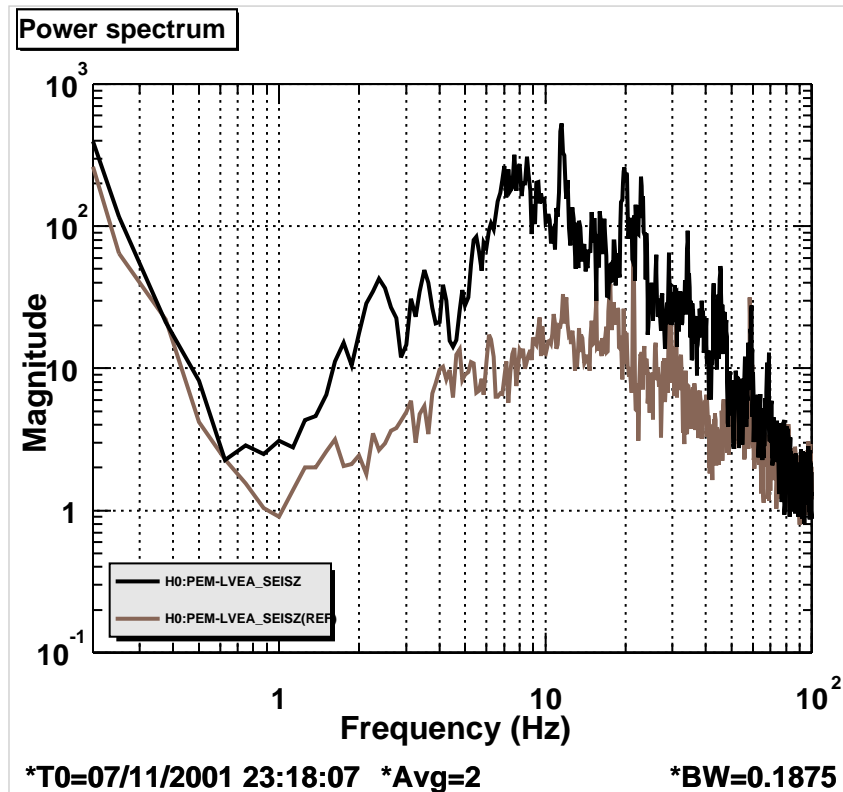
Sub 5 Hz HAM modes

LLO and LHO Corner Station Wind Speed Histograms

Fraction of Hours in which the top speed was:

Wind Speed (MPH)	LLO 9718 hours from 3 years	LHO 1999
0 to 5	0.370138	0.127873
5 to 10	0.278349	0.26675
10 to 15	0.219695	0.255746
15 to 20	0.097448	0.147931
20 to 25	0.0254168	0.0947207
25 to 30	0.00699732	0.0554395
30 to 35	0.00133772	0.026884
35 to 40	0.000308705	0.0129545
40 to 45	0.000102902	0.00390026
45 to 50	0.000102902	0.00376097
50 to 55	0	0.000696476
55 to 60	0	0.000139295
60 to 65	0	0.000139295
65 to 70	0	0
70 to 75	0	0
75 to 80	0.000102902	0
over 80	0	
TOTAL above 25	0.009	0.104

Seismic Noise Increase With Construction Near Corner Station

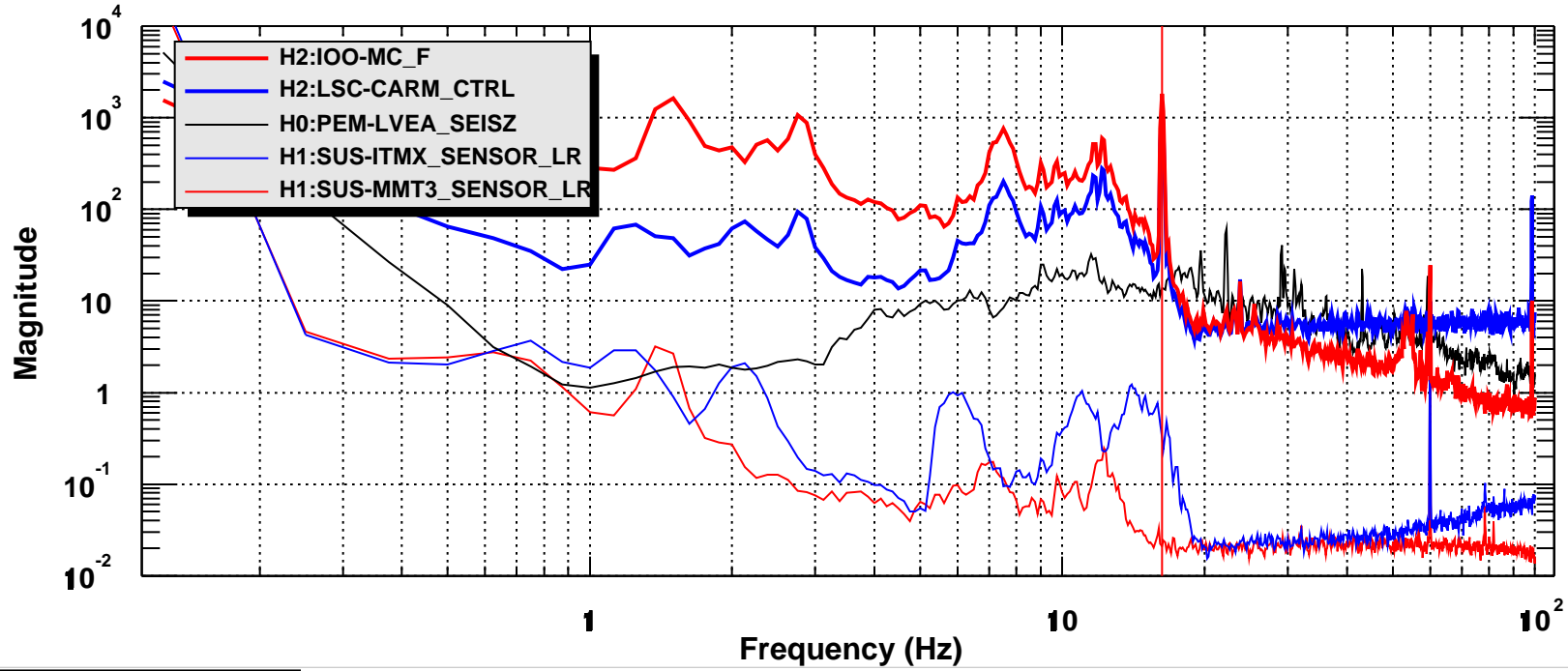


Could not lock with this factor of 10 increase (could hold 1 arm at factor of 5 increase)

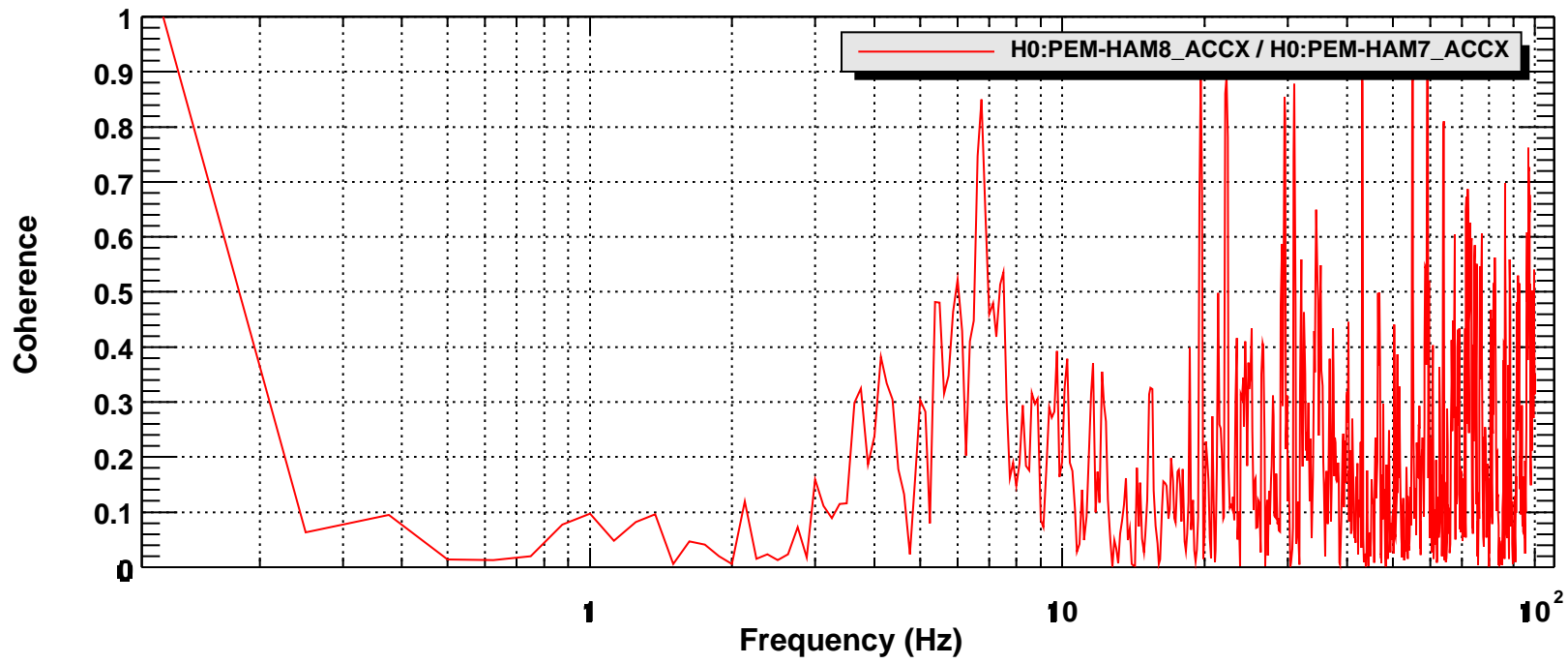
Construction spectrum has shape of non-construction spectrum: evidence for “ground resonance” of about 10 Hz

Increase in CARM above 5 Hz predominantly associated with HAM modes: mode cleaner is culprit because coherence between ends drops above 5 Hz

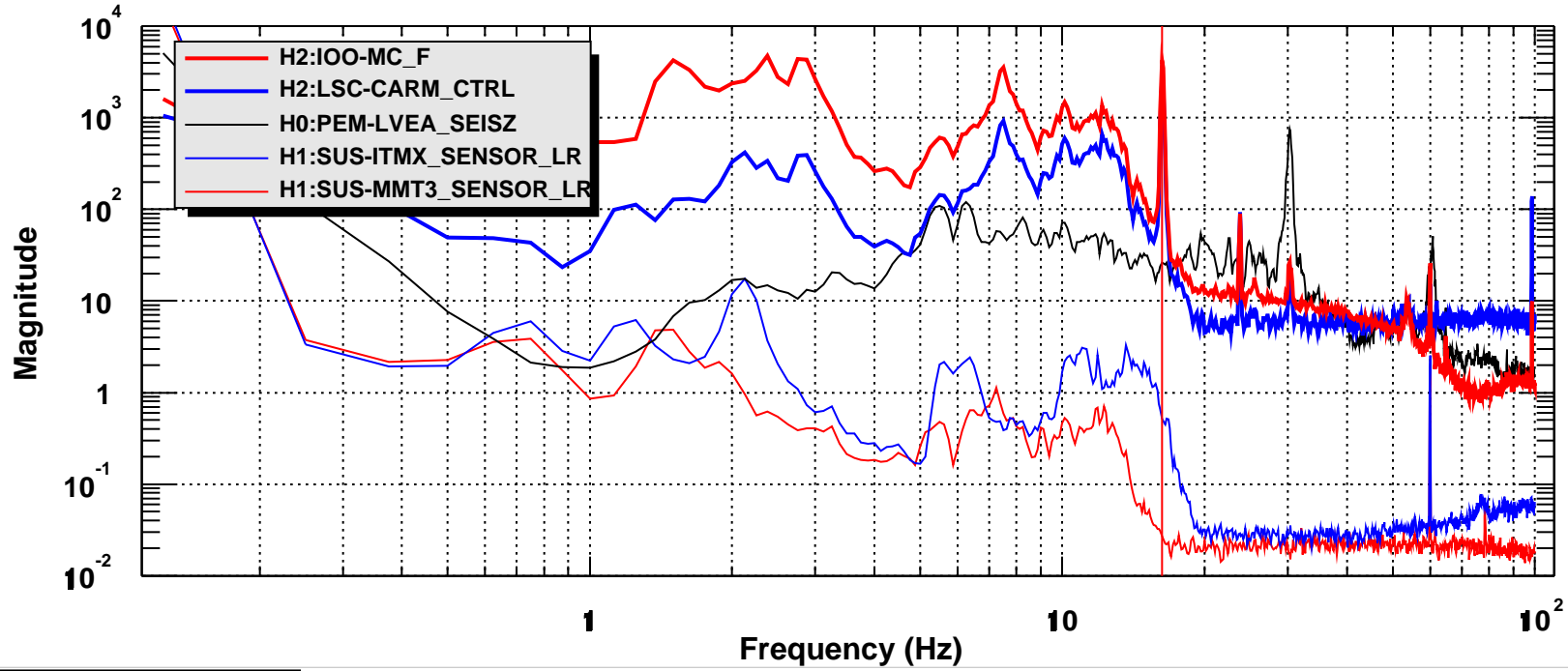
Power spectrum



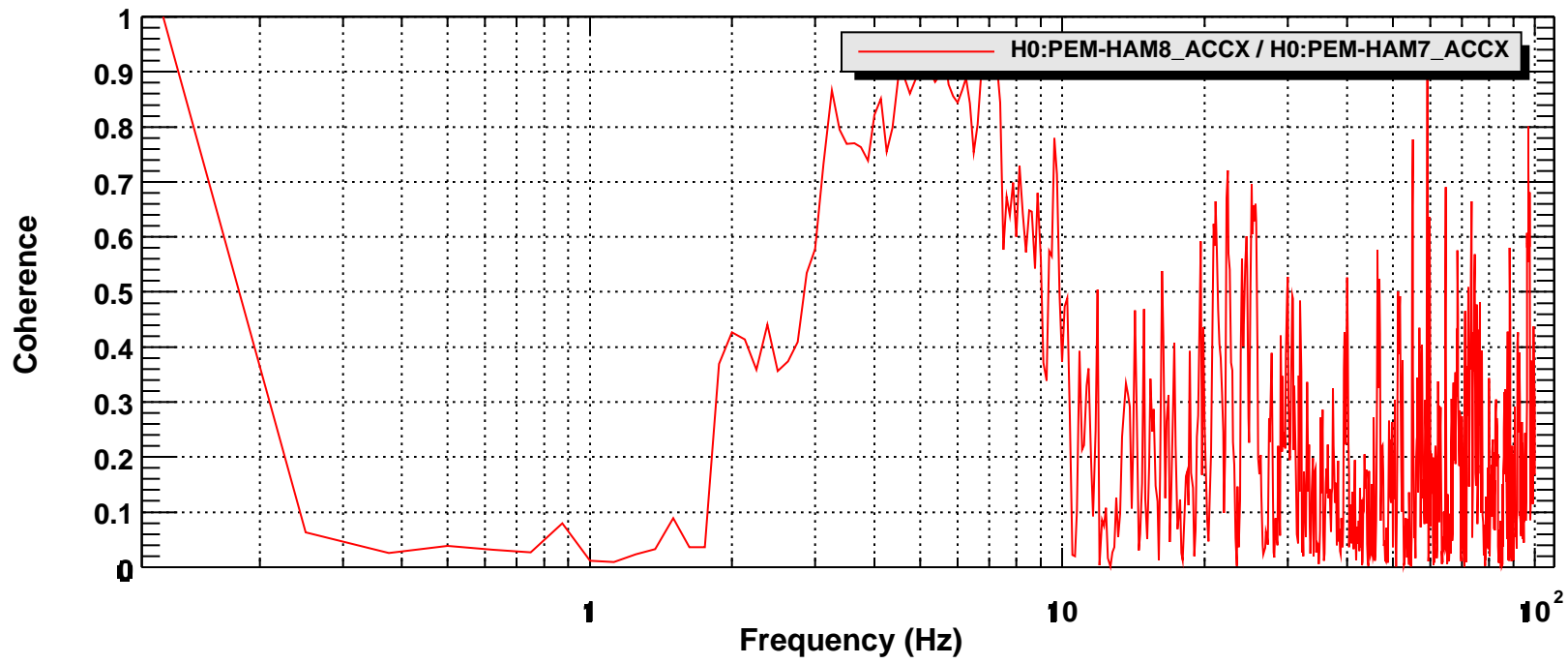
Coherence



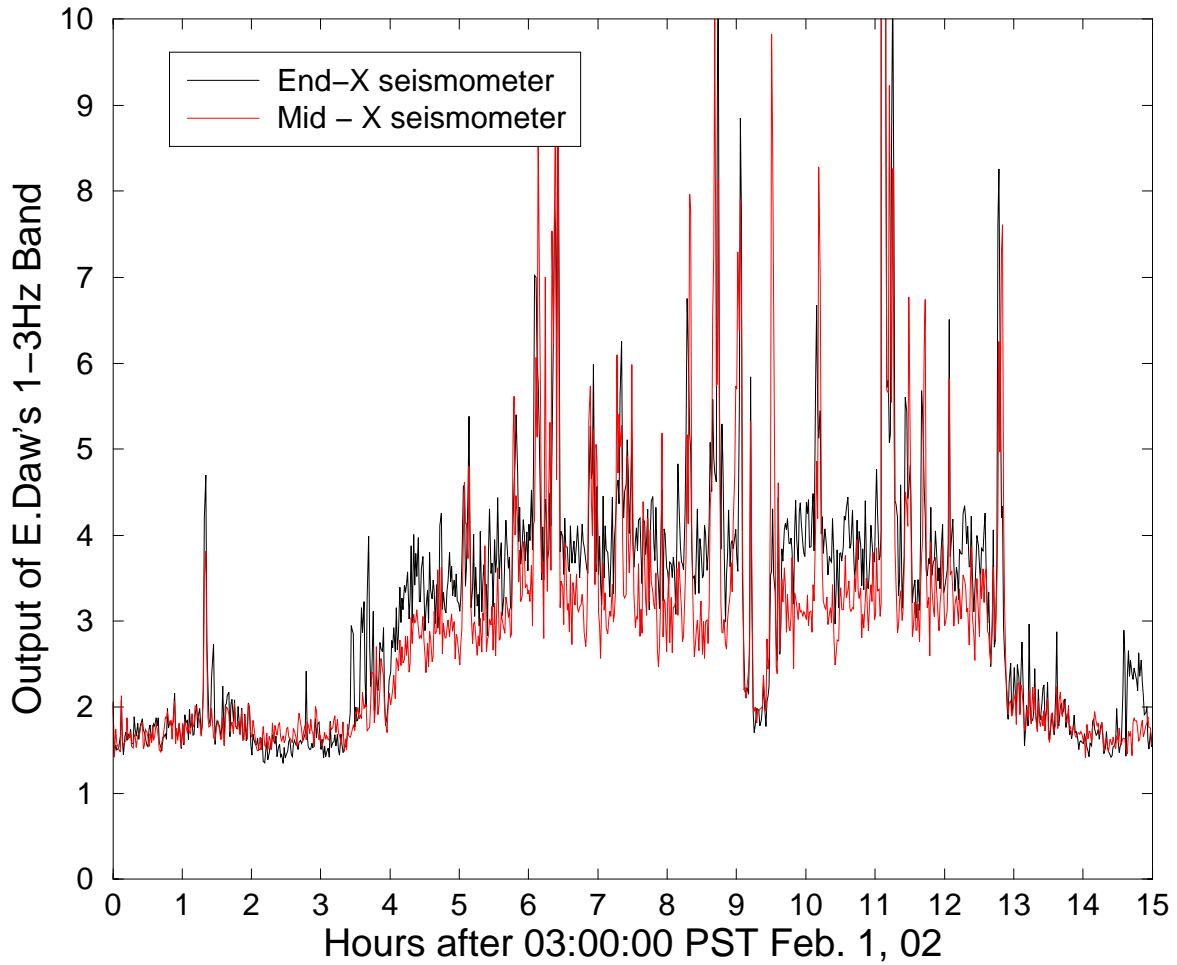
Power spectrum



Coherence



Anthropogenic Seismic Signal



Spikes are probably trucks on Route 2

Traced to Vitrification Plant Project

**10 km from X-end, up to 5000 workers expected during 5
year project**

