
S2

Intersite Environmental Transients

Investigation



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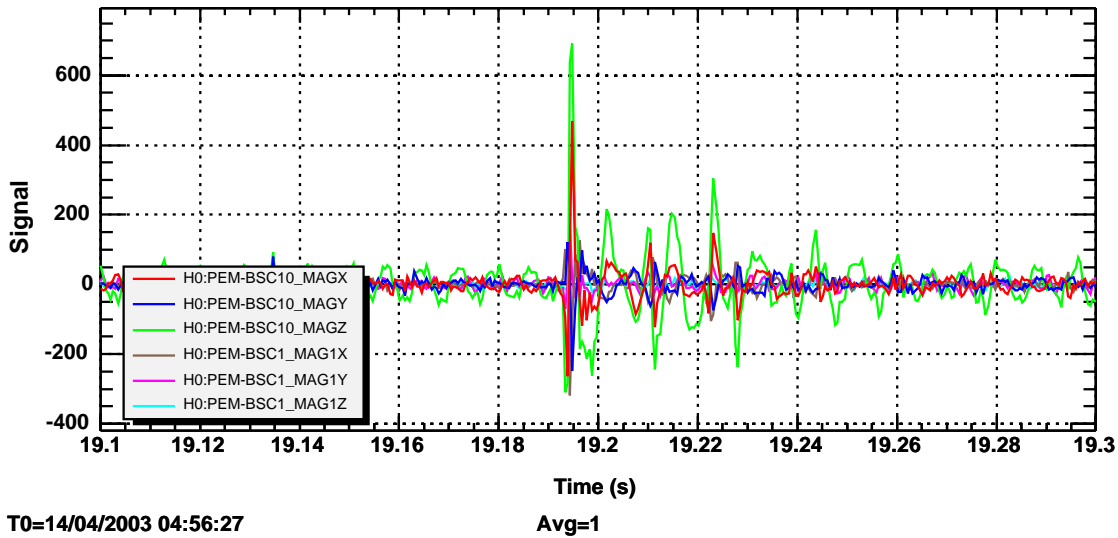
Robert Schofield (Oregon)

QUESTIONS

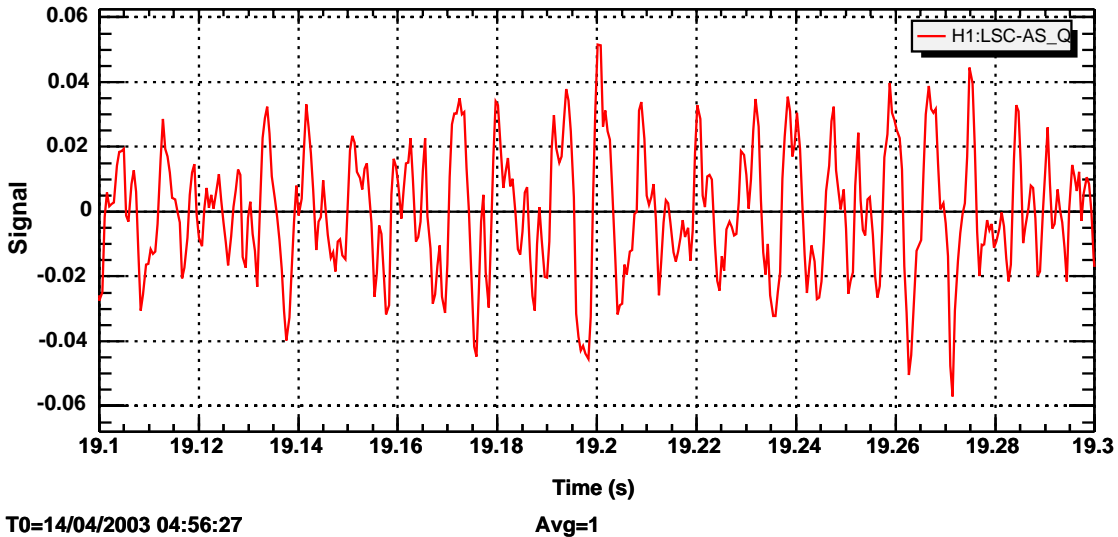
- 1) Do large local voltage spikes and lightning strikes show up on AS_Q? If not, smaller events that show up at both sites probably wont either.**
 - 2) Is there any evidence of coincident PEM events at greater than chance?**
 - 3) Correlations on a time scale longer than light travel time?**
 - 4) GPS associated events?**
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Nearby Lightning Not Seen on GW Channel

Storm during S2 over Rattlesnake Mountain ~ 10 km
Strike seen on fluxgate magnetometers at both stations:



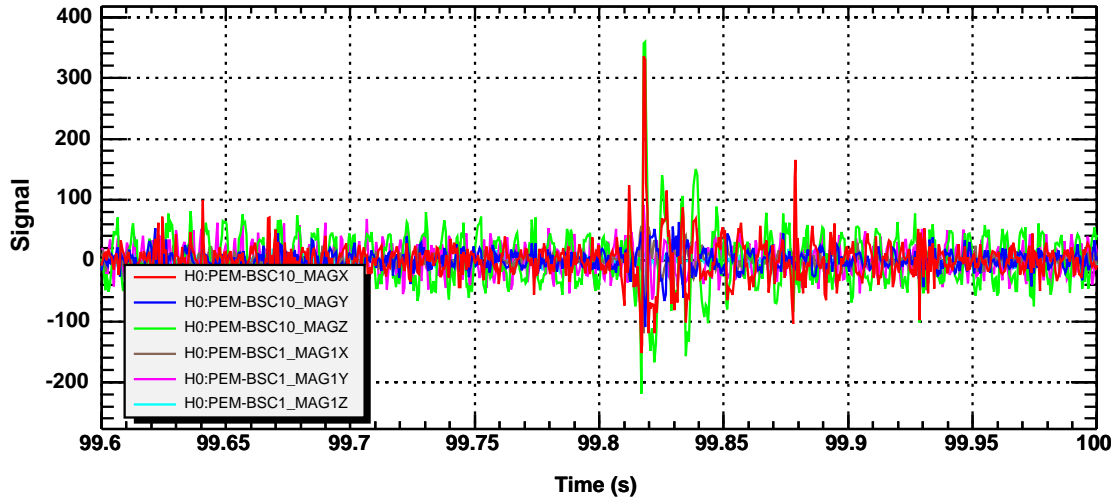
Not seen on H1 AS_Q



High-pass and comb-filtered time series

Strike at LHO Not Obvious at LLO Coil Magnetometers

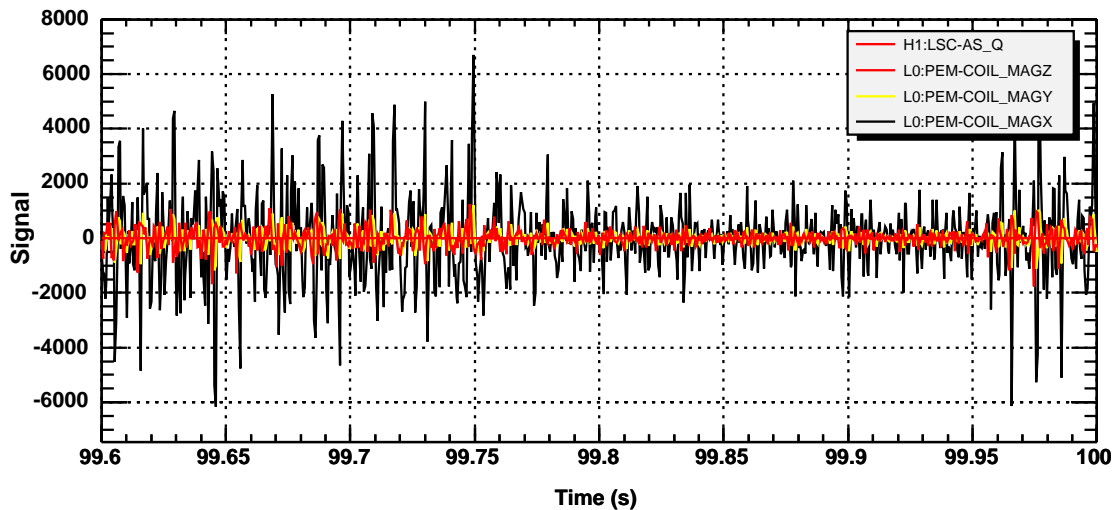
LHO fluxgate magnetometers:



T0=14/04/2003 04:59:47

Avg=1

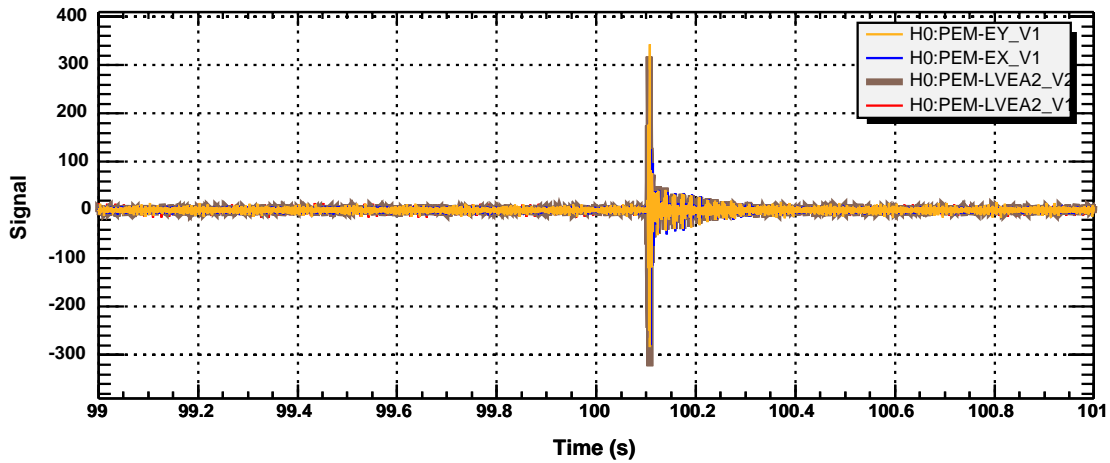
LLO coil magnetometers:



T0=14/04/2003 04:59:47

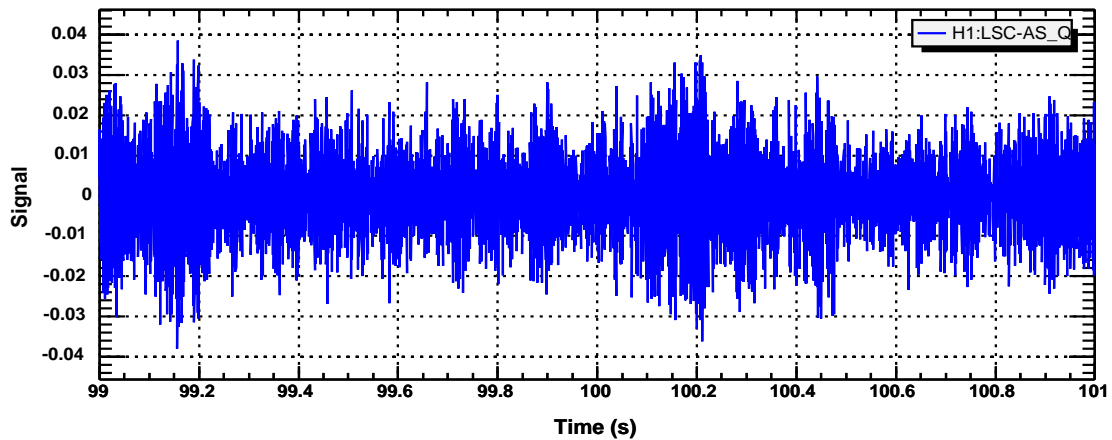
Avg=1

Line voltage glitch that appears at multiple LHO stations does not show up on AS_Q



T0=20/02/2003 13:36:42

Avg=1



T0=20/02/2003 13:36:42

Avg=1

High-pass and comb-filtered time series

magMon algorithm for detecting PEM bursts that are coincident between sites

- **Modification of an older version of glitchMon**
- **Coincidence before trigger generation to explore low thresholds**
- **Can insist on coincidence between multiple channels (e.g. on 2 of 3 voltage monitors at each site)**
- **Coincident event rates for aligned and offset LHO and LLO time series**

No excess over chance coincidence found in coil magnetometers:

L0:PEM-COIL_MAGX; H0:PEM-COIL_MAGY; 560-580 Hz 4th order butterworth; 2,370,460 seconds of S2

Threshold (sigma)	Events exceeding threshold	Events for offset time series	(on - off)	sqrt(on+off)
5.1	2	3	-1	2.24
4.65	29	35	-6	8
4.2	253	263	-10	22.7
3.75	1889	1826	63	61
3.3	14739	14711	28	172

No excess found in LLO and LHO line voltage monitors:

L0:PEM-EX_V1;;L0:PEM-EX_V2;L0:PEM-LVEA_V1;H0:PEM-H0:PEM-LVEA2_V2;

Threshold (sigma)	Events exceeding threshold	Events for offset time series	(on - off)	sqrt(on+off)
3.5	3	10	-7	3.60
3.1	152	121	31	16.5
2.7	3842	3924	-82	88.1
2.3	110334	109989	345	469
1.9	961362	960138	1224	1386

MY_V1; H0:PEM-LVEA2_V1; 1,144,260s of S2 data; only 1 event allowed each second; only 2 signals in excess of threshold demanded from each site.

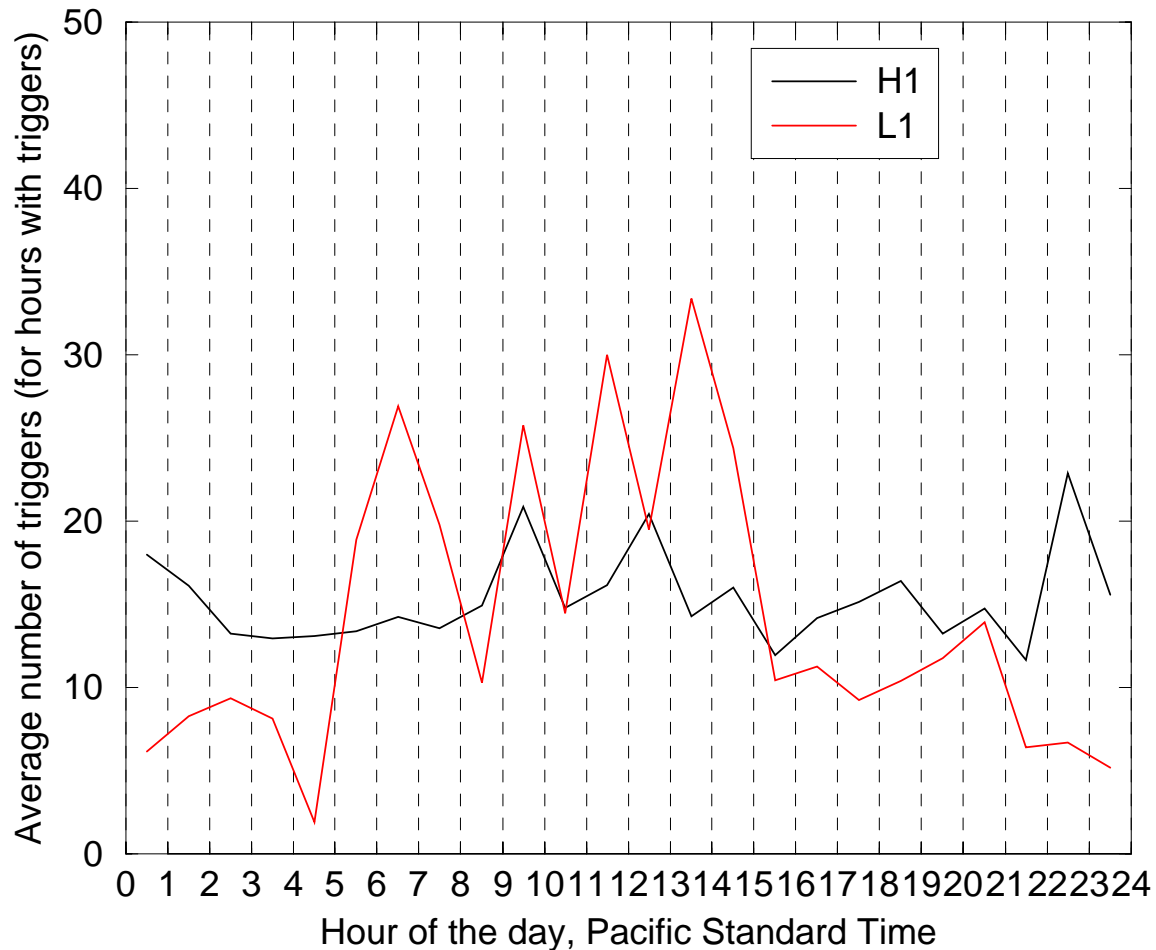
No excess found in radio channels:

H0:PEM-RADIO_LVEA; H0:PEM-RADIO_LVEA; 1,994,456 s

Threshold (sigma)	Events exceeding threshold	Events for offset time series	(on - off)	sqrt(on+off)
7.35	2	0	2	1.41
6.7	2	6	-4	2.8
6.05	10	10	0	4.5
5.4	50	36	14	9.3
4.75	130	116	14	15.7

Correlated Increase In LHO and LLO Event Rates During Working Hours

First 27 days of S2; TFC triggers with SNR > 120, central f > 100, duration < 1

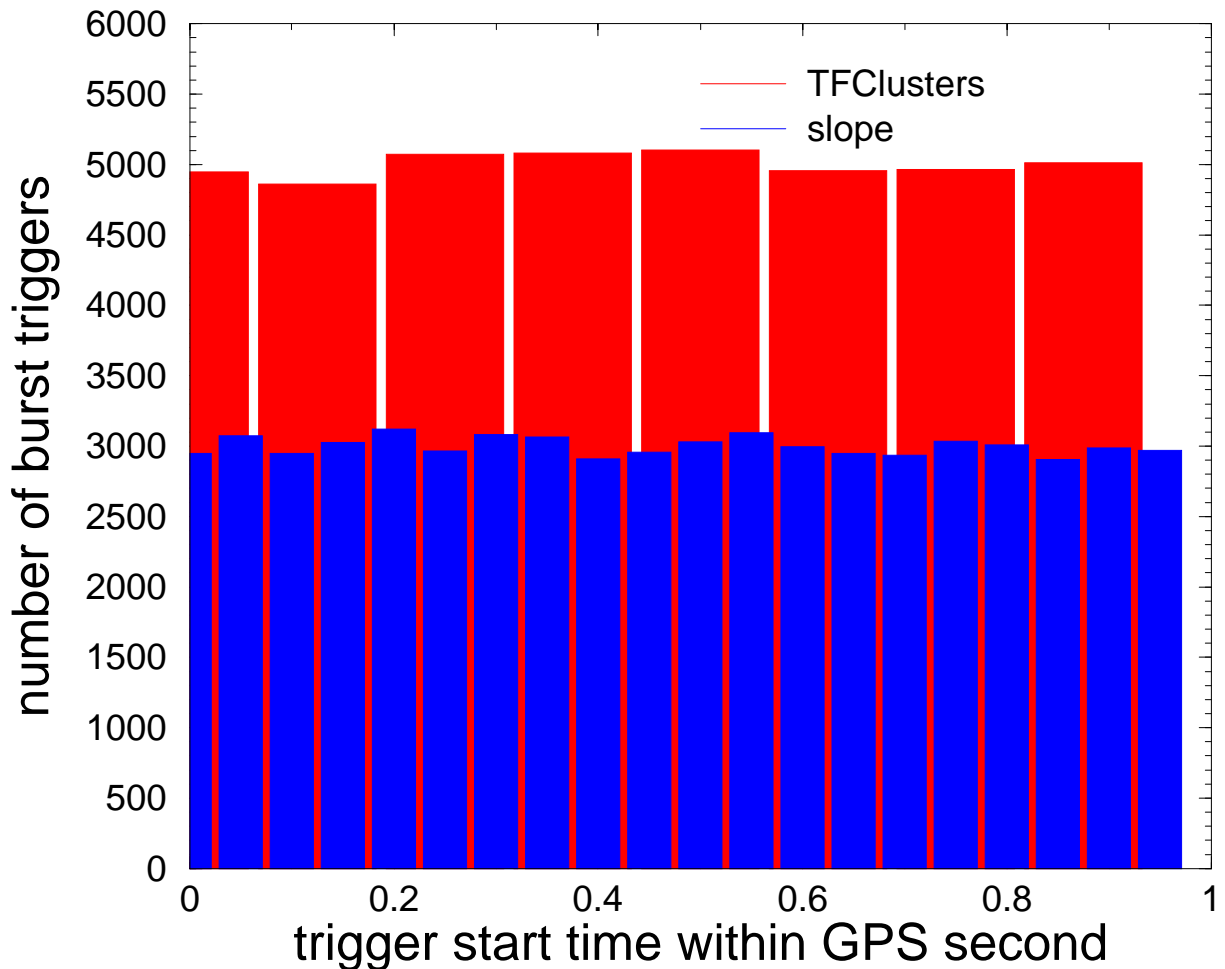


Probably associated with up-conversion of anthropogenically increased seismic signal.

Time shifts for background calculations should be small; look for correlations on scale of time shifts.

No Evidence of Increased Trigger Rate During Particular Part of GPS Second

small sample, though



Triggers for LHO; H1 or H2

SNR: TFC :7; slope: 8

Total number of events: TFC: 40000; slope: 60000

Total number of seconds with events: TFC: 21120; slope:50165
