



Glitch Group S5 Activities

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for the Glitch Working Group

LSC meeting, Hanford
March 21, 2006

G060071-00-Z



S5 activities



- **The Glitch Group continued commitment in S5:**

- » Off-site shifts
- » 2 weekly teleconferences
- » participation at S5-run-coordination and DetChar teleconferences.

- **Goals:**

- » A quasi-online assessment (3-4 days delay) of transient features and correlation as the run proceeds, using online tools developed over the past year.
- » Feedback to commissioning.
- » veto definition for online analysis (early stages).

- **Glitch-work related talks at this LSC meeting:**

- » John Zweizig – *S5 Data Quality* (next talk)
- » Shourov Chatterji - *Q Scan & Applications to Detector Characterization* (this afternoon)
- » Jake Slutsky - *S4 AS_I Veto for Inspiral Analysis* (wed morning)
- » Shantanu Desai – *S5 Loud Block-Normal Triggers & the Event Display* (wed afternoon)
- » Erik Katsavounidis - *S5 KleineWelle Glitch Studies* (wed afternoon)
- » Soma Mukherjee - *S5 Offline NoiseFloorMon Studies* (wed afternoon)
- » Duncan Brown - *S5 Online Inspiral Glitch Triggers* (wed afternoon)

- BurstMon – DMT monitor for data “burstiness”, F.O.M.s (S. Klimenko)
- BlockNormal – loud events, above fixed threshold (S. Desai)
- KleineWelle – transients on a variety of aux channels (L. Blackburn)
- InspiralMon – 10 loudest BNS candidates/day (D. Brown)
- Event Display - see Shantanu Desai’s talk
- Q-scan – see Shourov’s Chatterji’s talk
- NoiseFloorMon – slow non-stationarity after line and transient removal (S. Mukherjee)

Tools

Analysis methods

- Scan of loudest events
 - Auto-correlogram and cross-correlogram of triggers from different channels
 - Standard veto search
 - (Q-)spectrograms
-
- The trigger production is automatized (DMT, ONASYS)
 - Post-processing is at various levels of automatization (~1 day response)
 - Interpretation in the hands of shifters



S5 off-site glitch shifts



- ▶ E-notebook:

<http://www.lsc-group.phys.uwm.edu/glitch/investigations/s5index.html>

- ▶ Shift report:

http://www.ligo.mit.edu/~cadonati/S5/glitch/glitch_report-LC-20060309-20060312.html

- ▶ Weekly report:

http://www.ligo.mit.edu/~cadonati/S5/glitch/WeeklyDC_20060305-20060312.html



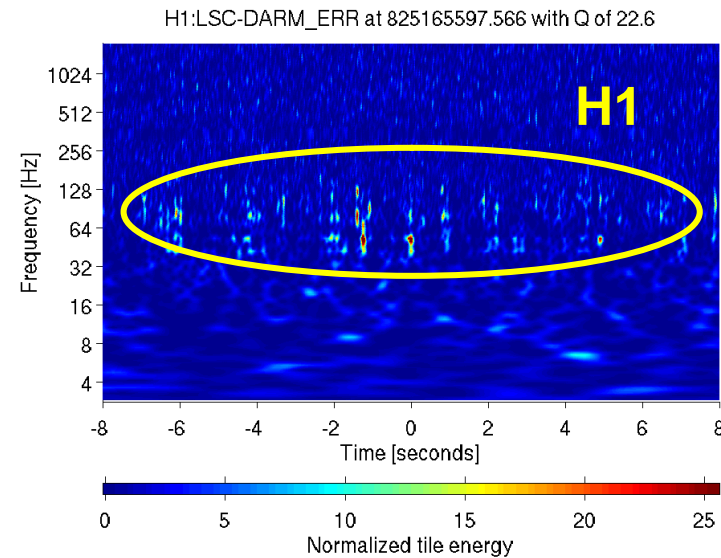
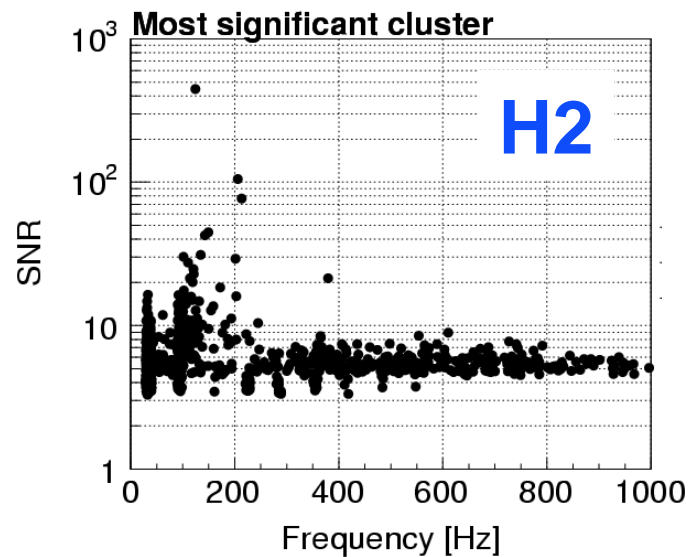
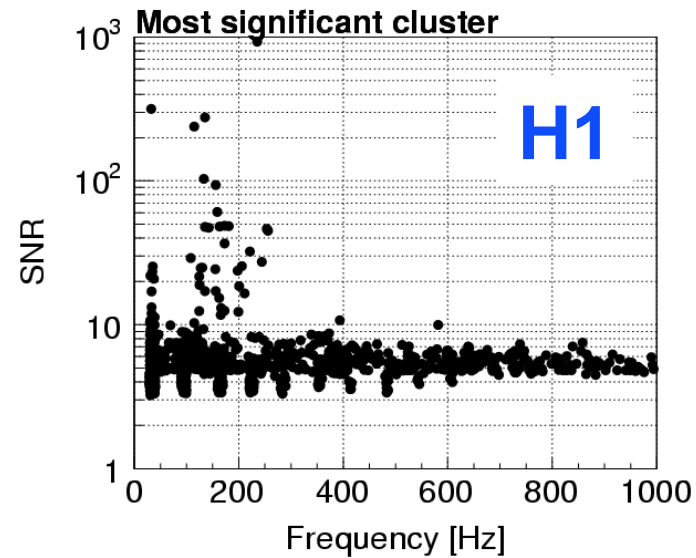
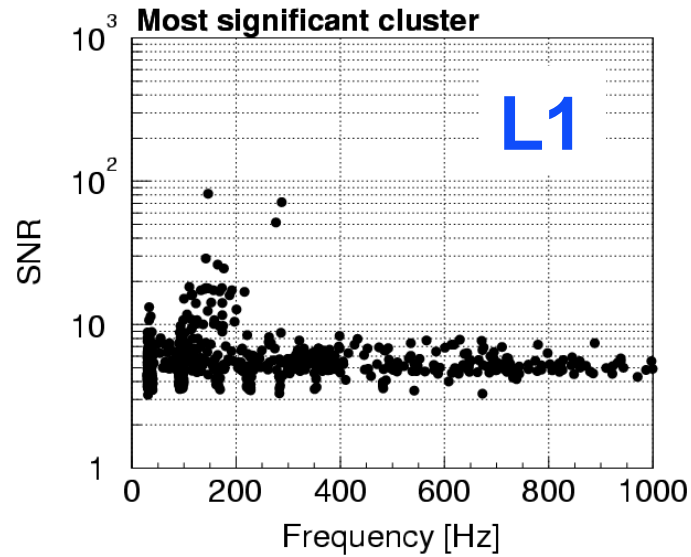
Participation



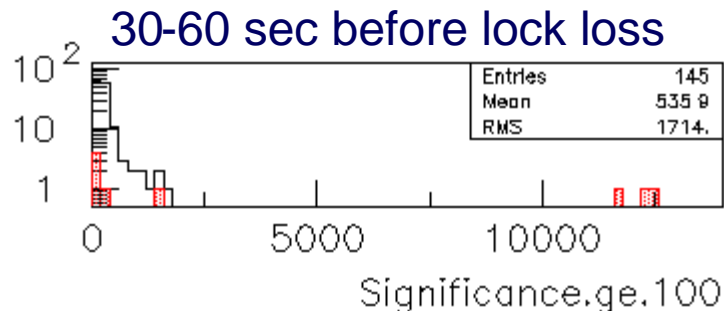
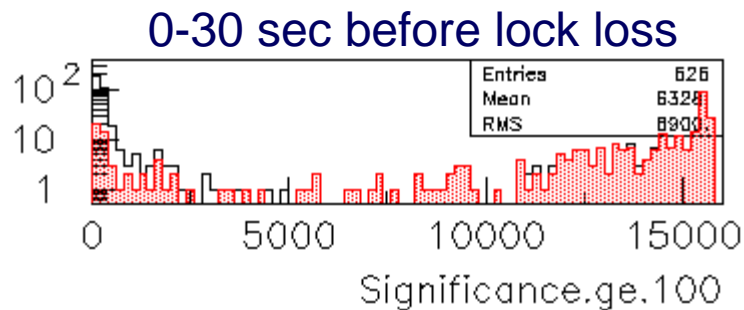
The next slides show some of the many features so far identified in S5 data. Plots and considerations are drawn from the work of several members of the glitch investigation team.

A. Di Credico, L. Blackburn, L. Cadonati, S. Chatterji, J. Dalrymple, S. Desai, J. Garofoli, G. Gonzalez, A. Gretaarson, E. Katsavounidis, S. Klimenko, S. Mukherjee, F. Raab, K. Riles, P. Saulson, P. Shawhan, J. Slusky, M. Zanolin, J. Zweizig

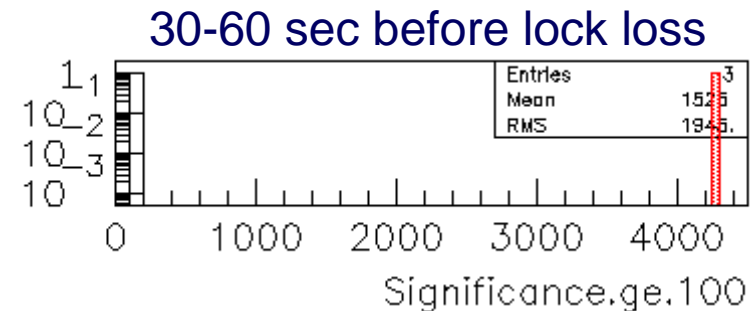
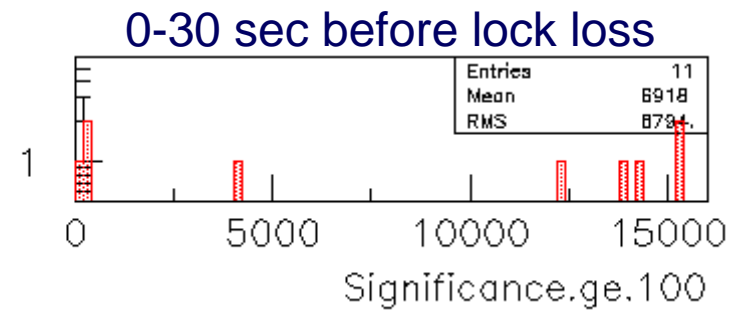
The Worst Glitching is at Low Frequency



Day 1-103 :
before commissioning break



Day 110-128 :
after commissioning break



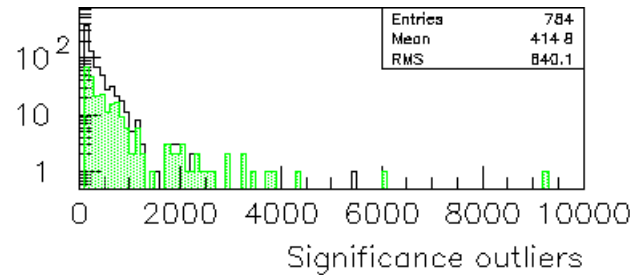
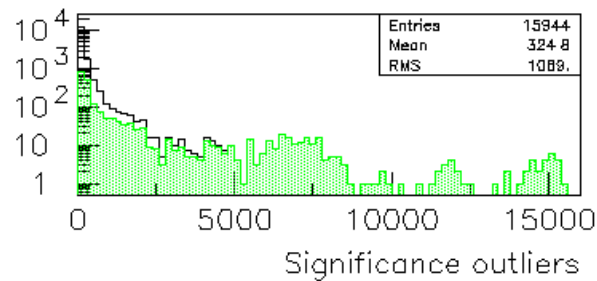


Veto studies are in early stages

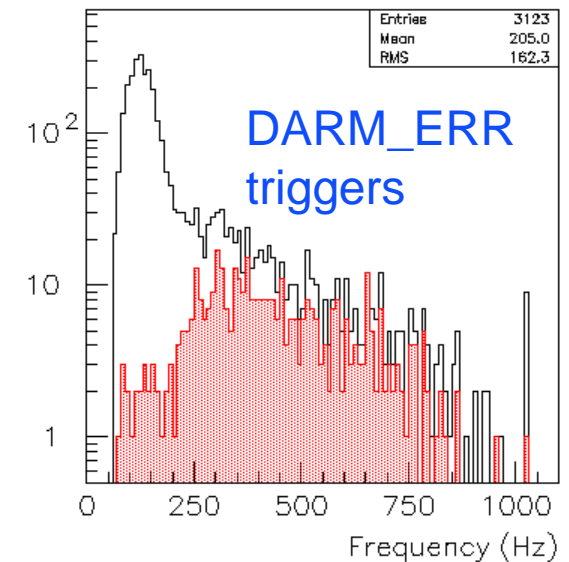
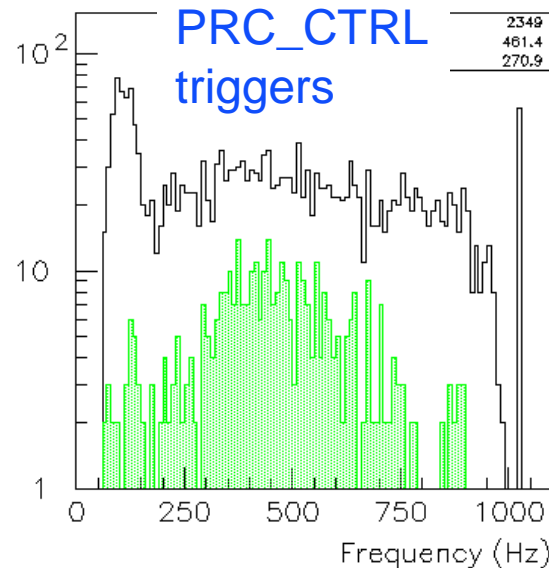
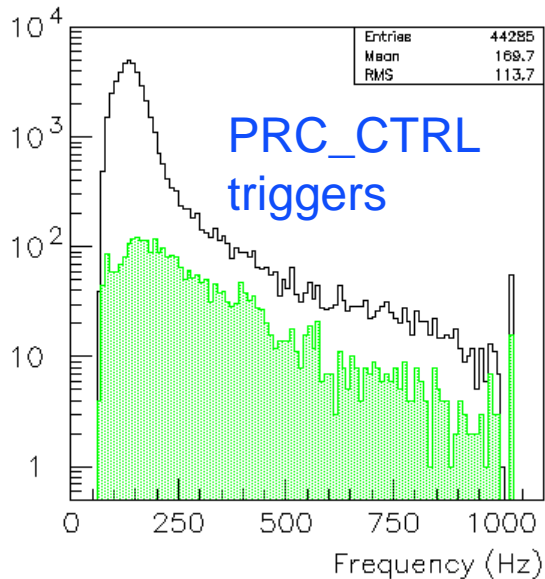


Day 1-103 :
before commissioning break

Day 110-128 :
after commissioning break



PRC_CTRL
Good veto for
Higher-freq events
In all 3 ifos

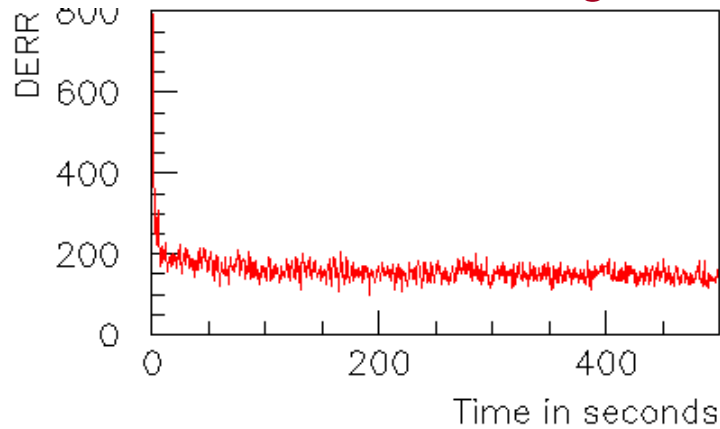




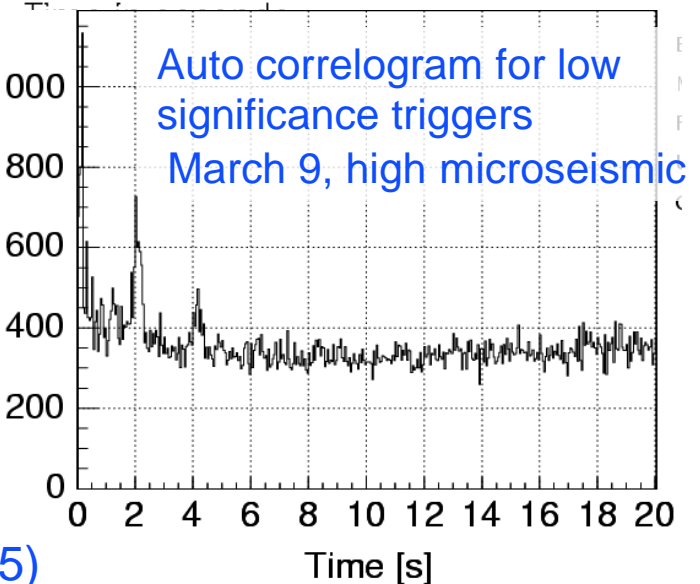
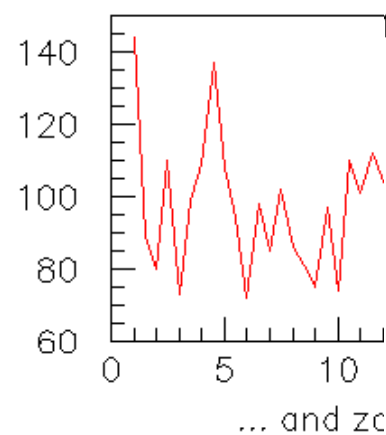
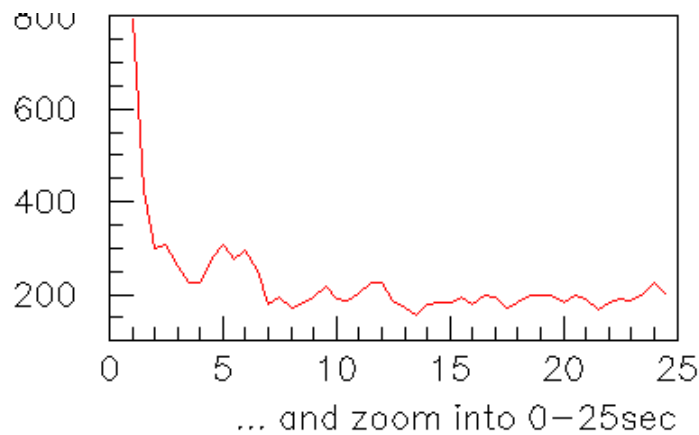
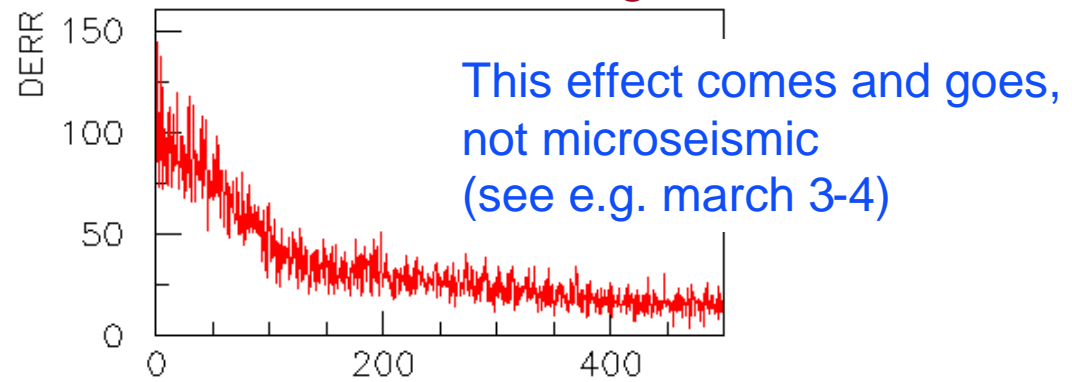
H1 auto-correlation



Day 1-103 :
before commissioning break



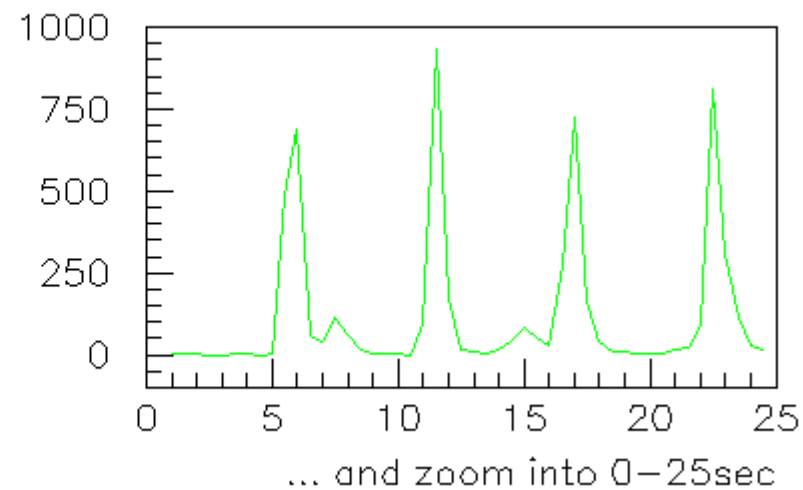
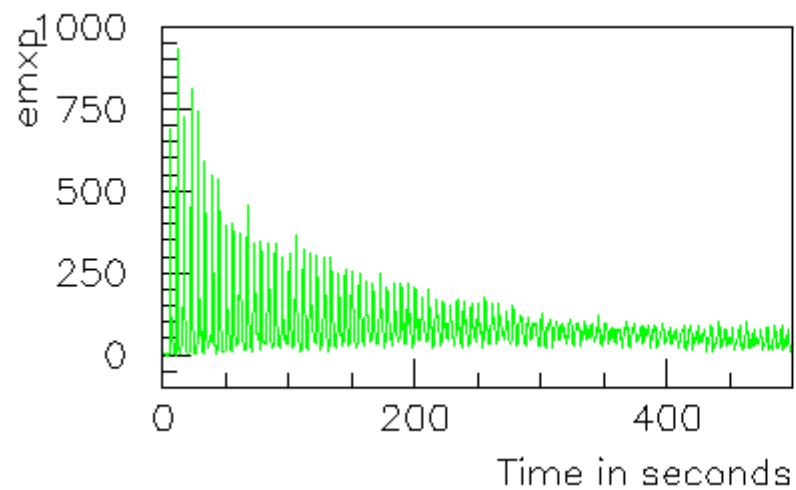
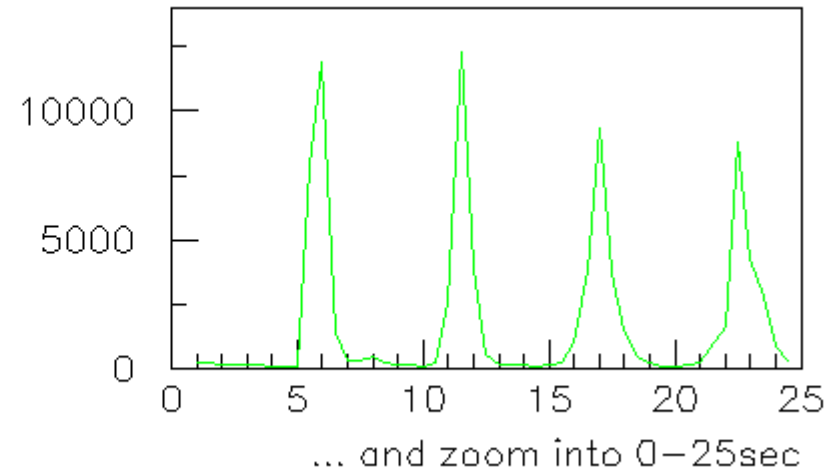
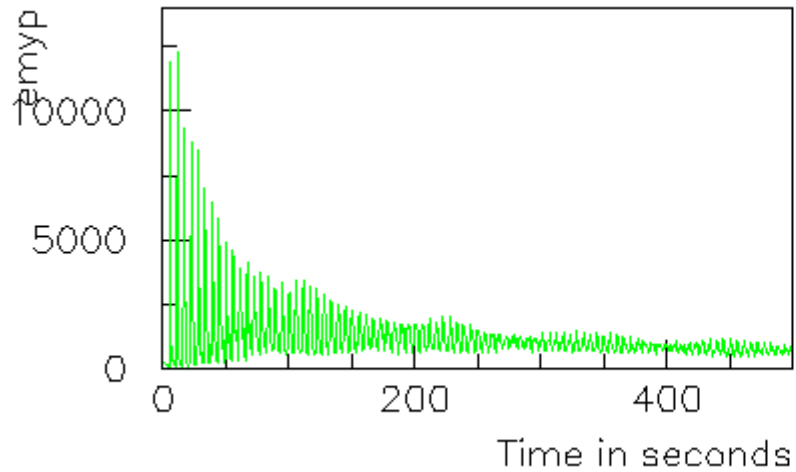
Day 110-128 :
after commissioning break



Auto-correlograms for high significance triggers (>35)



H1 ASC-ETMX,Y_P

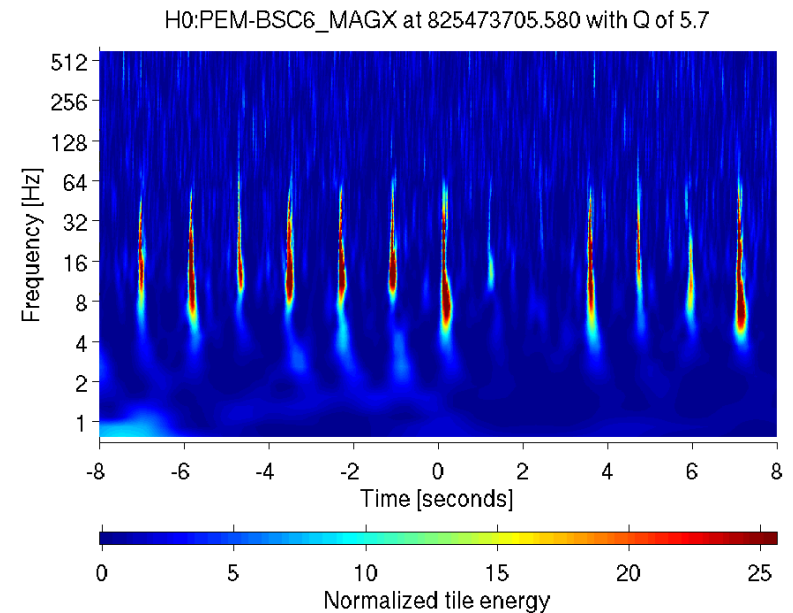
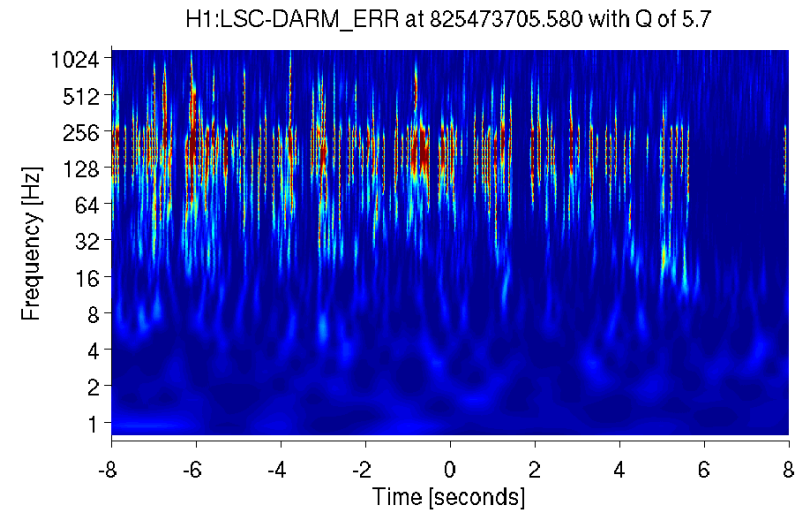
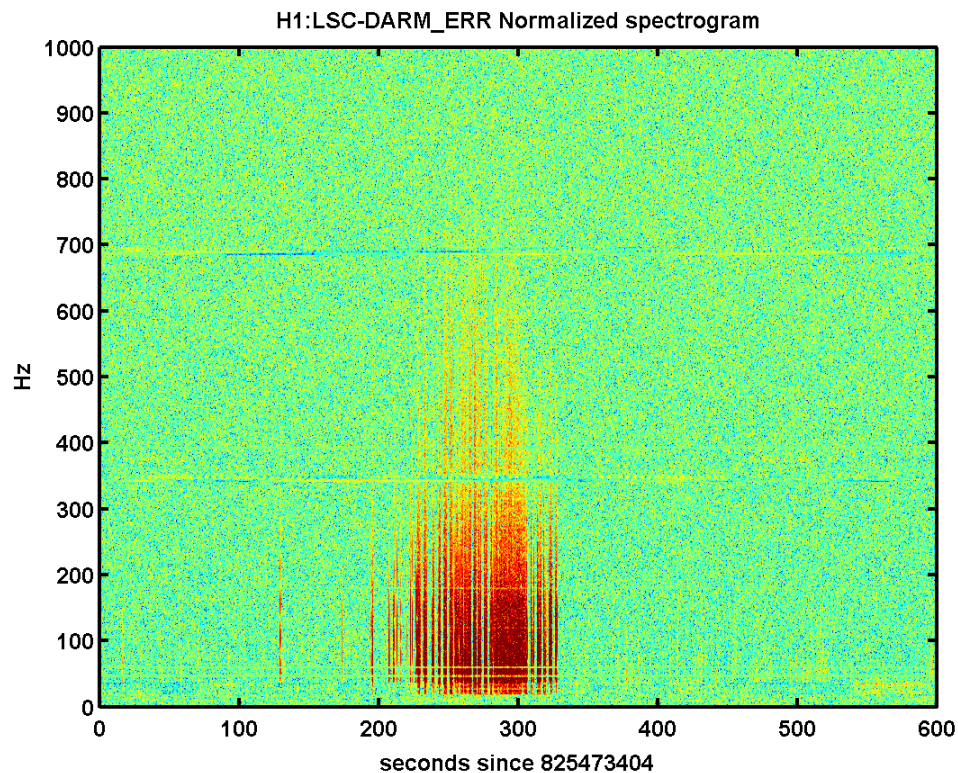




H1 glitchiness often seen in magnetometers

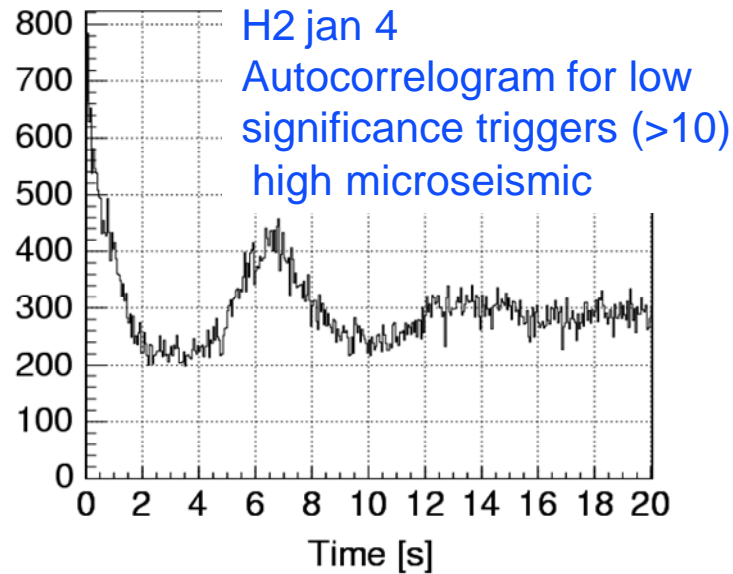


100 sec+ of very noisy data producing many "inspiral glitches" during Mar 4, 2:14 UTC, with glitches having a very weird structure, concentrated in narrow ~200 Hz freq band



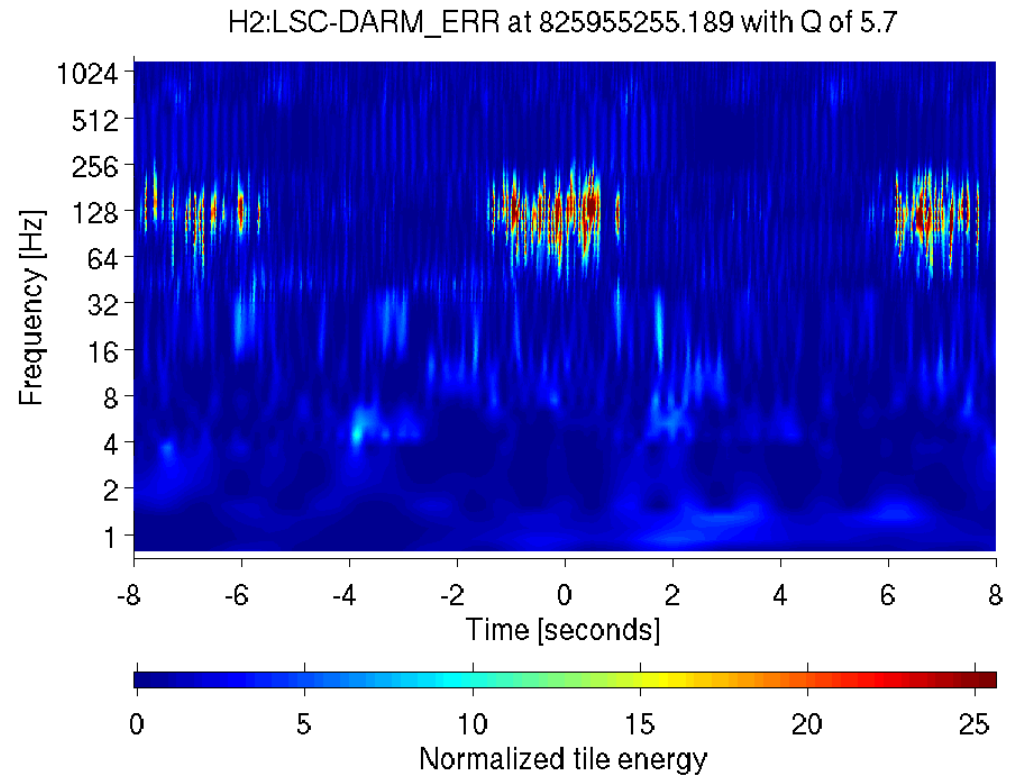


H2 - ~ 6 sec periodicity

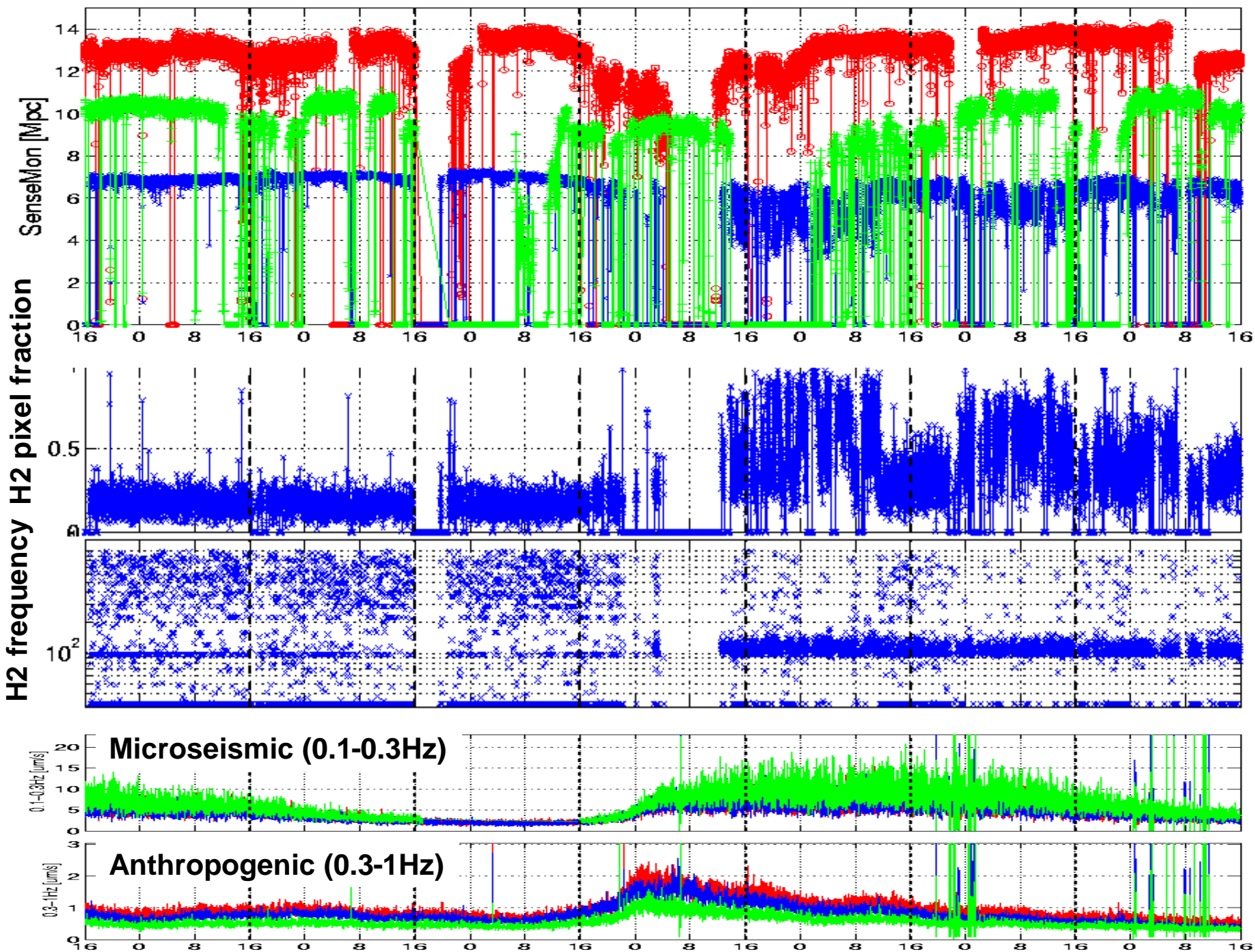


Always seen in low-significance
auto-correlograms

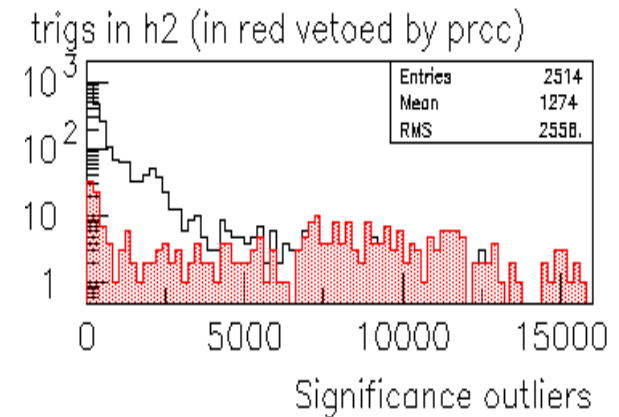
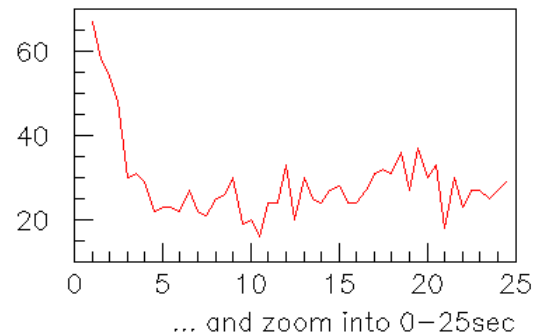
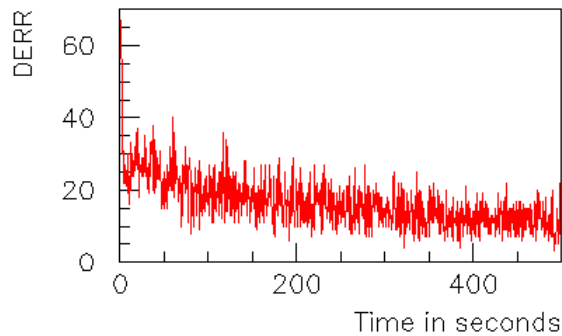
Since the maintenance,
they show up in loudest
event scan



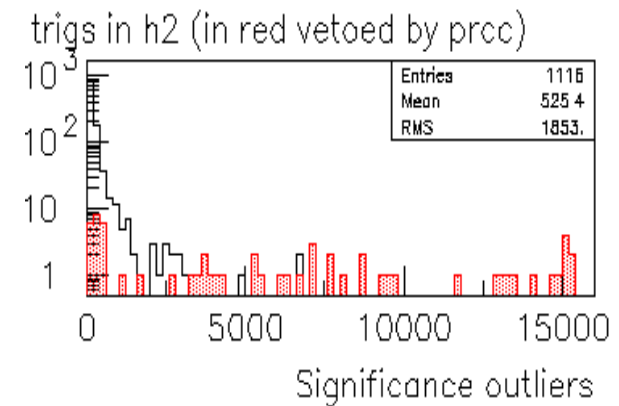
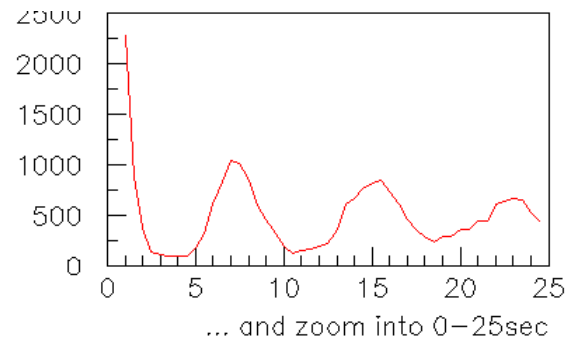
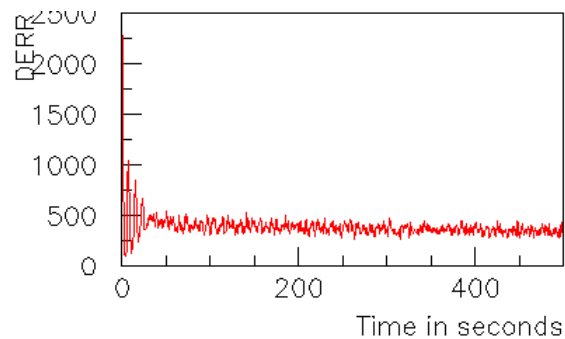
Sun Mar 05, 16:00 UTC – Sun Mar 12, 16:00 UTC



Day 1-103 : before commissioning break

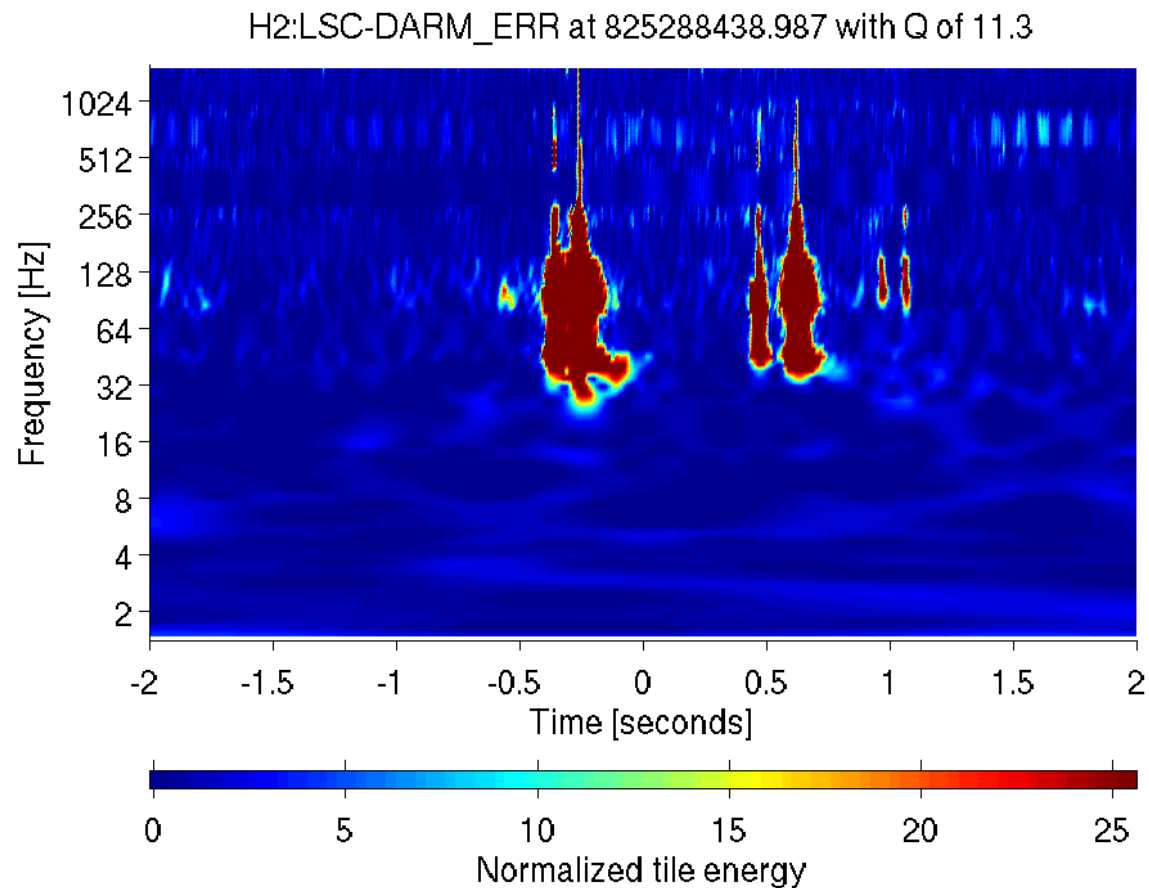


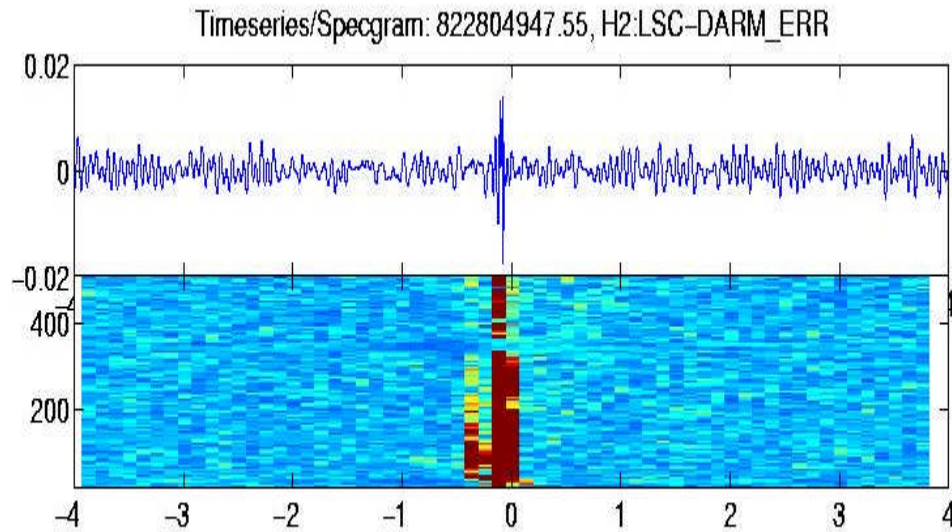
Day 110-128 : after commissioning break



Auto-correlograms for high significance triggers (>35)

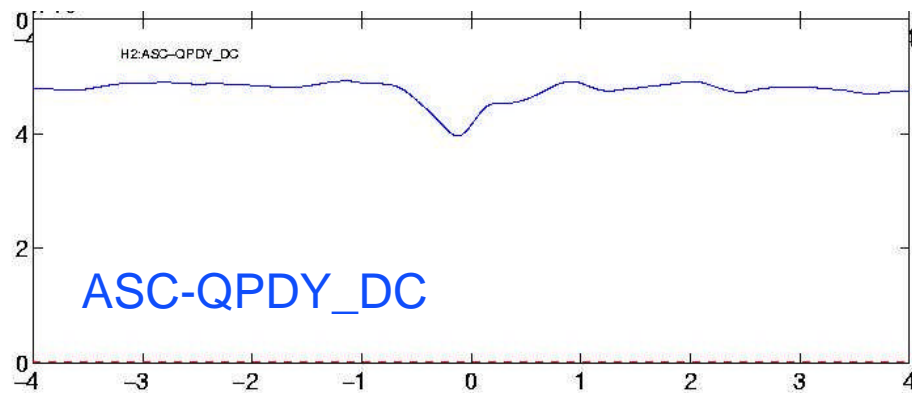
This appears in the inspiral search; shows in other channels but nowhere as loud!





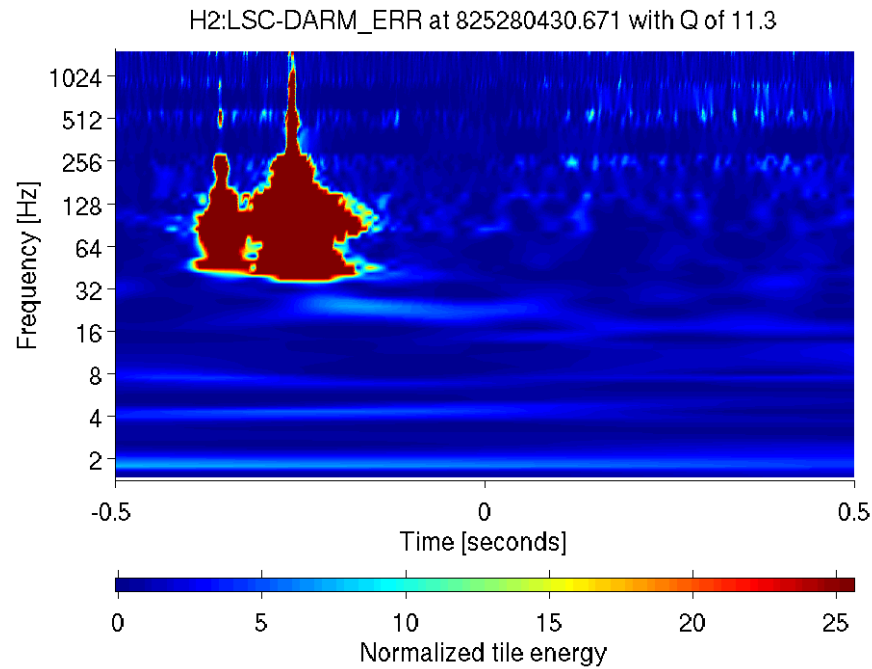
Also showing in
AS_I, POB_Q, POB_I,
PRC_CTRL, REFL_Q,
AS_DC, MICH_CTRL,
WFS2 ...

:plot made 03-Feb-2006 19:28:59

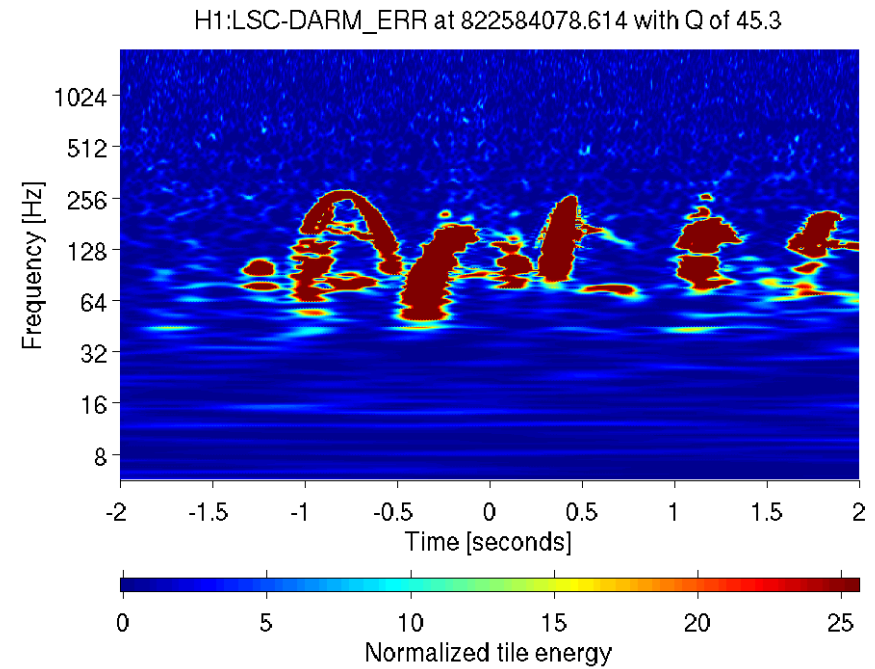


This plot made 03-Feb-2006 19:30:56

H2 when H1 is not locked

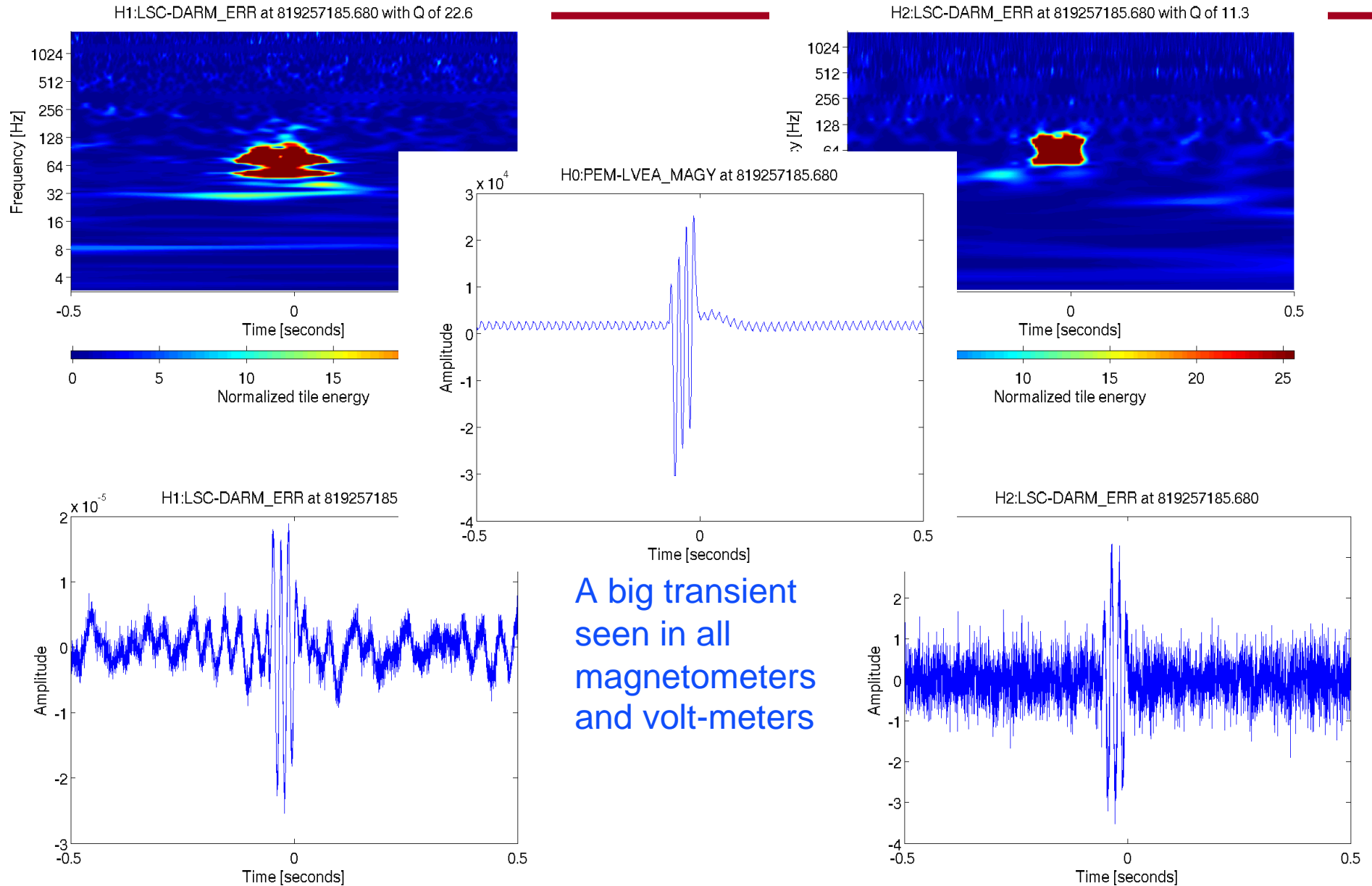


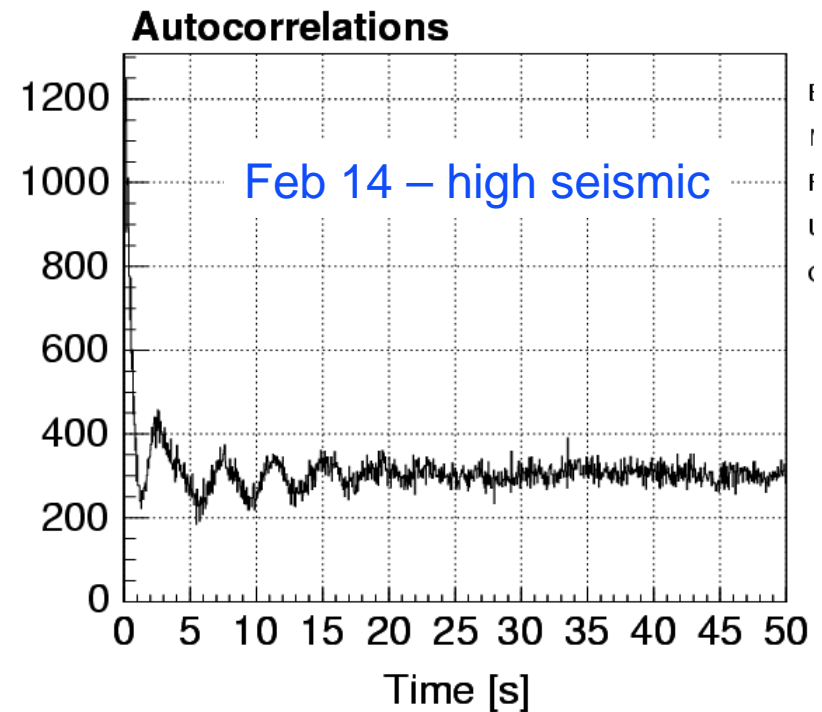
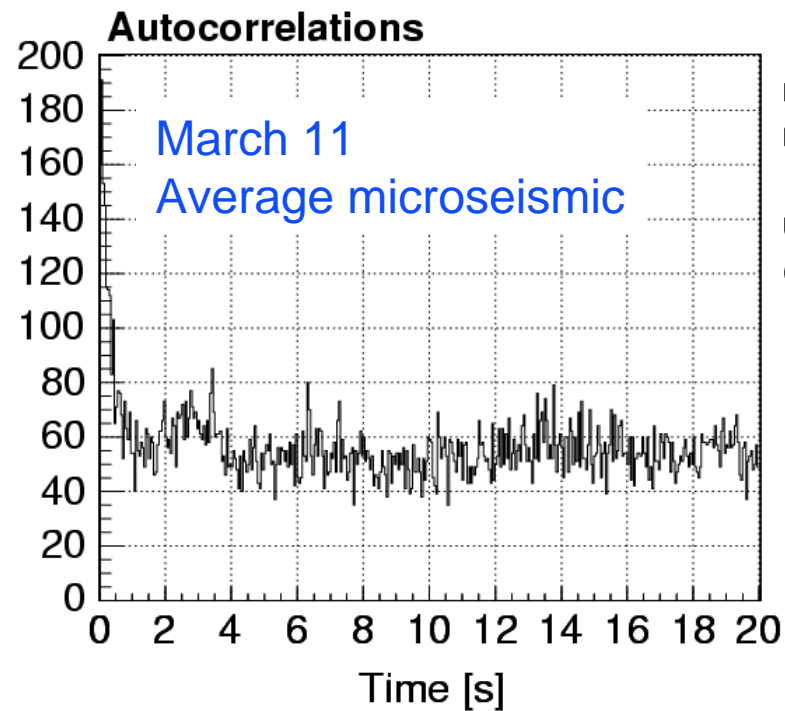
H1 when H2 is not locked





H1-H2 coincidence excess



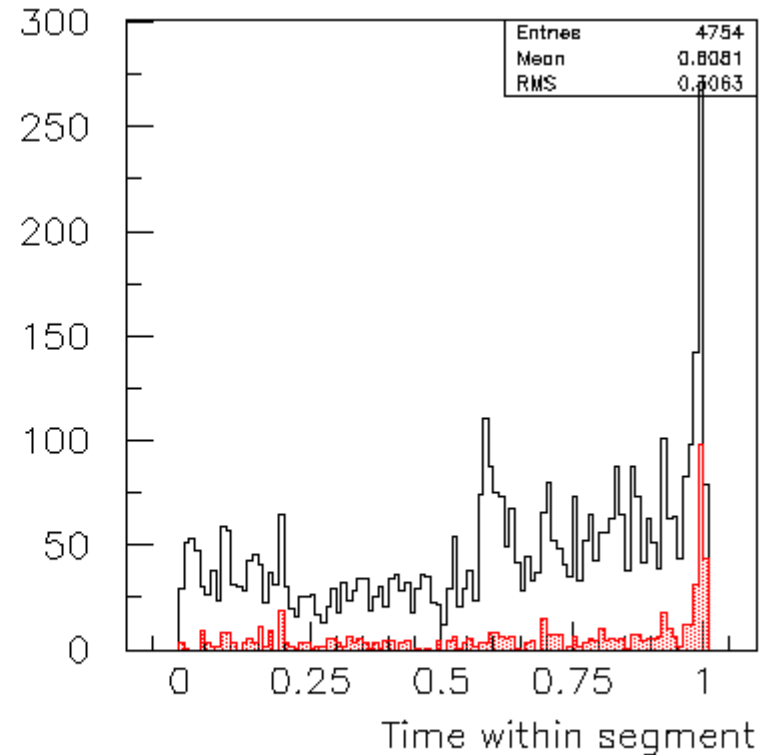
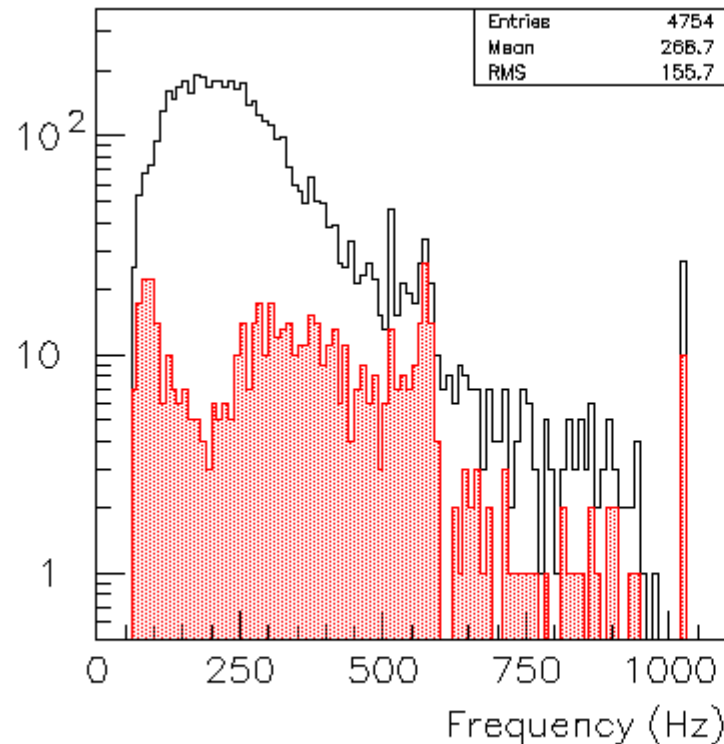
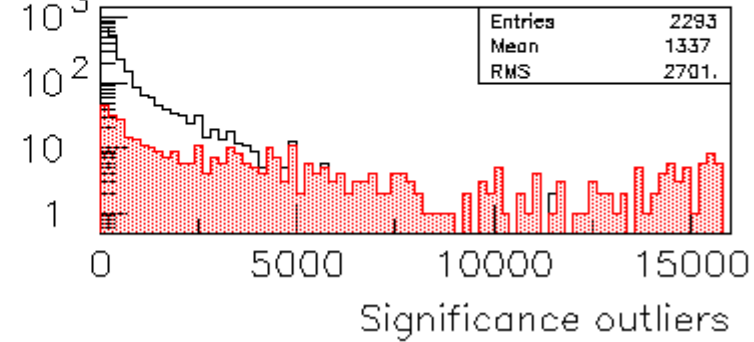
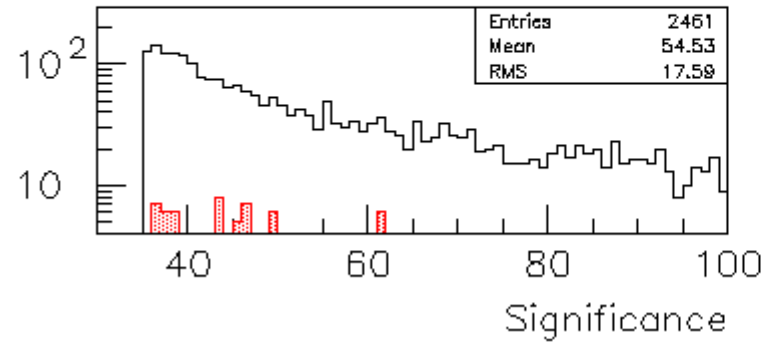


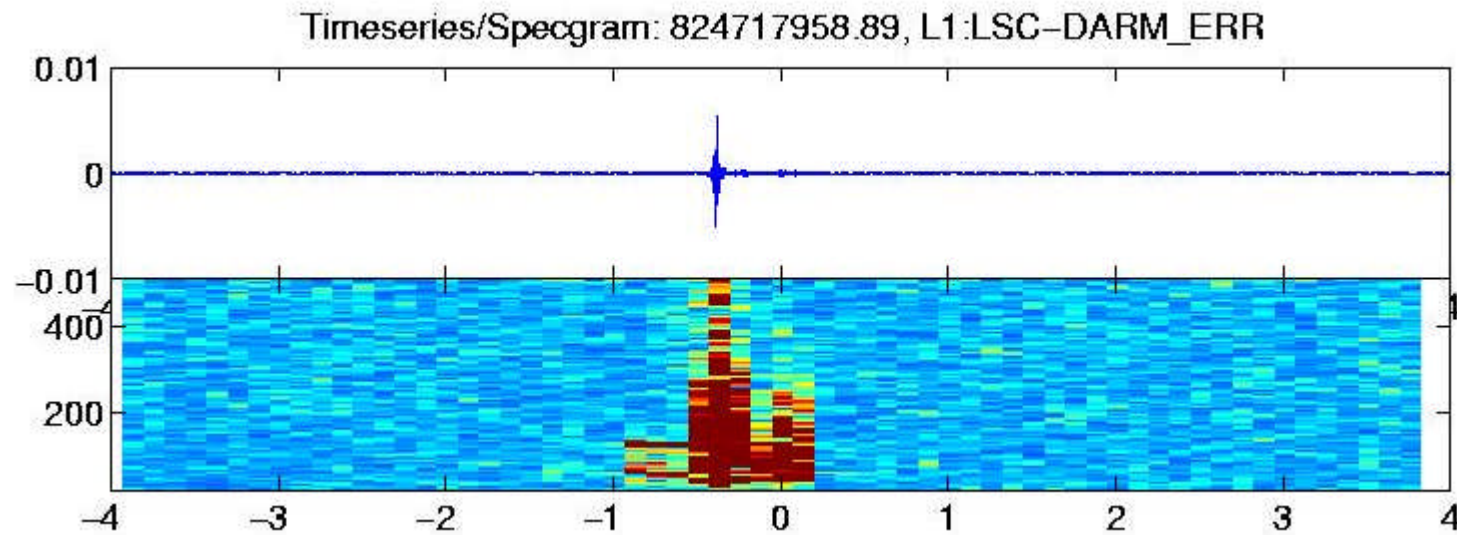
Structures show in low-significance auto-correlograms
But not in high-significance ones



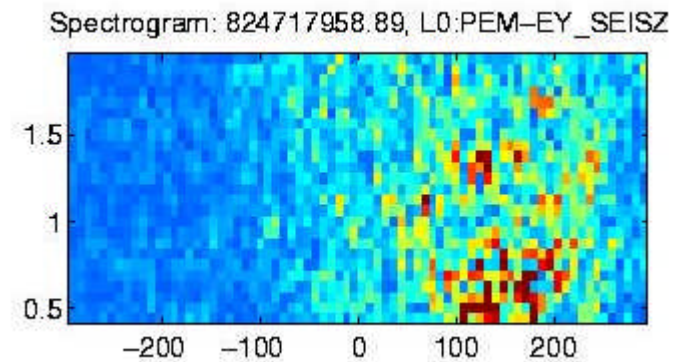
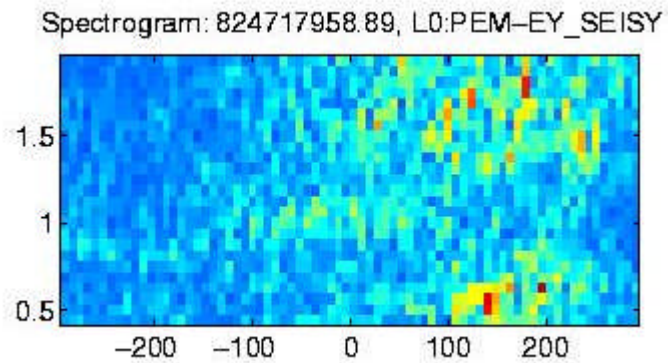
Day 1-103 : before commissioning break

alls5-features of DERR KleineWelle trigs in I1 (in red vetoed by prcc)





15 minutes before a train...

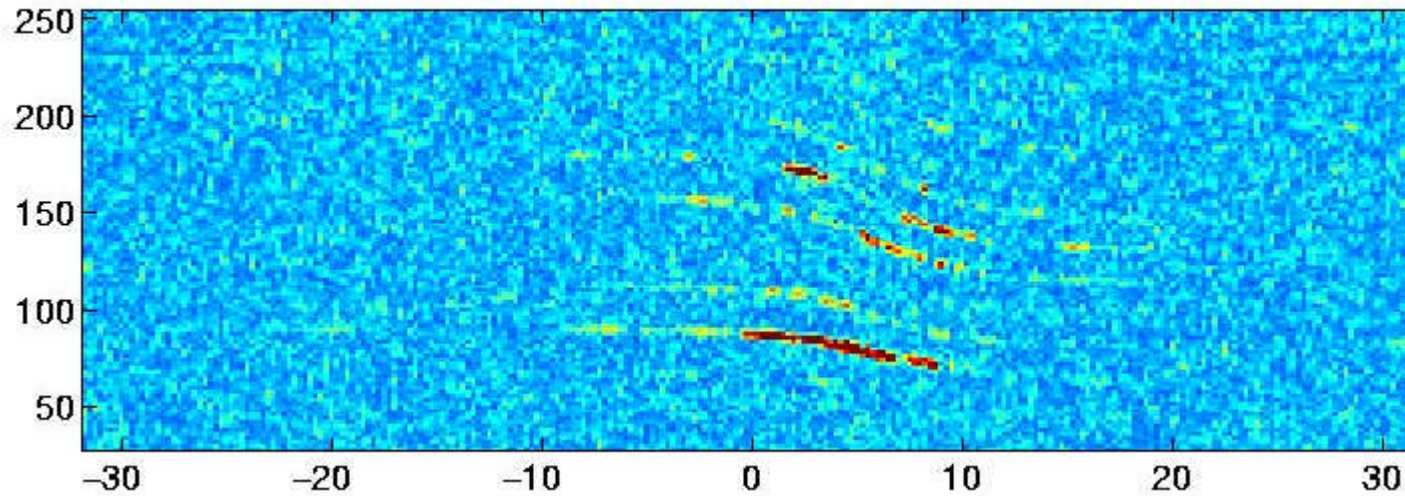




L1 – planes and helicopters

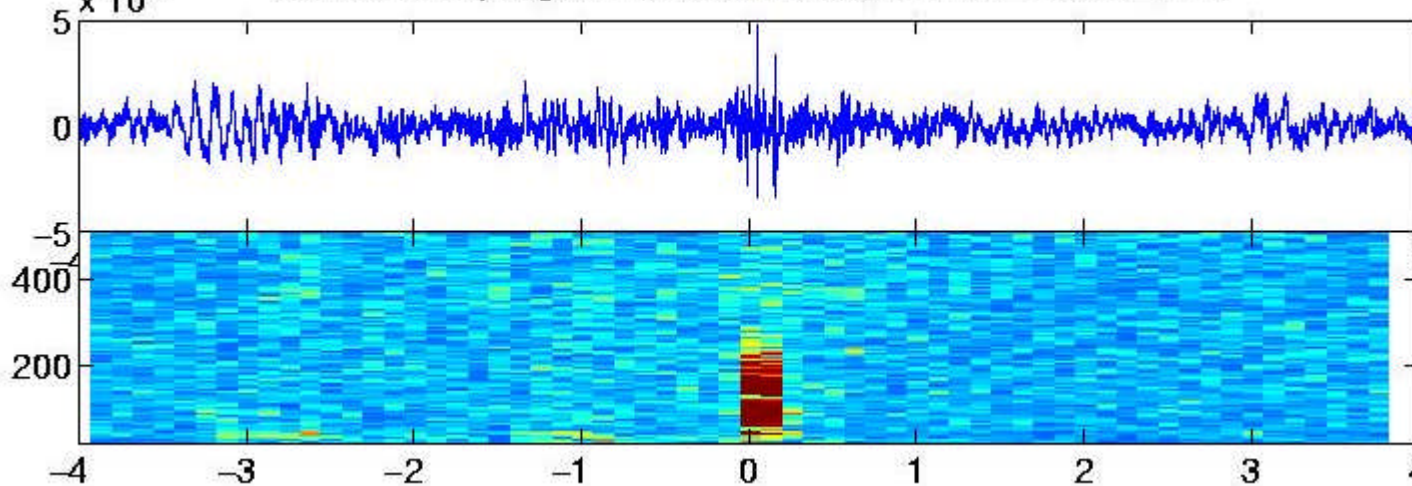


Spectrogram: 819912749.97, L0:PEM-BSC5_MIC



seconds

Timeseries/Spectrogram: 819912749.97, L1:LSC-DARM_ERR



BlockNormal
outlier

seconds 22



Conclusions



- The glitch group is finding lots of features, the limit is only manpower.
- The shift system is a way to do science monitoring offsite and learn about our data and provide feedback to commissioning/run coordination.
- Contribution/help is welcome!