S5 Upconversion DQ Flags

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L-V Meeting
March 19, 2008

Upconversion flags

- Upconversion flags by coil current (0.1-40Hz)
  - Flag the times that low frequency seismic signals disturb the IFO sensitivity
  - H1:SUS-ETMY_COIL_LL
  - Flags for S5 2nd year done
  - Re-run with updated scaling function in progress
- Compressor noise at optics roll mode frequency (~18Hz)
  - H2:DARM_ERR, H0:LVEA_SEISZ
  - Compressor motor noise at LHO staging building
  - in progress

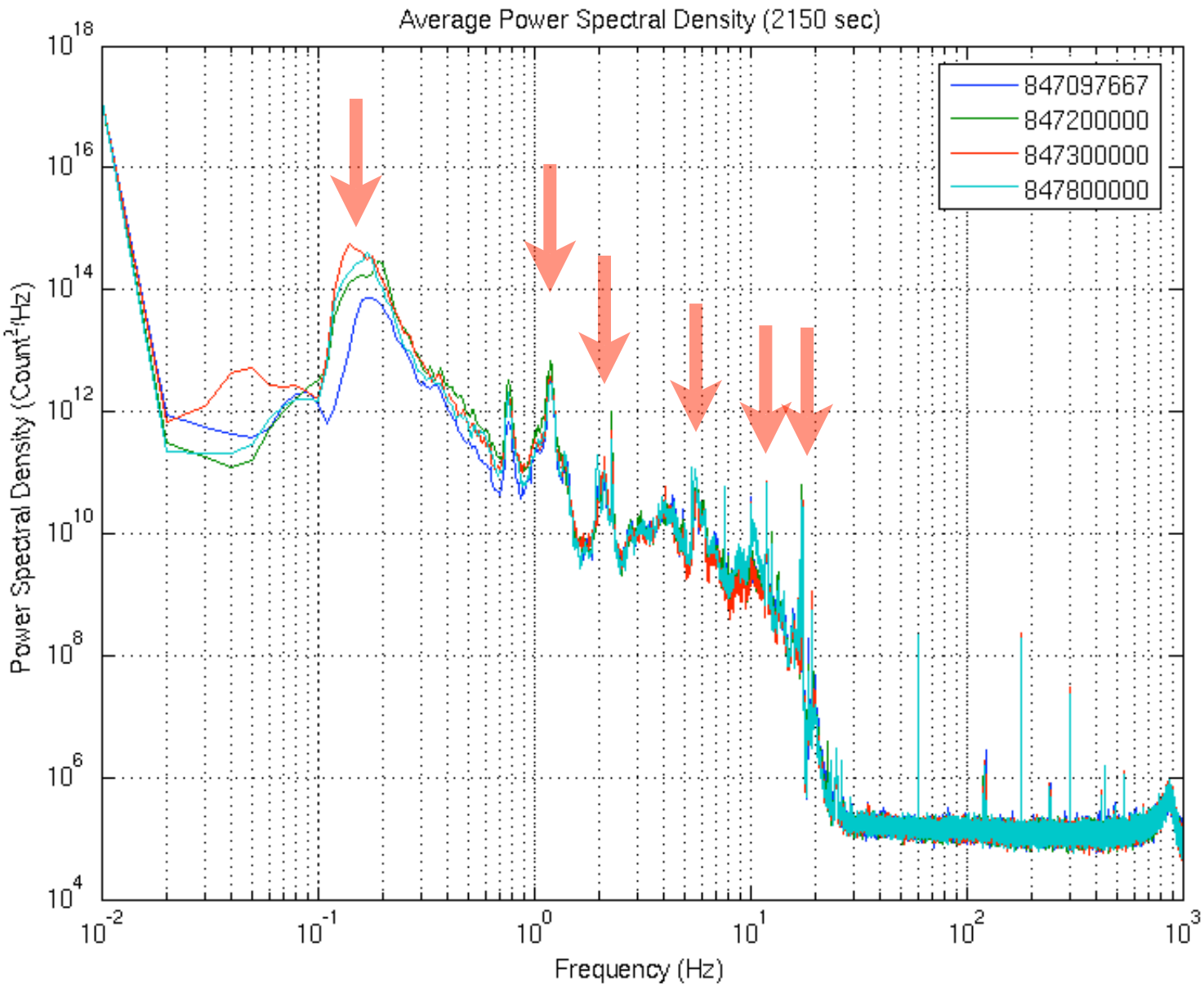
Flag by coil current

- Use H1:SUS-ETMY_COIL_LL for coil current
- Find conversion factor from selected coil peaks to H1:DARM_ERR signal
- Make a fit curve to the conversion factors -> Scaling function, *w(f)*
- Calculate band limited RMS data with the scaling function

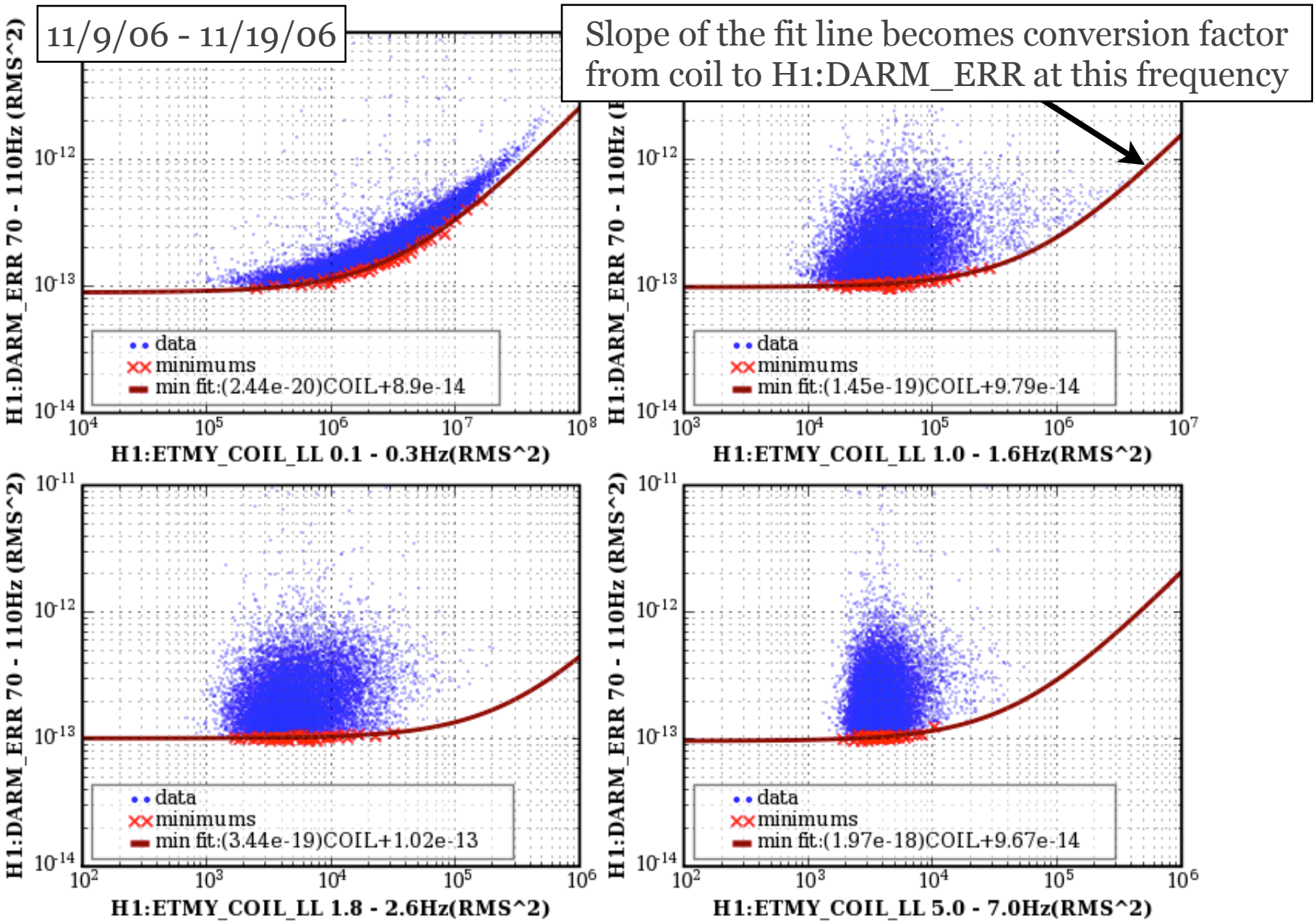
$$P_w = \int_{f_0}^{f_1} w(f)\tilde{P}(f)df$$

- Make a threshold for the scaled BLRMS

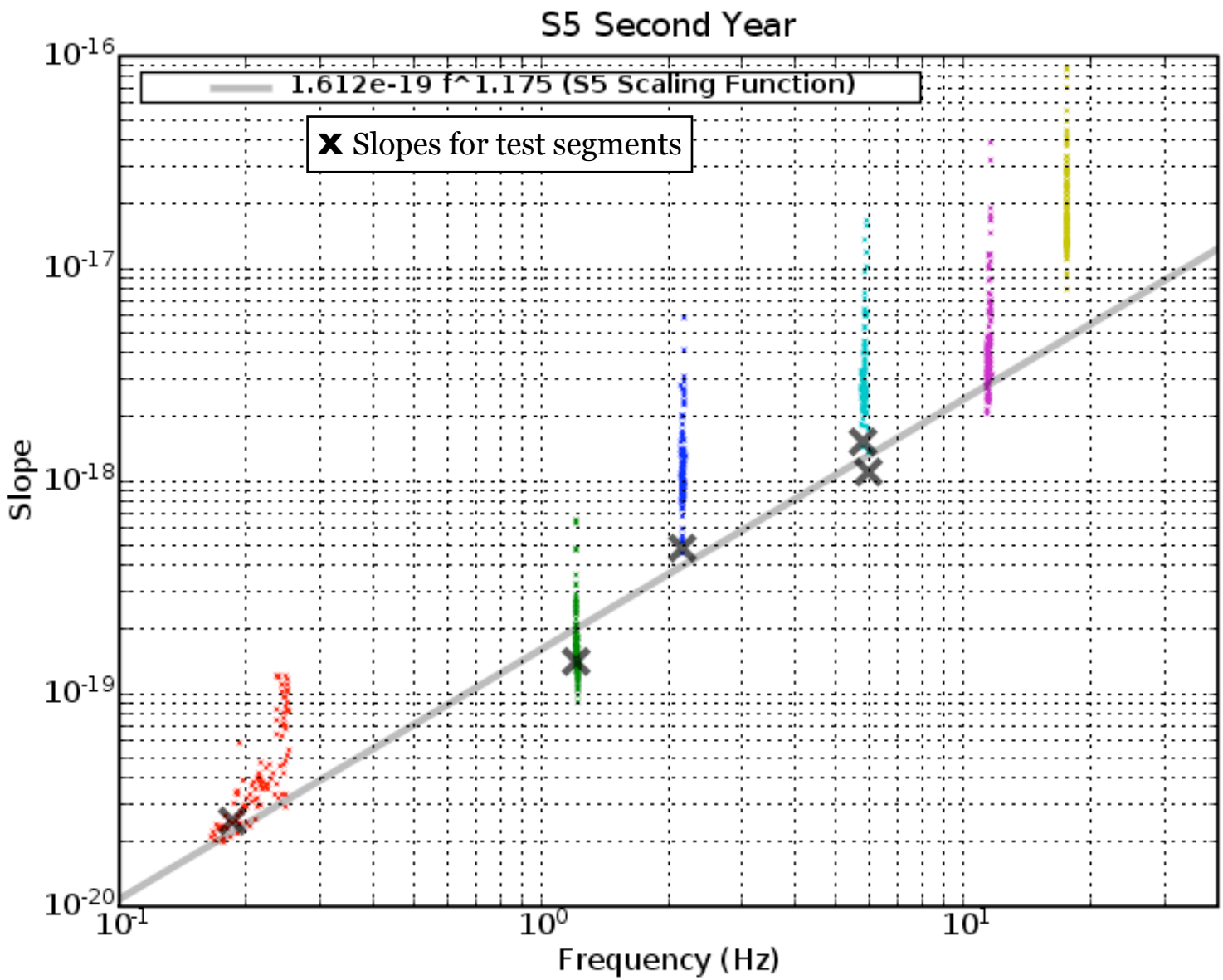
Peaks in the H1:SUS-ETMY_COIL_LL spectrum



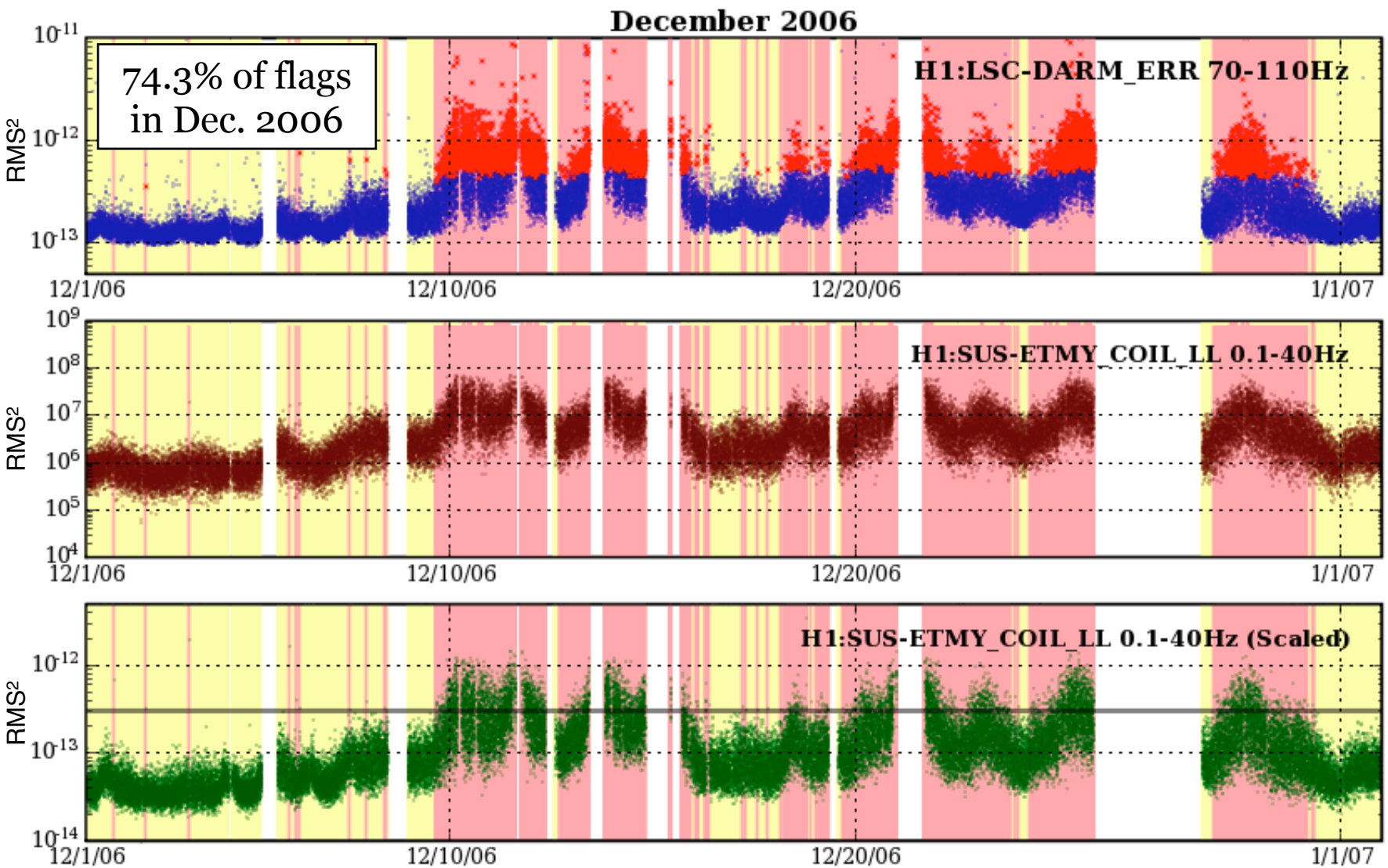
Finding how coil current at different frequencies affects H1:DARM_ERR



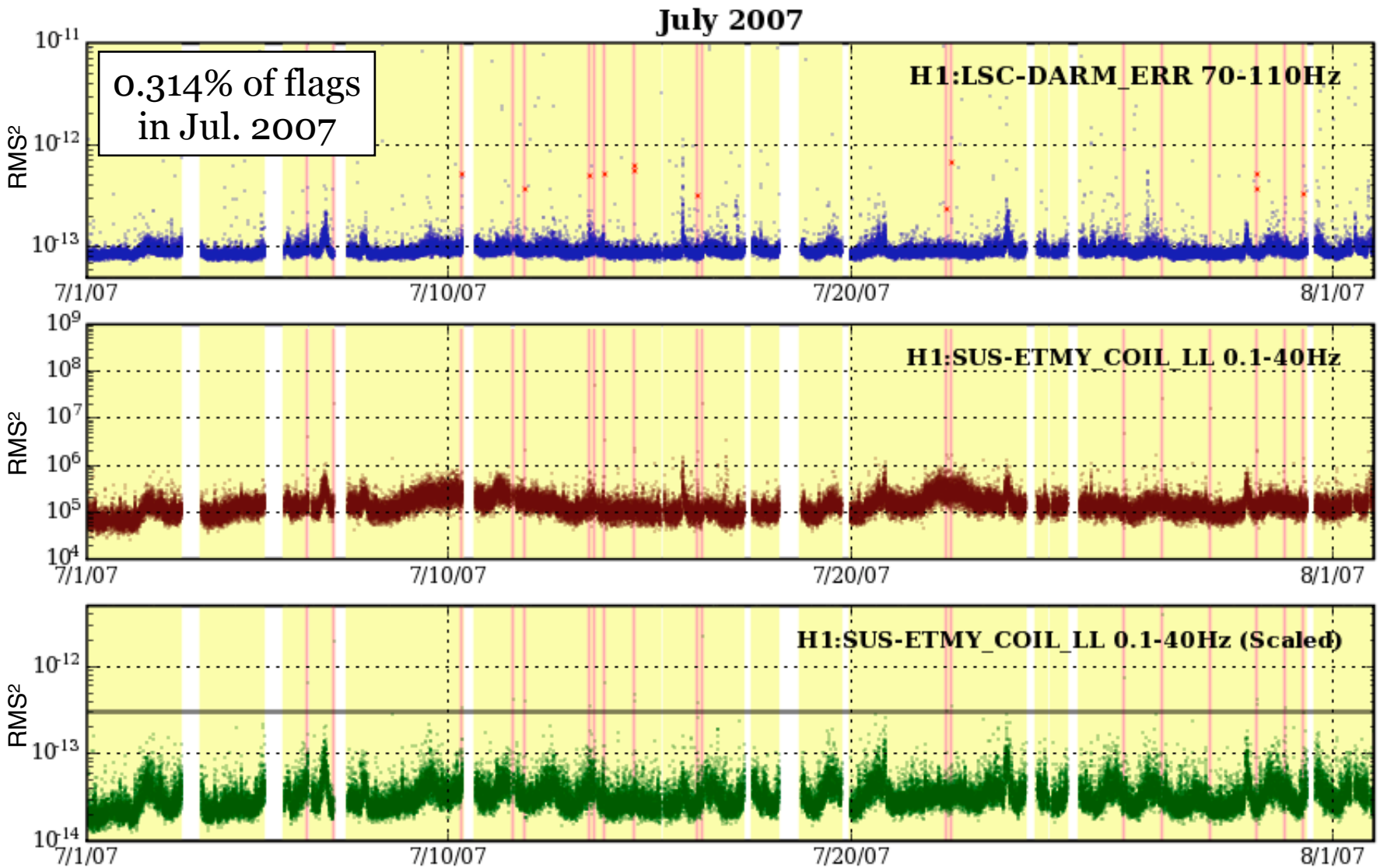
A fit to slopes for the different frequencies gives a scaling function of ~f^0.5 in current amplitude (~f in RMS^2)



Most of the flags in the high micro-seismic peak period



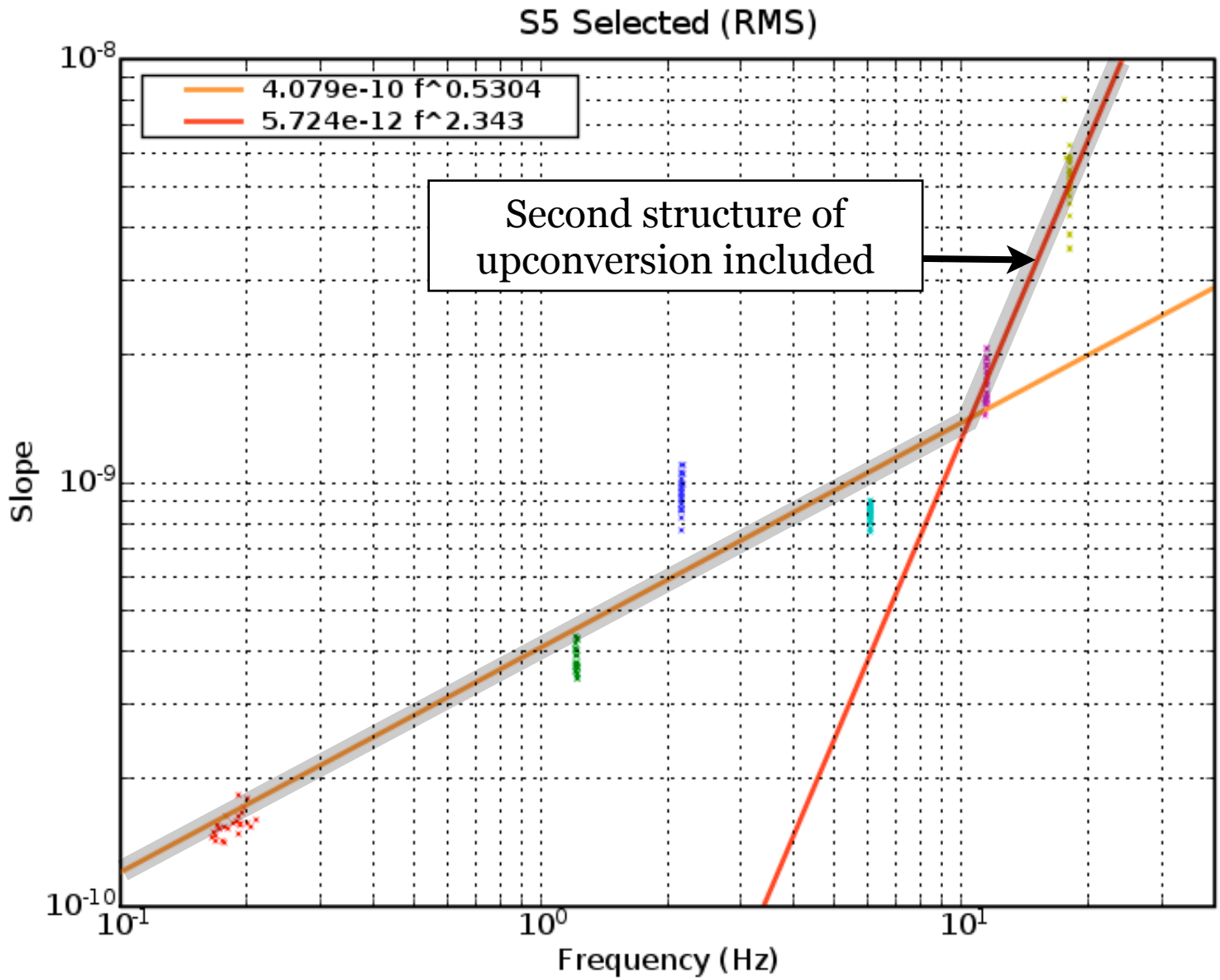
Less flags in low micro-seismic peak period



Updating scaling function

- The scaling function for the first run of S5 didn't include the second mechanism of the upconversion (>10Hz) -> Require an updated scaling function
- Use data for entire S5 to generate the updated function

Updated scaling function



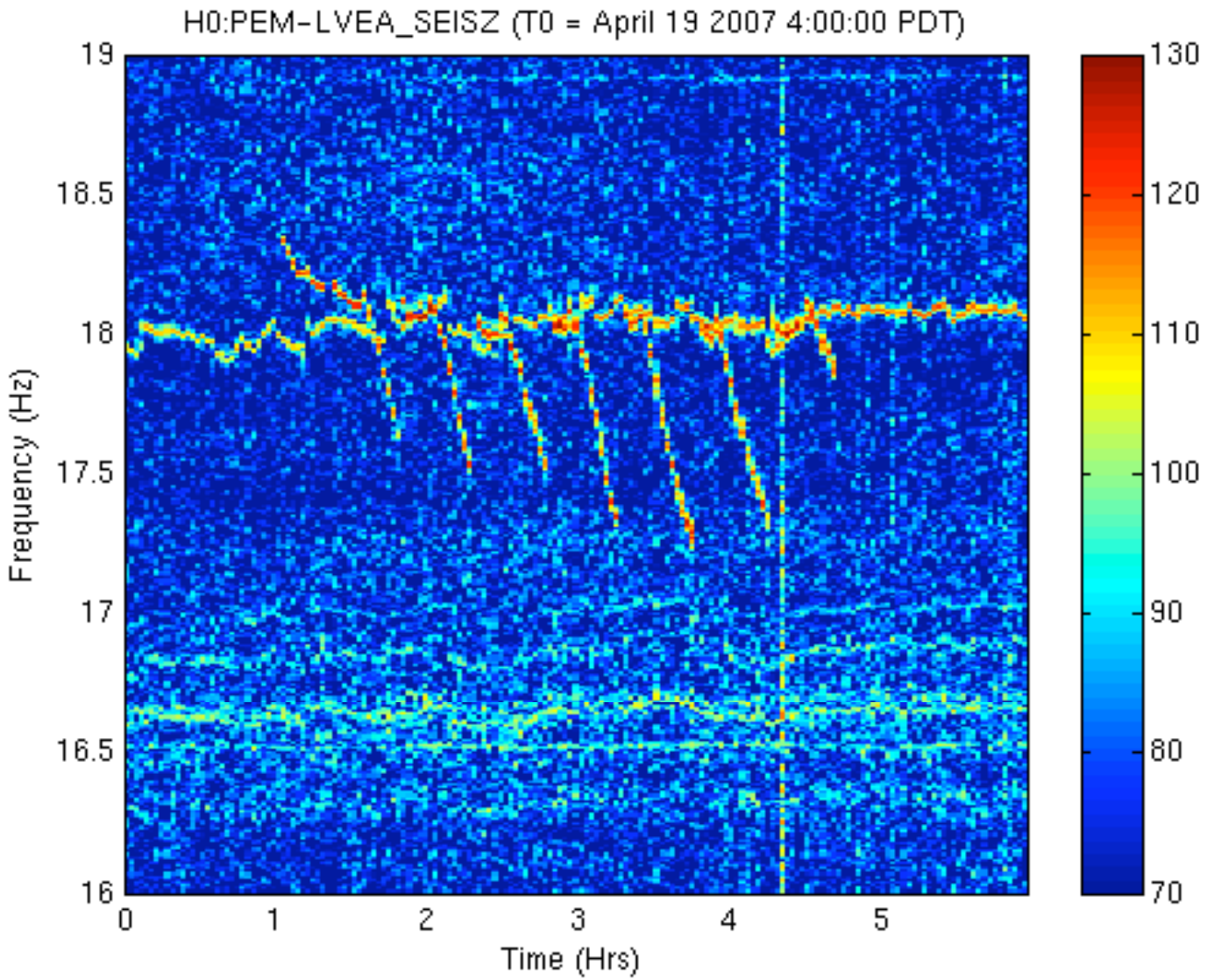
To do

- Estimate the noise in terms of strain or displacement
- Make flags for entire S5 with revised scaling function
  - Threshold by strain/displacement amplitude
  - Threshold based on running statistics
  - Multiple thresholds
  - Include ITM damping currents
- Study overlap with other flags
- Make flags for LLO

Flag for compressor noise (in progress)

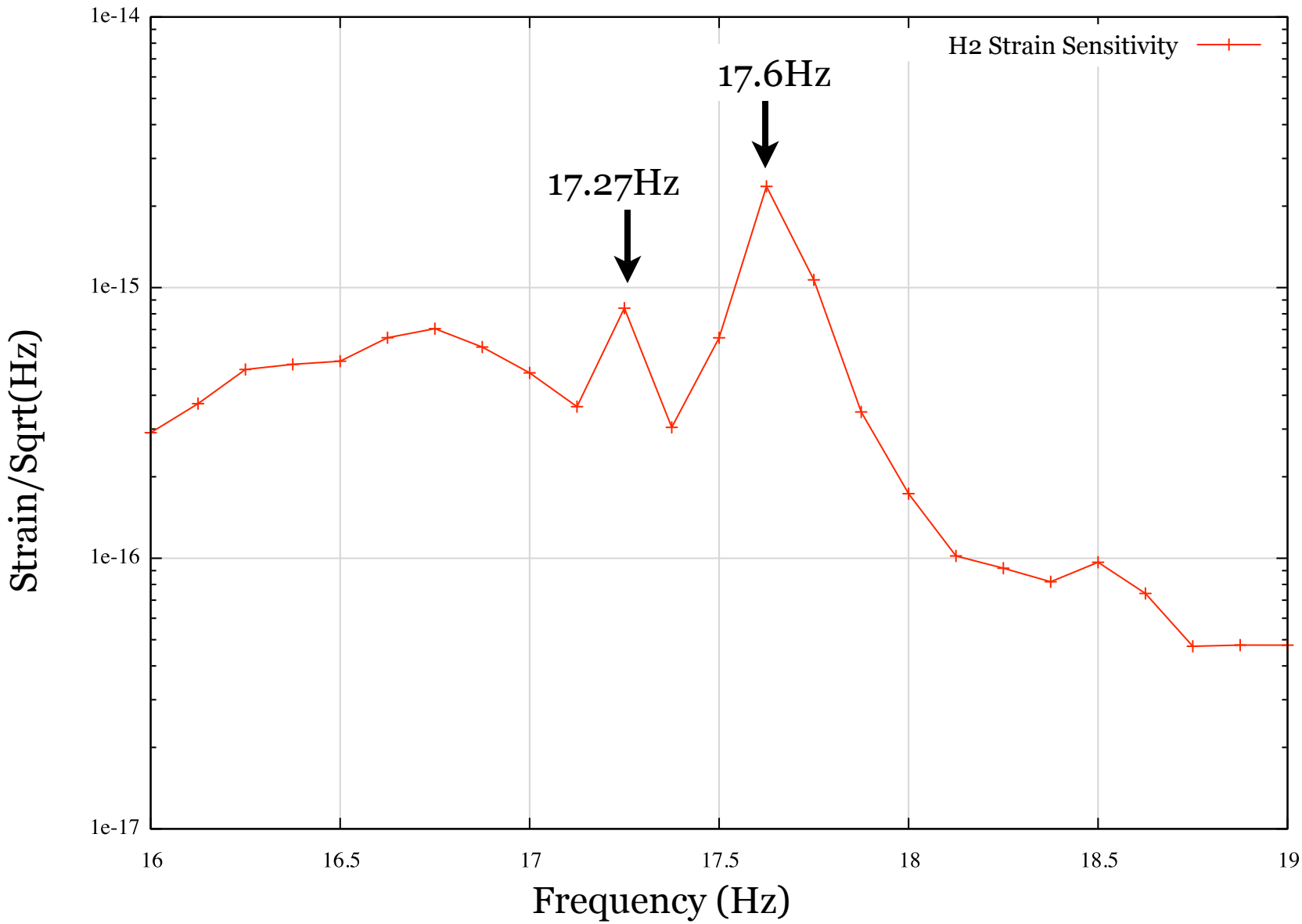
- A source of upconversion noise
- Compressor motor at the LHO staging building
- ~30 minutes period repeats several cycles
- The seismic noise at optics roll mode frequecy 17~18Hz
- Appeared in H2:DARM_ERR at ~17.27Hz, ~34.54Hz (2nd harmonic)

Compressor noise frequency drift down with ~30-min. period

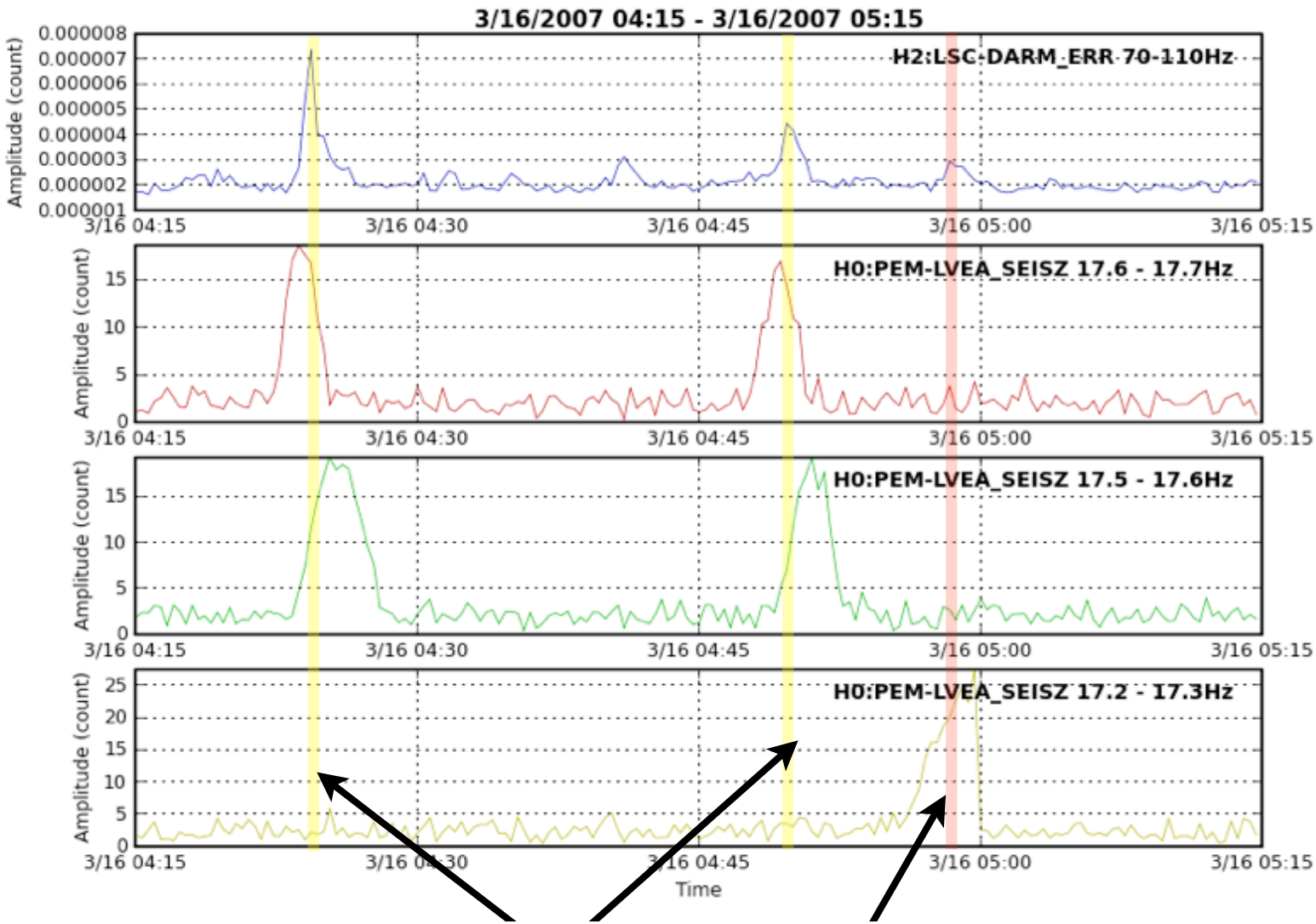


elog: 4/21/2007 by R.Schofield

Two roll mode peaks in the GW channel at 17-18Hz



DARM_ERR gets peaks when seismic signal at roll mode frequency



Summary

- Coil upconversion flags for S5 2nd year is available as "*COIL_UPCONVERSION*"
- Generation of the coil upconversion flags with updated scaling function for entire S5 is in progress
- Upconversion flags with thresholds other than 1% dead time are planned
- Compressor noise flag for H2 is under investigation for channels and bands that efficiently flag the event