Environmental Disturbances: E3 and E4 Investigations

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Topics

Peter Saulson's comparison of glitch monitors

Masahiro Ito's glitch catalog

David Shoemaker's compilation of environmental data

My table of frequencies of environmental sources

My initial attempts at impulse transfer functions

**Masahiro Ito's histogramming tool and John Zweizig's histogram comparing monitor**

Different behavior of glitch monitors in E4

Peter Saulson identified several glitches that were caught by only one monitor. John and Masahiro resolved differences.
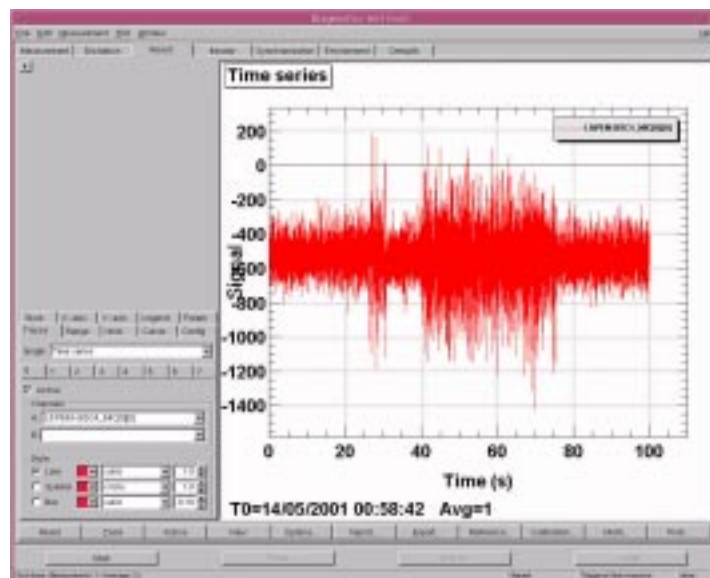
Missed by glitchMon: bug caused loss of channel.

Missed by Glitch: statistics calculated for current second.
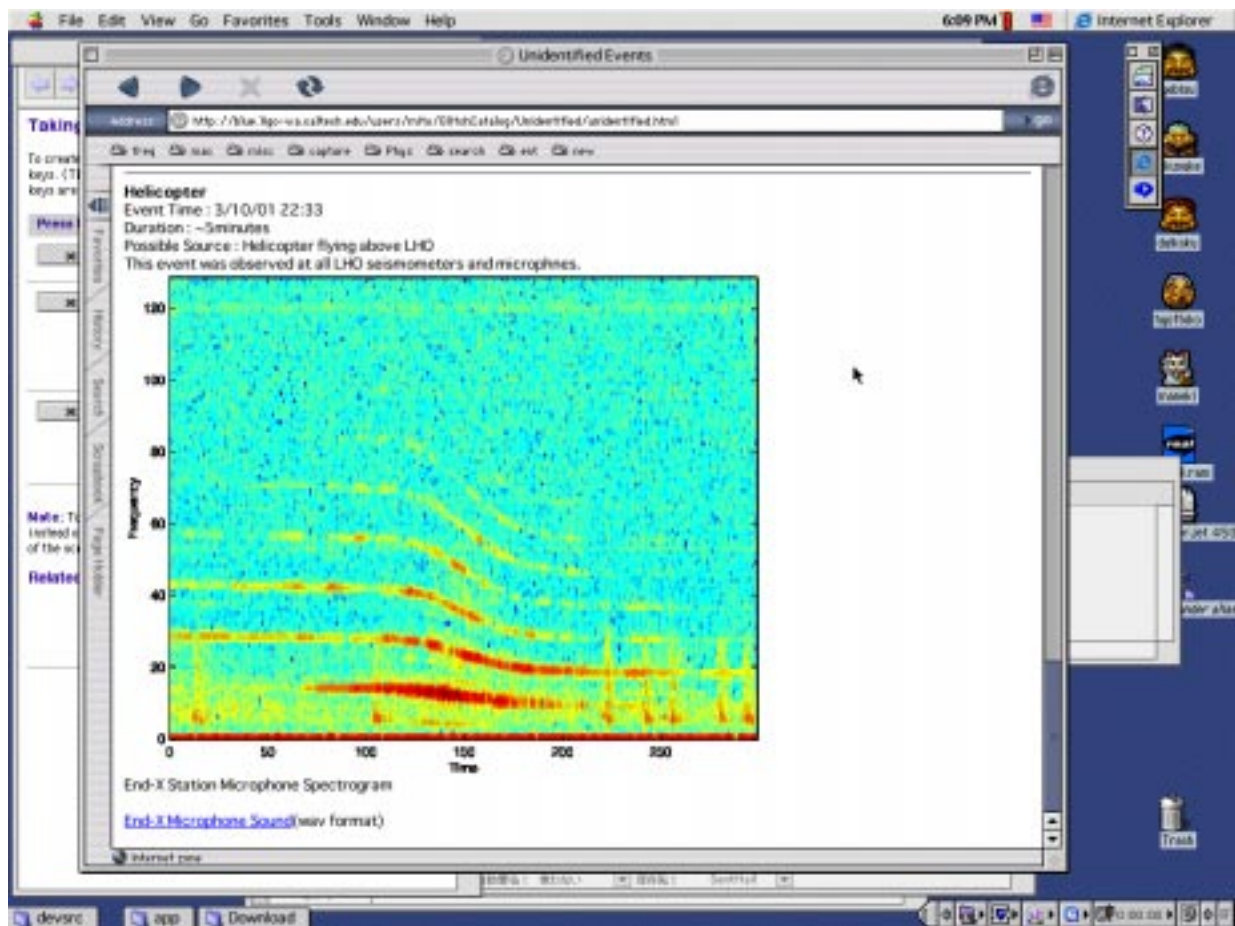
Missed by glitchMon: bug caused loss of channel.
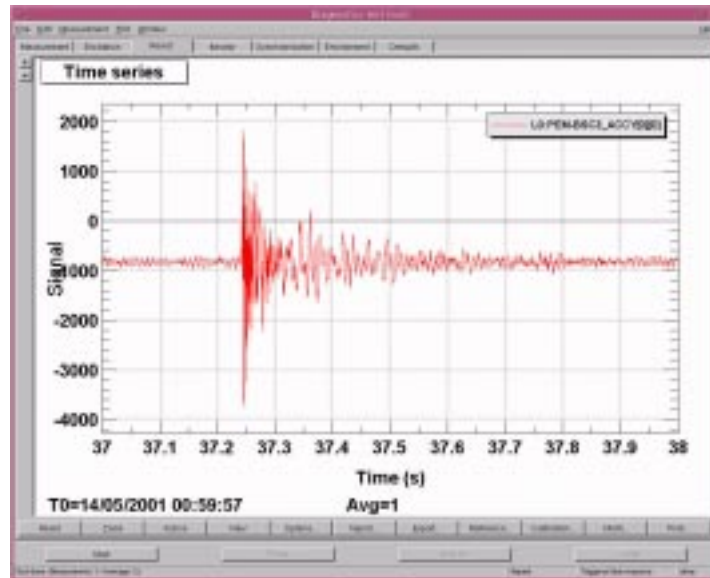
Second glitch missed by glitchMon: old version did not exclude glitch from statistics.

Glitch catalog

Masahiro Ito has started a catalog at:
http://blue.ligo-wa.caltech.edu/users/mito/GlitchCatalog/

The LIGO Observatory Environment
Edited by David Shoemaker

http://ligo.caltech.edu/~dhs/Adv-LIGO/T010074-03-D.pdf

Frequencies of environmental sources at Hanford

http://apex.ligo-wa.caltech.edu/~roberts/PEMfrequencies.pdf

Frequency Hz	Source or comments	Date
0.03 - 0.09	distant earthquake	1/00
1.2	seismic and magnetic peak excited by moving Y-end crane	11/01
2.5	seismic and magnetic peak excited by moving Y-end crane	11/01
3 - 12	truck traffic on 240 and other roads (about 60 MPH)	5/00
3.2	seismic and magnetic peak excited by moving Y-end crane	11/01
5-15	stomp	11/00
6.5	seismic and magnetic peak excited by moving Y-end crane	11/01
7 - 15	car traffic on 240 and other roads (about 60 MPH)	5/00
9-11	seismic and magnetic peak excited by moving Y-end crane	11/01
10 - 15	Yakima Firing Center tank shot signal	11/00
19	seismic and magnetic peak excited by moving Y-end crane	11/01
19.3	optic lab ventilator?	11/00
21	office area air handler fan belt harmonic	9/99
22 - 27	clean room fans	9/99
24	unknown source - on magnetic and control signals	
30	office area air handler fan motor	9/99
30	LVEA air handler	9/99
30	Kobelco purge aircompressor pump	9/99
30	Culligan water conditioner pump	9/99

Frequency Hz	Source or comments	Date
32	office area air handler belt harmonic	9/99
35	office area air handler fan	9/99
40	4k PSL table leg	6/01; elog 6/09/01
42	office area air handler fan belt harmonic	9/99
54	4k PSL table leg	6/01; elog: 6/09/01
55	LVEA chiller pad air compressor	1/01
55-65	4k PSL periscope	6/01; elog: 6/09/01
57 - 60	LVEA pad water-chiller compressors (12 compressors)	9/99
57.5	LVEA pad main pumps	9/99
58.5	mechanical room chilled water supply pump	9/99
59	Culligan water conditioner pump (LVEA access bay)	9/99
59	Kobelco purge air compressor compressor	9/99
59	Edwards turbo backing pump	9/99
64	office area air handler belt harmonic	9/99
69.9	Gateway monitor	4/01
72	chiller pad air compressor	1/01
76	Sun monitor	4/01
98.7	unknown: in control signals for a long time	
100	magnetic field at vault	5/01
133	dust monitors	3/00
255	reference cavity periscope	6/00
255	turbo pump power supply	6/00
256	PSL periscope at laser (main beam)	6/00
256	E. O. power supply fan	11/00: elog: 10/11/00
266	dust monitors	3/00

| Frequency Hz	Source or comments	Date
320	4k PSL periscope mirror support	6/01; elog 6/9/01
388	Electronics Solutions crate power supplies	2/01; elog 2/17/01
390	4k PSL periscope mirror support	6/01; elog 6/9/01
394	Electronics Solutions crate power supplies	2/01; elog 2/17/01
510-550	dust monitors	3/01
6-8k	pre-mode cleaner body modes	6/00

Acoustic impulse on microphones and mode cleaner control

Hit trash can close to PSL:

Red: PSL mic (not as in legend); Black: MC_F; Blue: Ham 8 mic
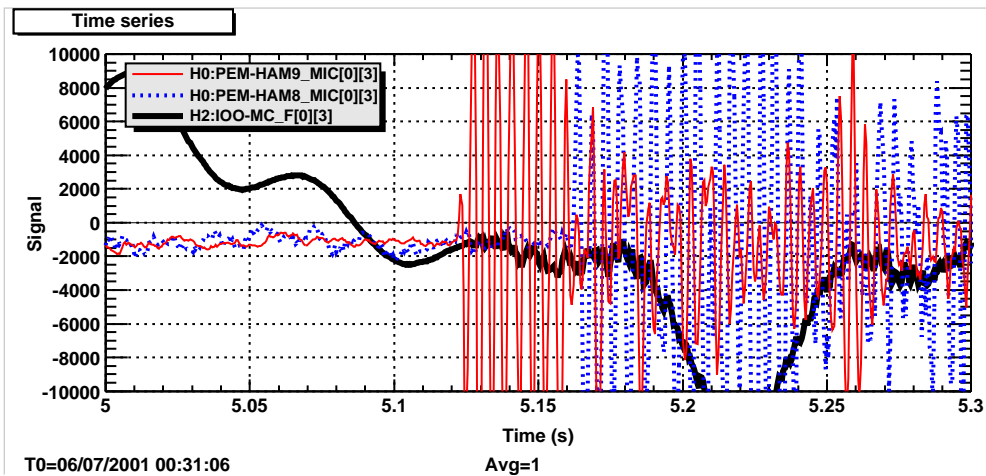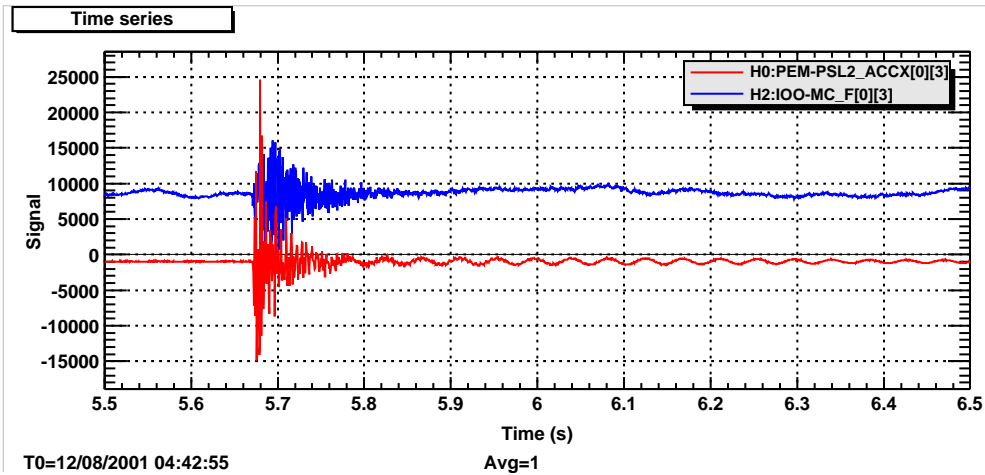

Hit same trash can close to Ham 8:
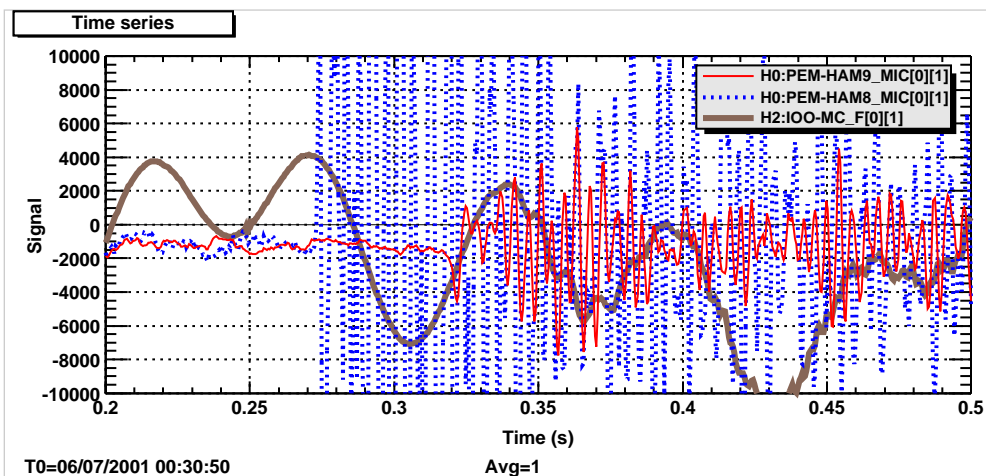
Ball park coupling: 300 Hz/Pascal at PSL table
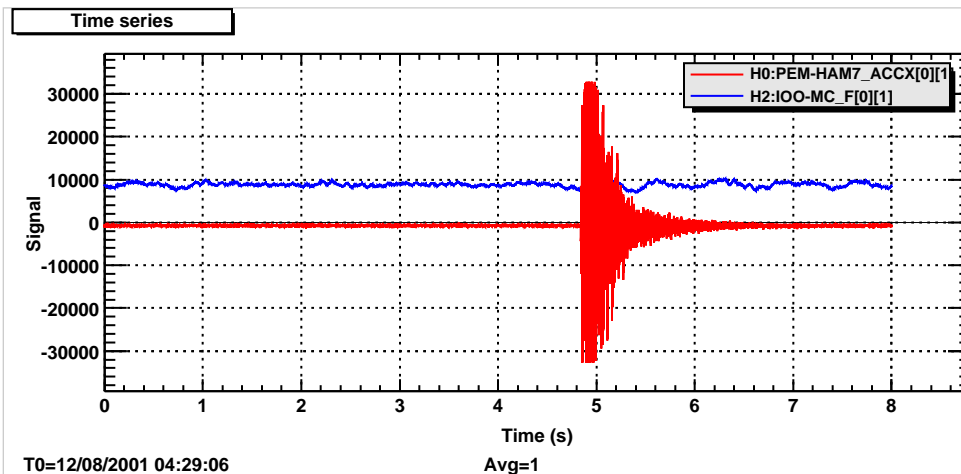
Taps of a pen

Against X-end of PSL Table:

Red: PSL accelerometer X; Blue: MC_F.

In the 150 to 400 Hz band roughly 0.01 Hz per $\mu m/s^2$

Against HAM7 cross beam:

Red: HAM7 accelerometer; Blue: MC_F

Histograms of channel levels

John Z.'s histogram comparing monitor with Masahiro I.'s Histogramming tool.

Such histograms could be used to select veto levels.