Summary of S1 at LIGO Hanford Observatory

Fred Raab

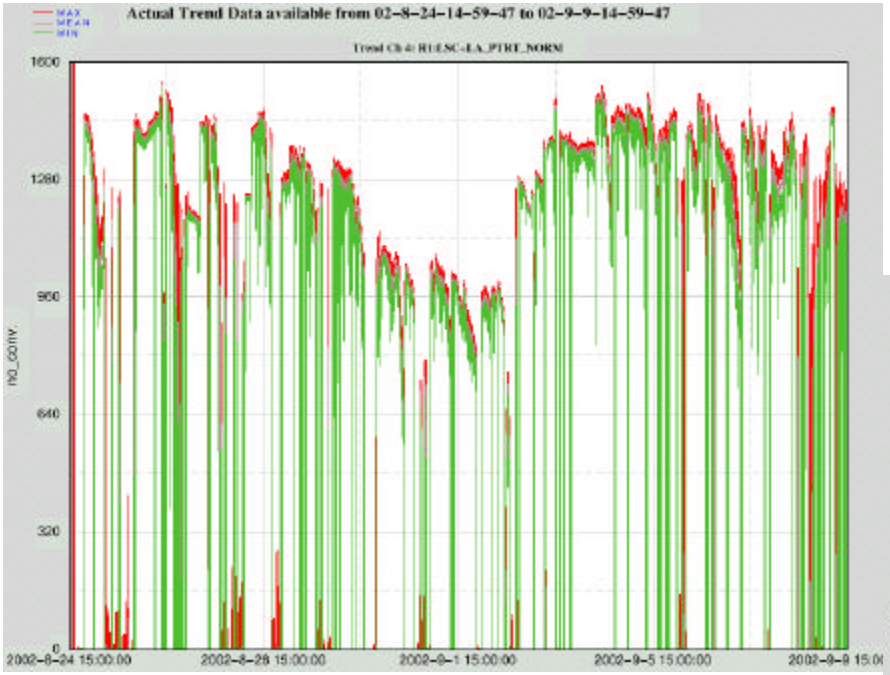
9 September 02

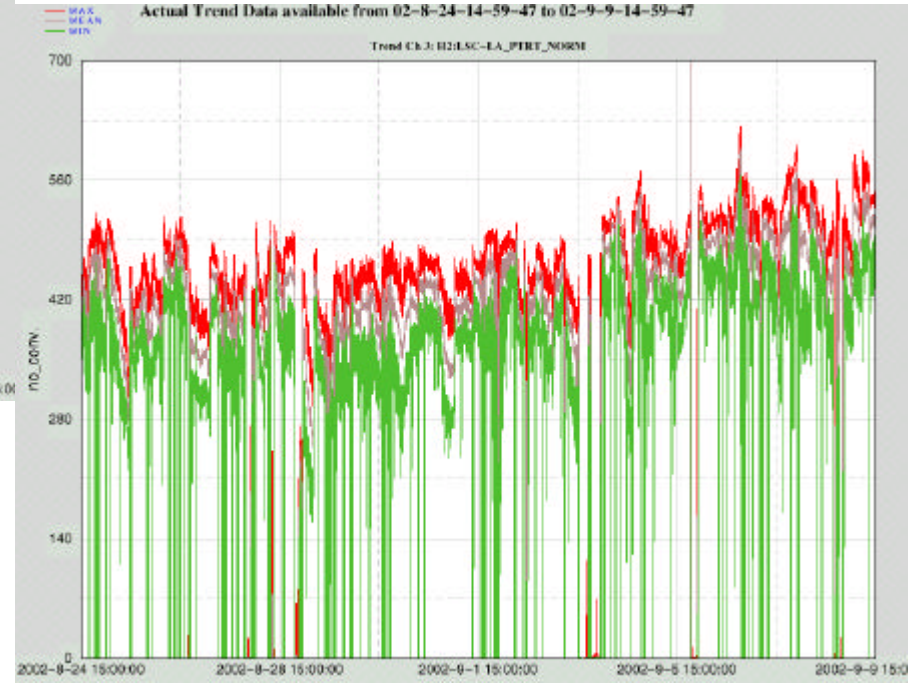
LIGO-G020407-00-W

Clean Science Duty Cycle (segments > 300 seconds)

- H1 “science” duty cycle ~ 58%
- H2 “science” duty cycle ~ 73%
- Longest locked section exceeded 21 hours on H1
- Nearly 100 hours of LIGO triple coincidence science data

Arm Powers


Actual Trend Data available from 02-8-24-14-59-47 to 02-9-9-14-59-47
MAX
MEAN
MIN
1600
1280
960
640
320
0
no_conv
2002-8-24 15:00:00
2002-8-28 15:00:00
2002-9-1 15:00:00
2002-9-5 15:00:00


Actual Trend Data available from 02-8-24-14-59-47 to 02-9-9-14-59-47
MAX
MEAN
MIN
700
560
420
280
140
0
no_conv
2002-8-24 15:00:00
2002-8-28 15:00:00
2002-9-1 15:00:00
2002-9-5 15:00:00

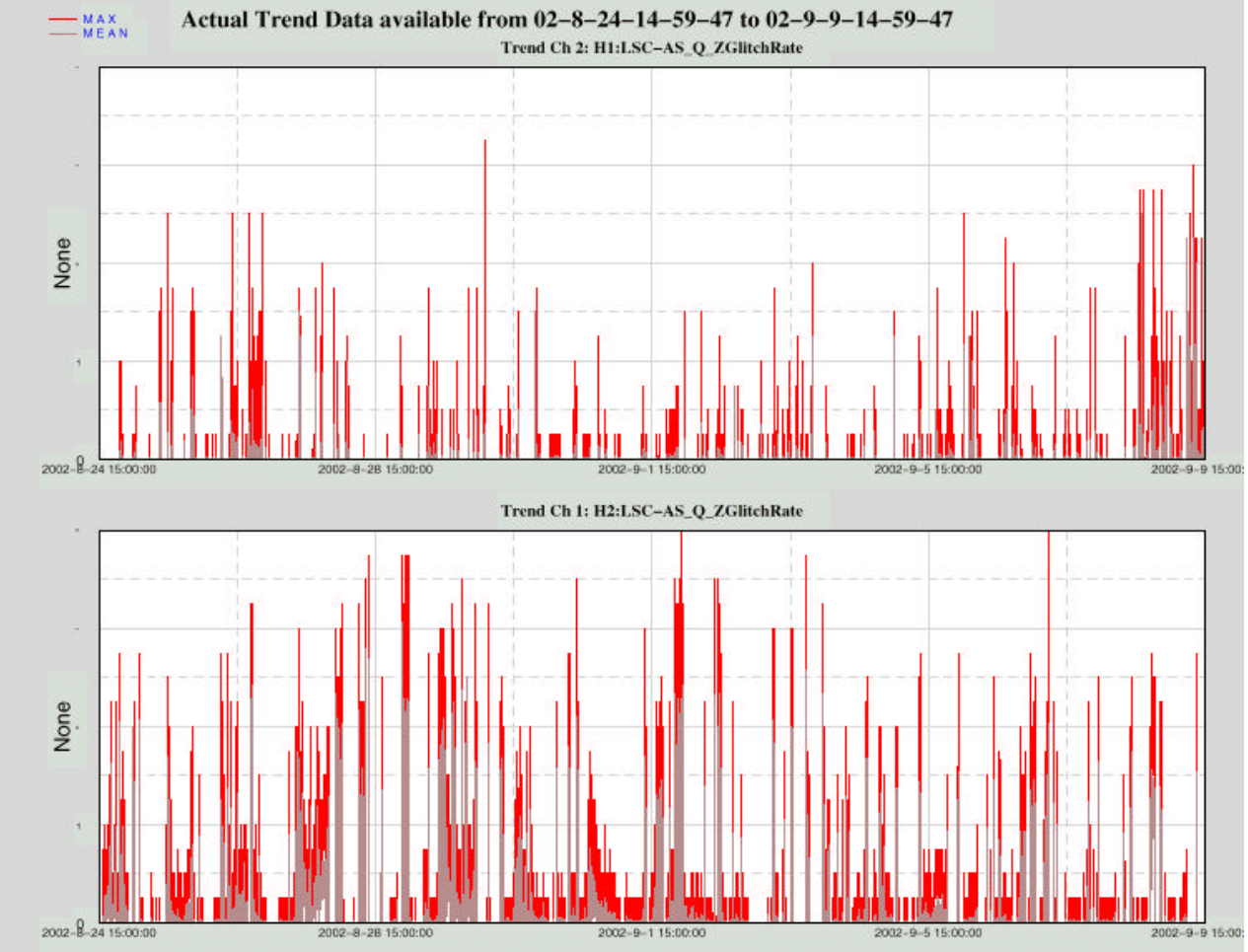
Rocky Start

- H1 had rough time coming into lock for run
  - » All-night marathon delivers locked H1, 1 hour before S1 start, but re-locking was problematical for 1st week
  - » Alignment did not seem to be an issue, since initial buildups of 1000-1400 were typical when it locked, but did not ease difficulty
  - » Once locked, IFO remained locked for very long times
- H1 noise had large sensitivity to NSPOB
  - » Variations of ~5x, depending on NSPOB
  - » Needed NSPOB ~ 400-450 for good noise
  - » Lock robustness required NSPOB > 150, so we would take IFO out of science mode for alignment tweak when NSPOB hit 200

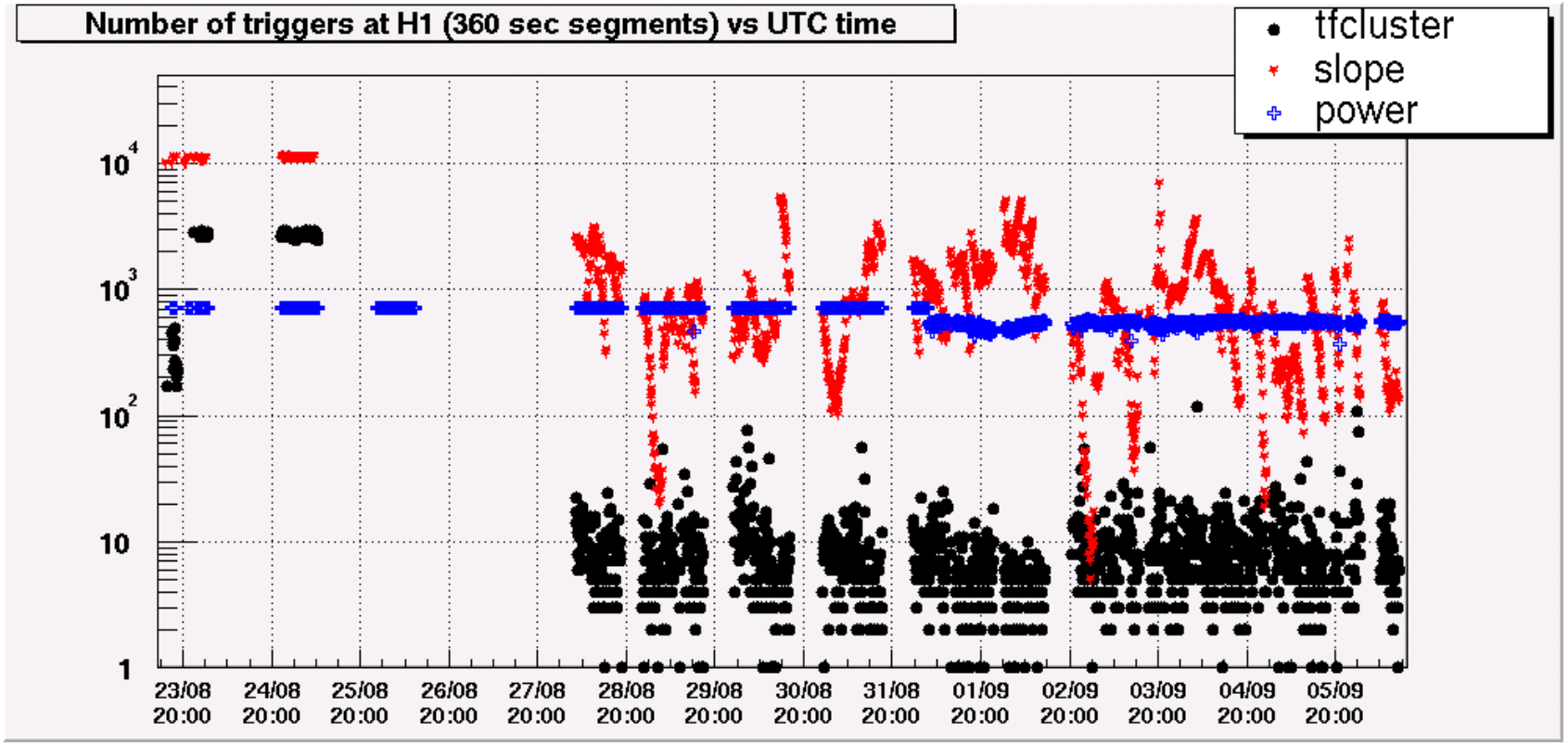
Operational Issues

- Continuous calibration lines at ~ 38, 974 Hz were a challenge
  - » Conlog monitored enabling of AWG channels, but not whether they have amplitude
  - » LineMon was thought to be working, but gave unreliable amplitude info because of a programming bug that was found late in run
  - » AutoCalibration script left amplitude of calibration lines set to zero
- SensMon was uninterpretable due to problems with calibration corrections
- Glitch monitors were largely quiet
  - » Data was far less glitchy than E7, but documented monitors were ill-suited to characterizing less glitchy data
  - » Need better pre-filtering before glitch-finding

ZGlitch Summary



Importance of On-line Analysis to Monitor Data Quality

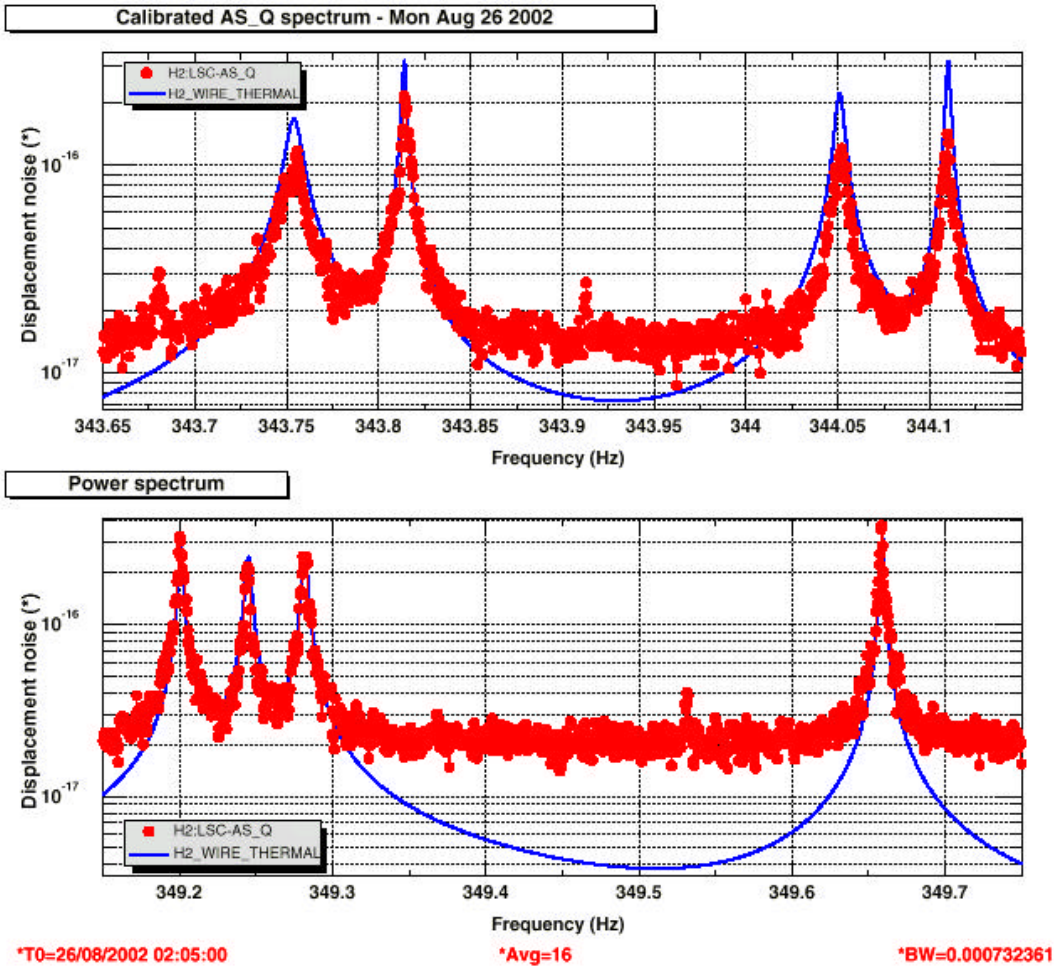


Apparently no event-rate discontinuity when “heartbeat” turned on

More Operational Issues

- CDS instability early in run due to GPS timing errors on H1
  - » Cured by running with doors open (default state prior to S1) and changes to timing configuration
- Non-linear steering found in H2:ETMx
  - » Appears that there is instability in controller at certain coil currents
- Alignment swings observed in H1:MMT3
- Some correlation of lock loss with single-bldg seismic transients
  - » Local vibration source?
- Some lock loss correlation between H1 and H2
  - » EY seismic transient coincident with H1 lock loss
  - » MY seismic transient coincident with H2 lock loss, 6 seconds later
  - » EY transient coincident with turn-on of site water system well pump

Some Good News: Thermal Noise Observed in 1st Violins on H2, L1



Almost good enough for tracking calibration.

Up Next…

- New digital controllers for H2
- Software upgrades for H1
- Install microseism upgrade
- Need water-system modifications
- Find the single-bldg vibration source
- Investigate noise correlations on ISC tables
- Improve Noise!