LIGO-T1000056-v5

Data Quality and Veto Choices for S5 Low Mass CBC Searches

The LIGO Scientific Collaboration

1. Introduction

This document details the specific data quality and veto choices made for the CBC Search for systems with total mass between 2 and 45 solar masses, minimum of 1 solar mass in each component, performed on data from LIGO's fifth science run (S5). This science run took place over two years, and the analysis were performed in three pieces. The first year was analyzed while the second year of data was being taken. Officially, the first year is defined from GPS times 815155213 (Nov 04 2005 16:00:00 UTC) to 846691214 (Nov 04 2006 16:00:00 UTC). The remaining year was divided into two portions, the first of which is referred to henceforth as "months 12-18": 846691214 (Nov 04 2006 16:00:00 UTC) to 863557214 (May 18 2007 21:00:00 UTC). The second half of the second year is referred to as the LIGO-Virgo run: 863557214 (May 18 2007 21:00:00 UTC) - 875232014 (Oct 01 2007 00:00:00 UTC). During the LIGO-Virgo run, data from the Virgo interferometer was also analyzed, though data quality and veto choices for this interval are not discussed in this document.

Matched filtering is the optimal method of finding known signals in data with stationary Gaussian noise [1, 2]. The searches for CBCs in S5 data used a matched filter method to compare theoretically predicted waveforms with the LIGO gravitational wave channel data. Because the masses of the components of the binary determine both the duration and the frequency profile of the gravitational radiation, template banks consisting of many thousands of different waveforms are constructed.

Data transients of non-astrophysical origin often produce triggers of with a large signal to noise ratio (ρ), as there is significant power in these transients. Even with the signal consistency checks, disturbances of non-astrophysical origin increase the false alarm rate by producing coincidences from non-astrophysical events. This reduces the significance of the events which are not caused by these transients, as the rate of coincidences is increased, and thus the measured false alarm rate of the events is elevated. This has the effect of "burying" good gravitational wave candidates, as coincidences due to transient detector noises often produce significant outliers. In order to remove these effects, the time intervals within which triggers should not be trusted are defined as *vetoes*.

We used two main approaches to creating vetoes for S5 CBC searches. There were a multitude of noticeable data artifacts in S5, and common transient phenomenologies were investigated by members of the Detchar and Glitch groups [3], composed of members from all LSC search groups, including the CBC group. Alternatively, hundreds of data records from auxiliary monitors to the interferometer were investigated for correlations with the gravitational wave data, without prior mechanisms or known transients in mind[4, 5, 6]. These included physical and environmental monitors (PEM) such as seismometers, magnetometers, weather monitoring stations, as well as records of the state of feedback control signals in the length and angular sensing and control systems (LSC and ASC, respectively), and other systems such as the thermal control system (TCS) lasers that heated specific optics to counteract thermal lensing effects due to heating from the main laser.

For the purpose of CBC searches, additional padding to the data quality or auxiliary channel time intervals containing transients was required to reliably veto the entirety of the effect of each transient. This procedure, and the procedures used to arrive at all of the metrics, and categorization below are included in the reference [7].

We used several metrics to evaluate both data quality flags and auxiliary channel

correlations for use as vetoes . The percentage of triggers vetoed defines the *efficiency* of the veto $E = \frac{N_{vt}}{N_t} \cdot 100\%$, where N_{vt} is the number of clustered triggers vetoed and N_t is the total number of clustered triggers. The percentage of science time which is contained in a veto interval defines the *deadtime* $D = \frac{T_v}{T} \cdot 100\%$, where T_v is the time vetoed and T is the total science time, including the vetoed time. The percentage of veto intervals that contain at least one clustered trigger defines the *used percentage* such that $U = \frac{N_{wt}}{N_w} \cdot 100\%$ where N_{wt} is the number of veto windows that contain at least one cluster and N_w is the total number of windows. From these metrics we constructed two quantities of interest, described at length in reference [7]:

$$R_{ED} = \frac{E}{D}, \tag{1}$$

$$R_U = \frac{U}{T_w \frac{N_t}{T} \cdot 100\%}. \tag{2}$$

These vetoes were arranged into four categories in S5, in descending order of usefulness. Category 1 is used to veto segments that will not be searched at all, Categories 2 and 3 are used to veto candidates after the coincident analysis is performed, and Category 4 is not used to veto, but only to inform the follow up of final detection candidates. As before, this decision process is outlined in reference [7].

The next three Sections record the veto choices and effectiveness, their safety, and histograms of vetoed triggers and all triggers, respectively. These Sections have entries for the first year, months 12-18, and LIGO-Virgo sequentially. A final section then contains the equivalent effectiveness information for the auxiliary channel vetoes.

Each subsection on veto effectiveness contains lists, in ascending order of veto category, alphabetically within veto category, of the veto name, window paddings, deadtime, efficiency, R_{ED}, used percentage, and R_U. Each subsection on safety of the data quality flag vetoes lists the veto name, window paddings, deadtime, efficiency of vetoing hardware injections, R_{ED}, and the number of injections vetoed N_V. Note that the Burst group injections usually contained groups of dozens of injections, meaning that flags typically comprised of intervals longer than a few seconds over-report efficiency in the presence of such injection sequences. This is most common with seismic flags.

2. Data Quality Flag Vetoes

2.1. First year

Data quality veto definitions and results for the first year, low mass, CBC search. Category 1 contains only non-science mode data mislabeled as science data, or data corruptions. Category 2 vetoes were predominantly overflows for all interferometers, with total deadtimes of order 1%. Category 3 was populated by vetoes for environmental noises such as seismic motion, wind, and anthropogenic ground motions, and by the LIGHTDIP flags. Category 4 mostly contained category 3 flags with more window padding, and other large deadtime vetoes.

H1						
Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA	NA

H1 Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.58	2.26	3.91	82.87	1.95
SEVERE LSC OVERFLOW	4 1	0.01	0.34	28.94	71.66	32.57
CALIB DROPOUT 1SEC	10 0	0.00	0.03	10.14	40.68	9.96
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	0.00	17.36	60.00	17.36
CALIB DROPOUT AWG STUCK	10 0	0.03	0.20	5.84	100.00	0.16
ASI CORR OVERFLOW	4 0	0.00	NA	NA	NA	NA
ASC Overflow	4 1	0.02	0.43	21.02	55.78	25.36
MASTER OVERFLOW ASC	4 1	0.02	0.45	18.75	57.62	22.92
POWMAG	4 0	0.00	0.03	11.66	20.62	10.94
SIDECOIL ETMX	0 0	0.00	0.04	15.24	31.00	16.44
SIDECOIL ETMY	0 0	0.06	1.85	33.48	60.03	31.84
TCS GLITCH LOUD	4 0	0.00	0.04	26.95	59.62	27.10

Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 02 PERCENT	2 2	0.57	2.81	4.92	12.81	5.83
Wind Over 30MPH	8 8	0.17	0.96	5.54	35.22	5.60
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA	NA
SEVERE LSC OVERFLOW	25 1	0.04	0.53	14.46	73.12	8.31
ASI CORR OVERFLOW	10 0	0.00	NA	NA	NA	NA
ASC Overflow	25 1	0.06	0.66	10.86	69.50	7.90
MASTER OVERFLOW ASC	25 1	0.07	0.68	10.39	68.43	7.51
POWERMAINS DISRUPTION	0 0	0.49	0.61	1.26	39.09	0.69
POWERMAINS GLITCH	0 0	0.01	0.02	3.85	4.84	3.85
DARM 09 11 dHz HIGHTHRESH	0 0	0.04	0.33	7.30	74.48	3.95
DARM 18 24 dHz HIGHTHRESH	0 0	0.04	0.26	5.77	71.52	3.79
DARM 50 70 dHz MEDTHRESH	0 0	0.15	1.86	12.15	91.00	4.83
SEISMIC EY 99PCTL 3 10HZ	10 10	1.24	5.29	4.29	50.89	2.02
H2 Not Locked	0 15	3.73	4.89	1.31	66.51	0.81

Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
PD Overflow	25 1	2.57	3.08	1.20	17.54	1.80
MASTER OVERFLOW SUS MC2	0 0	0.00	0.01	13.26	12.90	13.69
MASTER OVERFLOW SUS RM	25 1	0.00	0.02	17.83	87.50	9.60
MASTER OVERFLOW LSC	25 1	2.62	3.24	1.24	18.68	1.86
DARM 09 11 dHz LOWTHRESH	0 0	5.34	11.53	2.16	43.42	2.30
DARM 11 13 dHz LOWTHRESH	0 0	5.05	11.14	2.21	46.20	2.45
DARM 18 24 dHz LOWTHRESH	0 0	1.48	3.68	2.48	36.32	1.93
DARM 50 70 dHz LOWTHRESH	0 0	0.46	4.61	10.08	86.79	4.60

H2						
Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
PEM INJECTION	0 0	0.04	0.00	0.00	0.00	0.00
MISSING RAW	0 0	0.00	NA	NA	NA	NA

Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.62	4.14	6.71	62.34	3.57
SEVERE LSC OVERFLOW	4 1	0.01	1.04	76.63	72.12	80.15
CALIB DROPOUT 1SEC	10 0	0.01	0.35	42.13	68.12	40.76
CALIB DROPOUT 1SAMPLE	10 0	0.00	NA	NA	NA	NA
CALIB GLITCH ZG	10 0	0.00	0.03	86.43	66.67	47.14
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA	NA
ASI CORR OVERFLOW	4 0	0.02	0.95	60.05	46.09	71.71
ASC Overflow	4 1	0.00	0.15	62.89	71.43	79.37
MASTER OVERFLOW ASC	4 1	0.01	0.22	43.59	54.17	52.67
POWMAG	4 0	0.00	0.06	24.18	17.48	22.66
MMT3 OPTLEVER	0 0	0.14	1.06	7.29	3.77	9.77
OSEM GLITCH	2 0	0.00	0.29	214.90	82.88	214.90
TCS GLITCH LOUD	4 0	0.01	0.48	87.72	79.47	88.31

Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 04 PERCENT	2 2	0.78	3.18	4.06	4.11	4.56
Wind Over 30MPH	8 8	0.19	0.57	3.01	9.81	3.18
CALIB BAD COEFFS 60	0 0	0.00	0.01	48.62	100.00	24.31
SEVERE LSC OVERFLOW	25 1	0.05	1.47	29.88	73.33	20.37
ASI CORR OVERFLOW	10 0	0.03	1.14	36.73	48.05	33.98
ASC Overflow	25 1	0.01	0.22	29.18	77.05	21.40
MASTER OVERFLOW ASC	25 1	0.02	0.34	22.63	55.17	14.80
POWERMAINS DISRUPTION	0 0	0.49	0.61	1.23	17.27	0.74
POWERMAINS GLITCH	0 0	0.01	0.04	6.11	3.14	6.11
H1 Not Locked	0 15	4.23	6.10	1.44	35.83	0.98

Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
PD Overflow	25 1	0.05	1.47	29.53	73.04	20.29
MASTER OVERFLOW SUS MC2	0 0	0.02	0.02	0.81	11.11	11.52
MASTER OVERFLOW LSC	25 1	0.05	1.57	28.73	72.25	19.38

L1						
Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 3	0 0	0.00	NA	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA	NA
Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.58	1.58	2.74	80.95	1.23
SEVERE LSC OVERFLOW	4 1	0.11	1.67	14.87	54.14	15.88
CALIB DROPOUT 1SEC	10 0	0.00	0.00	1.71	10.53	1.80
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT BN	0 0	0.00	NA	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA	NA
ASI CORR OVERFLOW	4 0	0.76	5.37	7.05	23.62	9.70
ASC Overflow	4 1	0.03	0.38	13.55	52.59	15.42
MASTER OVERFLOW ASC	4 1	0.71	1.95	2.75	32.09	7.32
POWMAG	4 0	0.01	0.14	10.91	30.23	10.34
BAD SENSING	0 0	0.11	0.19	1.75	50.00	0.11
Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 04 PERCENT	2 2	1.70	7.55	4.44	19.95	5.12
TRAIN LIKELY	-360 -360	1.08	1.71	1.59	54.37	0.47
CALIB BAD COEFFS 60	0 0	0.00	0.03	9.96	100.00	0.87
SEVERE LSC OVERFLOW	25 1	0.40	2.23	5.58	56.37	4.13
ASI CORR OVERFLOW	10 0	1.32	5.91	4.46	28.61	5.34
ASC Overflow	25 1	0.09	0.54	6.06	63.62	4.66
MASTER OVERFLOW ASC	25 1	1.01	2.41	2.37	48.02	3.40
BADRANGE GLITCHINESS	0 0	0.03	0.20	5.98	100.00	0.18
ELEVATED GLITCHINESS	0 0	0.67	1.25	1.88	40.00	0.08
SEVERE GLITCHINESS	0 0	0.73	1.37	1.89	67.44	0.06
EARTHQUAKE GLITCHINESS	0 0	0.17	0.41	2.42	100.00	0.12
HURRICANE GLITCHINESS	0 0	0.25	0.82	3.33	62.50	0.03
BAD SERVO	0 0	0.01	0.00	0.00	0.00	0.00
AUTOBURT GLITCHES	0 0	0.28	1.32	4.73	83.70	0.41
SEC LOGGING	0 0	0.00	NA	NA	NA	NA

Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
PD Overflow	25 1	0.39	2.17	5.51	55.37	4.06
TRAIN LIKELY	-60 -60	2.84	3.64	1.28	58.09	0.25
MASTER OVERFLOW SUS MC2	0 0	4.79	9.89	2.07	6.70	2.75
MASTER OVERFLOW SUS RM	0 0	0.00	0.02	44.75	65.38	44.75
MASTER OVERFLOW LSC	25 1	0.42	2.27	5.39	56.17	3.98

2.2. Months 12-18

Data quality veto definitions and results for months 12 to 18 of the low mass CBC search.

H1 Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
CORRUPTED RDS C03 LX	0 0	0.00	NA	NA	NA	NA
MISSING RDS C03 L2	0 0	0.00	NA	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA	NA

H1 Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.37	1.60	4.36	90.24	1.44
INJECTION UNBLINDED	0 0	0.00	NA	NA	NA	NA
SEVERE LSC OVERFLOW	8 8	0.01	0.25	31.98	100.00	11.94
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.01	0.11	11.12	89.47	3.00
ASI CORR OVERFLOW	8 8	0.00	NA	NA	NA	NA
ASC Overflow	8 8	0.06	0.72	12.69	72.01	8.60
MASTER OVERFLOW ASC	8 8	0.06	0.74	12.41	72.43	8.19
POWMAG	4 0	0.00	0.01	6.88	18.18	6.51
SIDECOIL ETMX	8 8	0.02	0.36	16.55	79.41	7.76
SIDECOIL ETMY	8 8	0.18	2.38	12.93	52.78	5.40
PD Overflow	8 8	0.01	0.25	30.41	98.21	11.73
H2 LOCKGAIN	0 0	2.11	4.24	2.01	60.02	0.43
H2 LOCKLOSS	0 0	0.69	2.61	3.78	75.82	1.48
TIDAL SERVO DESATURATION	0 0	0.01	0.14	17.48	91.67	4.92
SIDECOIL ETMX RMS 6HZ	8 8	0.01	0.19	14.41	76.27	7.45
SIDECOIL ETMY RMS 6HZ	8 8	0.12	1.33	10.80	46.91	4.58
H1H2 SCATTERING	0 0	0.20	1.19	6.09	50.34	1.80
SLEDGEHAMMER	0 0	0.00	NA	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.05	11.25	35.90	11.02

H1 Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 02 PERCENT	2 2	0.69	3.58	5.15	17.41	5.35
Wind Over 30MPH	8 8	0.31	1.43	4.70	31.91	3.27
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA	NA
SEVERE LSC OVERFLOW	25 8	0.02	0.40	26.72	100.00	6.14
ASI CORR OVERFLOW	25 8	0.00	NA	NA	NA	NA
ASC Overflow	25 8	0.10	0.84	8.39	73.46	4.51
MASTER OVERFLOW ASC	25 8	0.10	0.86	8.36	74.07	4.42
PD Overflow	25 8	0.02	0.40	25.67	98.21	6.03
POWERMAINS DISRUPTION	0 0	0.45	0.66	1.47	44.67	0.53
POWERMAINS GLITCH	0 0	0.01	0.01	1.35	2.51	1.35
DARM 09 11 dHz LOWTHRESH	0 0	0.20	1.26	6.26	69.52	2.49
DARM 11 13 dHz LOWTHRESH	0 0	0.11	0.88	8.06	72.39	2.59
DARM 18 24 dHz LOWTHRESH	0 0	0.01	0.04	7.69	43.75	1.57
DARM 50 70 dHz LOWTHRESH	0 0	0.00	NA	NA	NA	NA
SEISMIC EY 99PCTL 3 10HZ	10 10	1.06	2.49	2.35	35.31	0.95
SEIS DARMERR 5 7HZ	0 0	0.00	NA	NA	NA	NA
SIDECOIL ETMX RMS 6HZ	25 8	0.02	0.23	11.57	77.78	4.29
SIDECOIL ETMY RMS 6HZ	25 8	0.19	1.69	8.92	53.25	2.93
SIDECOIL ETMX	25 8	0.03	0.42	12.59	80.00	4.41
SIDECOIL ETMY	25 8	0.29	3.25	11.04	57.97	3.19
SEISMIC X 30 100 mHz HIGHTHRESH	0 0	0.29	1.36	4.75	42.55	0.78
SEISMIC Y 30 100 mHz HIGHTHRESH	0 0	0.91	2.64	2.90	36.61	1.31
DEWAR GLITCH	0 0	0.00	0.00	1.79	3.33	1.79
MASTER OVERFLOW IOO	8 8	0.00	NA	NA	NA	NA
PRE LOCKLOSS 120 SEC	0 0	0.12	0.14	1.14	12.97	0.51
TIDAL SERVO PRESATURATION	0 0	0.00	NA	NA	NA	NA
BN GLITCHINESS	0 0	0.00	NA	NA	NA	NA
CONCRETE WORK	0 0	0.00	NA	NA	NA	NA

H1 Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
AIRCRAFT VERY LIKELY	0 0	3.37	3.77	1.12	32.19	0.58
AIRCRAFT LIKELY	0 0	3.40	3.83	1.12	32.37	0.58
MASTER OVERFLOW SUS MC2	0 0	0.00	0.00	71.63	100.00	71.63
MASTER OVERFLOW SUS RM	25 8	0.00	NA	NA	NA	NA
MASTER OVERFLOW LSC	25 8	0.02	0.41	24.83	98.25	5.86
H2 Not Locked	0 15	2.99	5.78	1.93	70.64	0.76
HUMAN ACTIVITY	0 0	0.00	NA	NA	NA	NA
LAB ACTIVITY	0 0	0.00	NA	NA	NA	NA
MACHINE ACTIVITY	0 0	1.98	4.22	2.14	65.15	0.06
VEHICULAR ACTIVITY	0 0	2.23	3.09	1.39	60.00	0.10
OTHER ACTIVITY	0 0	1.99	0.92	0.46	82.93	0.03
SEISMIC X 30 100 mHz LOWTHRESH	0 0	1.15	2.29	1.99	22.69	0.81
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	3.89	4.92	1.26	18.93	0.68
NO CALIB LINE	0 0	0.00	NA	NA	NA	NA
COMMISSIONING ELOG	0 0	0.03	0.12	4.01	50.00	0.05
COSMIC RAY	0 0	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE ELOG	0 0	0.14	0.27	1.94	100.00	0.04
CHECKSUM MISMATCH	0 0	0.00	NA	NA	NA	NA
PROCESSOR TROUBLE ELOG	0 0	0.85	2.03	2.38	71.43	0.01
COIL UPCONVERSION	0 0	1.84	8.57	4.65	56.64	3.04
ETMX COIL OVERFLOW	0 0	0.00	NA	NA	NA	NA
ETMY COIL OVERFLOW	0 0	0.00	NA	NA	NA	NA

H2 Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
PEM INJECTION	0 0	0.00	NA	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA	NA

H2 Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.41	3.30	8.03	62.06	2.37
INJECTION UNBLINDED	0 0	0.00	NA	NA	NA	NA
SEVERE LSC OVERFLOW	8 8	0.01	0.83	71.33	91.14	26.10
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	NA	NA	NA	NA
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.00	0.05	16.11	83.33	6.71
ASI CORR OVERFLOW	8 8	0.02	0.84	53.83	88.18	26.74
ASC Overflow	8 8	0.06	2.92	48.75	85.58	16.34
MASTER OVERFLOW ASC	8 8	0.06	2.96	47.90	86.05	15.84
POWMAG	4 0	0.00	0.02	12.37	13.64	11.72
PD Overflow	8 8	0.01	0.82	69.91	91.14	26.10
H1 LOCKGAIN	0 0	1.48	6.76	4.57	59.21	0.76
H1 LOCKLOSS	0 0	1.15	6.14	5.34	71.76	1.16
MMT3 OPTLEVER	0 0	0.00	NA	NA	NA	NA
OSEM GLITCH	2 0	0.00	NA	NA	NA	NA
ISCT10 TABLE GLITCH	10 0	0.00	NA	NA	NA	NA
ISCT10 TABLE GLITCH MILD	10 0	0.00	NA	NA	NA	NA
H1H2 SCATTERING	0 0	0.16	3.90	24.16	39.06	3.36
SLEDGEHAMMER	0 0	0.00	NA	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.07	73.07	94.44	69.56

H2 Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 04 PERCENT	2 2	2.68	12.28	4.59	6.44	4.74
Wind Over 30MPH	8 8	0.19	1.21	6.27	18.92	4.06
CALIB BAD COEFFS 60	0 0	0.13	0.43	3.28	100.00	0.06
SEVERE LSC OVERFLOW	25 8	0.02	1.03	46.58	90.00	13.26
ASI CORR OVERFLOW	25 8	0.03	1.01	33.62	88.29	13.39
ASC Overflow	25 8	0.09	3.58	41.03	87.76	9.84
MASTER OVERFLOW ASC	25 8	0.09	3.62	40.69	88.21	9.68
PD Overflow	25 8	0.02	1.03	46.34	90.00	13.26
POWERMAINS DISRUPTION	0 0	0.45	0.64	1.44	21.33	0.61
POWERMAINS GLITCH	0 0	0.01	0.01	1.24	0.96	1.24
DEWAR GLITCH	0 0	0.00	0.05	23.60	18.31	23.60
MASTER OVERFLOW IOO	8 8	0.00	NA	NA	NA	NA
PRE LOCKLOSS 120 SEC	0 0	0.28	0.90	3.19	12.01	1.11
CONCRETE WORK	0 0	0.00	NA	NA	NA	NA
OSEM GLITCH	25 8	0.00	NA	NA	NA	NA
SICK	0 0	1.87	10.45	5.58	77.78	0.15
ROUTE10 TRAFFIC	0 0	0.01	0.10	8.59	100.00	0.34
SENSEMON RANGE STEP	0 0	0.00	NA	NA	NA	NA
ASC TROUBLE	0 0	0.00	NA	NA	NA	NA
BALING ACTIVITY	0 0	0.06	0.71	10.99	100.00	0.13
EARTHQUAKE GLITCHINESS	0 0	0.00	NA	NA	NA	NA
FM ROLLMODE EXCITED	0 0	2.36	14.78	6.26	34.58	3.57
ISCT10 TROUBLE	0 0	0.00	NA	NA	NA	NA
STACK RESONANCE	0 0	0.01	0.32	44.68	100.00	0.57
TCS TROUBLE	0 0	0.00	NA	NA	NA	NA
BADMONTH	0 0	45.86	43.04	0.94	73.76	0.05

H2 Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
AIRCRAFT VERY LIKELY	0 0	3.31	4.03	1.22	15.16	0.65
AIRCRAFT LIKELY	0 0	3.33	4.06	1.22	15.28	0.66
MASTER OVERFLOW SUS MC2	0 0	0.00	0.08	64.45	50.00	64.45
MASTER OVERFLOW LSC	25 8	0.02	1.04	45.17	90.00	12.89
H1 Not Locked	0 15	1.76	6.91	3.93	67.20	1.71
HUMAN ACTIVITY	0 0	0.00	NA	NA	NA	NA
MACHINE ACTIVITY	0 0	1.93	3.67	1.90	58.82	0.14
VEHICULAR ACTIVITY	0 0	2.22	2.77	1.24	75.00	0.17
OTHER ACTIVITY	0 0	1.51	0.99	0.66	72.73	0.09
SEISMIC X 30 100 mHz LOWTHRESH	0 0	1.05	1.39	1.31	12.33	1.06
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	3.39	4.50	1.33	11.06	0.95
NO CALIB LINE	0 0	0.13	0.43	3.28	100.00	0.06
LIGHTDIP 04 PERCENT	8 8	5.98	19.07	3.19	9.69	2.63
COMMISSIONING ELOG	0 0	0.12	0.16	1.31	100.00	0.03
COSMIC RAY	0 0	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE ELOG	0 0	0.06	0.01	0.21	33.33	0.12
CHECKSUM MISMATCH	0 0	0.00	NA	NA	NA	NA
PROCESSOR TROUBLE ELOG	0 0	0.98	0.56	0.58	75.00	0.03
ETMX COIL OVERFLOW	0 0	0.00	NA	NA	NA	NA
ETMY COIL OVERFLOW	0 0	0.00	NA	NA	NA	NA
MMT3 YAW SATURATION	0 0	0.00	NA	NA	NA	NA
MMT3 GLITCHINESS	0 0	0.00	NA	NA	NA	NA

L1 Category 1 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
OUT OF LOCK	0 0	0.00	NA	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA	NA
CORRUPTED RDS C03 LX	0 0	0.00	NA	NA	NA	NA
MISSING RDS C03 L2	0 0	0.00	NA	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA	NA

L1 Category 2 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
Injection	64 16	0.41	1.64	4.01	88.79	1.21
INJECTION UNBLINDED	0 0	0.00	0.00	0.00	0.00	0.00
SEVERE LSC OVERFLOW	8 8	0.12	0.83	7.24	39.80	4.08
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	3.69	25.00	4.19
CALIB GLITCH ZG	10 0	0.00	0.00	16.76	100.00	16.76
CALIB DROPOUT BN	0 0	0.00	NA	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.07	0.37	5.36	62.86	1.81
ASI CORR OVERFLOW	8 8	0.64	4.54	7.08	38.53	4.18
ASC Overflow	8 8	0.05	0.31	6.33	43.00	4.40
MASTER OVERFLOW ASC	8 8	0.05	0.32	6.17	43.56	4.23
POWMAG	4 0	0.04	0.20	5.34	15.56	4.78
PD Overflow	8 8	0.12	0.84	7.09	39.23	4.02
BAD SENSING	0 0	0.00	NA	NA	NA	NA
RAILED RBS PZT	0 0	0.00	NA	NA	NA	NA
DAQ ERROR	0 0	0.00	NA	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.01	20.78	88.89	23.42

L1 Category 3 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
LIGHTDIP 04 PERCENT	2 2	3.55	18.82	5.30	23.67	5.46
TRAIN LIKELY	-360 -360	0.54	0.92	1.71	42.69	0.53
BS OPTLEVER GAINPEAKING	0 0	0.00	NA	NA	NA	NA
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA	NA
SEVERE LSC OVERFLOW	25 8	0.22	1.14	5.15	42.72	2.25
ASI CORR OVERFLOW	25 8	1.00	5.69	5.69	43.85	2.38
ASC Overflow	25 8	0.08	0.36	4.77	47.44	2.50
MASTER OVERFLOW ASC	25 8	0.08	0.37	4.74	47.74	2.45
PD Overflow	25 8	0.23	1.14	5.04	41.85	2.20
MASTER OVERFLOW IOO	8 8	0.00	0.01	16.17	100.00	9.70
PRE LOCKLOSS 120 SEC	0 0	0.26	0.45	1.74	22.81	0.75
BADRANGE GLITCHINESS	0 0	0.00	NA	NA	NA	NA
ELEVATED GLITCHINESS	0 0	0.47	0.95	2.04	64.29	0.03
SEVERE GLITCHINESS	0 0	0.01	0.12	8.38	100.00	0.11
EARTHQUAKE GLITCHINESS	0 0	0.18	0.55	3.00	83.33	0.06
HURRICANE GLITCHINESS	0 0	0.00	NA	NA	NA	NA
BAD SERVO	0 0	0.00	NA	NA	NA	NA
AUTOBURT GLITCHES	0 0	0.63	3.28	5.19	93.22	0.41
SEC LOGGING	0 0	0.00	NA	NA	NA	NA
SEISMIC X 30 100 mHz MEDTHRESH	0 0	1.16	6.12	5.27	58.14	1.79
SEISMIC Y 30 100 mHz MEDTHRESH	0 0	1.40	5.64	4.03	50.67	1.56
SEISMIC X 30 100 mHz HIGHTHRESH	0 0	0.62	4.42	7.15	67.82	2.08
SEISMIC Y 30 100 mHz HIGHTHRESH	0 0	0.70	3.58	5.14	56.97	1.75
BS OPTLEVER HIGHRMS	0 0	0.00	NA	NA	NA	NA
BS OPTLEVER	0 0	0.00	0.03	17.17	47.50	17.52
BS OPTLEVER GAINPEAKING	0 0	0.00	NA	NA	NA	NA
LVEA NOISY	0 0	0.00	NA	NA	NA	NA

L1 Category 4 vetoes						
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	Used(%)	R_U
AIRCRAFT VERY LIKELY	0 0	1.22	1.42	1.17	33.30	0.51
AIRCRAFT LIKELY	0 0	1.25	1.47	1.17	34.16	0.52
TRAIN LIKELY	-60 -60	1.84	2.42	1.31	54.69	0.27
MASTER OVERFLOW SUS MC2	2 2	0.37	2.70	7.32	29.50	5.44
MASTER OVERFLOW SUS RM	2 0	0.00	0.00	12.29	33.33	12.29
MASTER OVERFLOW LSC	25 8	0.23	1.17	5.01	42.23	2.16
NO CALIB LINE	0 0	0.00	NA	NA	NA	NA
EX LOGGING	0 0	0.00	NA	NA	NA	NA
SEISMIC X 30 100 mHz LOWTHRESH	0 0	3.86	11.79	3.06	45.11	1.39
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	5.10	13.13	2.58	43.17	1.33
PHOTODIODE OFF	0 0	0.00	NA	NA	NA	NA
BSOPLEV 3p6HZOSCILLATIONS	0 0	0.00	NA	NA	NA	NA
MOVED LVEA SEIS	0 0	0.00	NA	NA	NA	NA
TCS ITMX LIGHTDIP 10 PERCENT	4 0	0.00	0.01	2.68	29.41	2.71
TCS ITMX LIGHTDIP 20 PERCENT	4 0	0.00	0.00	1.27	11.11	1.28
BAD CALIBRATION NEAR 7KHZ	0 0	0.00	NA	NA	NA	NA
SPOB GLITCHINESS	0 0	0.00	NA	NA	NA	NA

3. Data Quality Veto Safety

3.1. First year

Data quality veto safety for the first year, low mass, CBC search.

H1					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA

Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.58	100.00	173.17	7941.00
SEVERE LSC OVERFLOW	4 1	0.01	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.00	0.00	0.00	0.00
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	0.00	0.00	0.00
CALIB DROPOUT AWG STUCK	10 0	0.03	0.00	0.00	0.00
ASI CORR OVERFLOW	4 0	0.00	NA	NA	NA
ASC Overflow	4 1	0.02	0.00	0.00	0.00
MASTER OVERFLOW ASC	4 1	0.02	0.00	0.00	0.00
POWMAG	4 0	0.00	0.00	0.00	0.00
SIDECOIL ETMX	0 0	0.00	0.00	0.00	0.00
SIDECOIL ETMY	0 0	0.06	0.00	0.00	0.00
TCS GLITCH LOUD	4 0	0.00	0.00	0.00	0.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 02 PERCENT	2 2	0.57	0.40	0.71	32.00
Wind Over 30MPH	8 8	0.17	0.13	0.72	10.00
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA
SEVERE LSC OVERFLOW	25 1	0.04	0.00	0.00	0.00
ASI CORR OVERFLOW	10 0	0.00	NA	NA	NA
ASC Overflow	25 1	0.06	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 1	0.07	0.00	0.00	0.00
POWERMAINS DISRUPTION	0 0	0.49	0.16	0.34	13.00
POWERMAINS GLITCH	0 0	0.01	0.00	0.00	0.00
DARM 09 11 dHz HIGHTHRESH	0 0	0.04	0.00	0.00	0.00
DARM 18 24 dHz HIGHTHRESH	0 0	0.04	0.01	0.28	1.00
DARM 50 70 dHz MEDTHRESH	0 0	0.15	0.00	0.00	0.00
SEISMIC EY 99PCTL 3 10HZ	10 10	1.24	0.78	0.63	62.00
H2 Not Locked	0 15	3.73	0.53	0.14	42.00

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
PD Overflow	25 1	2.57	0.23	0.09	18.00
MASTER OVERFLOW SUS MC2	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW SUS RM	25 1	0.00	0.00	0.00	0.00
MASTER OVERFLOW LSC	25 1	2.62	2.33	0.89	185.00
DARM 09 11 dHz LOWTHRESH	0 0	5.34	3.69	0.69	293.00
DARM 11 13 dHz LOWTHRESH	0 0	5.05	3.85	0.76	306.00
DARM 18 24 dHz LOWTHRESH	0 0	1.48	1.69	1.14	134.00
DARM 50 70 dHz LOWTHRESH	0 0	0.46	0.11	0.25	9.00

H2					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
PEM INJECTION	0 0	0.04	0.00	0.00	0.00
MISSING RAW	0 0	0.00	NA	NA	NA

Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.62	100.00	161.90	8808.00
SEVERE LSC OVERFLOW	4 1	0.01	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.01	0.00	0.00	0.00
CALIB DROPOUT 1SAMPLE	10 0	0.00	NA	NA	NA
CALIB GLITCH ZG	10 0	0.00	0.00	0.00	0.00
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA
ASI CORR OVERFLOW	4 0	0.02	0.00	0.00	0.00
ASC Overflow	4 1	0.00	0.00	0.00	0.00
MASTER OVERFLOW ASC	4 1	0.01	0.00	0.00	0.00
POWMAG	4 0	0.00	0.00	0.00	0.00
MMT3 OPTLEVER	0 0	0.14	0.03	0.24	3.00
OSEM GLITCH	2 0	0.00	0.00	0.00	0.00
TCS GLITCH LOUD	4 0	0.01	0.00	0.00	0.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 04 PERCENT	2 2	0.78	1.12	1.44	99.00
Wind Over 30MPH	8 8	0.19	0.14	0.72	12.00
CALIB BAD COEFFS 60	0 0	0.00	0.00	0.00	0.00
SEVERE LSC OVERFLOW	25 1	0.05	0.00	0.00	0.00
ASI CORR OVERFLOW	10 0	0.03	0.00	0.00	0.00
ASC Overflow	25 1	0.01	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 1	0.02	0.00	0.00	0.00
POWERMAINS DISRUPTION	0 0	0.49	0.15	0.30	13.00
POWERMAINS GLITCH	0 0	0.01	0.00	0.00	0.00
H1 Not Locked	0 15	4.23	0.56	0.13	49.00

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
PD Overflow	25 1	0.05	0.00	0.00	0.00
MASTER OVERFLOW SUS MC2	0 0	0.02	0.00	0.00	0.00
MASTER OVERFLOW LSC	25 1	0.05	0.64	11.61	56.00

L1					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 1	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 3	0 0	0.00	NA	NA	NA
MISSING RDS LEVEL 4	0 0	0.00	NA	NA	NA

Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.58	100.00	173.23	6380.00
SEVERE LSC OVERFLOW	4 1	0.11	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.00	0.00	0.00	0.00
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA
CALIB DROPOUT BN	0 0	0.00	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA
ASI CORR OVERFLOW	4 0	0.76	0.03	0.04	2.00
ASC Overflow	4 1	0.03	0.00	0.00	0.00
MASTER OVERFLOW ASC	4 1	0.71	0.16	0.22	10.00
POWMAG	4 0	0.01	0.00	0.00	0.00
BAD SENSING	0 0	0.11	0.05	0.43	3.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 04 PERCENT	2 2	1.70	1.02	0.60	65.00
TRAIN LIKELY	-360 -360	1.08	4.83	4.49	308.00
CALIB BAD COEFFS 60	0 0	0.00	0.00	0.00	0.00
SEVERE LSC OVERFLOW	25 1	0.40	0.00	0.00	0.00
ASI CORR OVERFLOW	10 0	1.32	0.05	0.04	3.00
ASC Overflow	25 1	0.09	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 1	1.01	0.52	0.51	33.00
BADRANGE GLITCHINESS	0 0	0.03	0.00	0.00	0.00
ELEVATED GLITCHINESS	0 0	0.67	0.22	0.33	14.00
SEVERE GLITCHINESS	0 0	0.73	0.31	0.43	20.00
EARTHQUAKE GLITCHINESS	0 0	0.17	1.57	9.26	100.00
HURRICANE GLITCHINESS	0 0	0.25	0.06	0.25	4.00
BAD SERVO	0 0	0.01	0.00	0.00	0.00
AUTOBURT GLITCHES	0 0	0.28	0.05	0.17	3.00
SEC LOGGING	0 0	0.00	NA	NA	NA

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
PD Overflow	25 1	0.39	0.00	0.00	0.00
TRAIN LIKELY	-60 -60	2.84	5.06	1.78	323.00
MASTER OVERFLOW SUS MC2	0 0	4.79	5.05	1.05	322.00
MASTER OVERFLOW SUS RM	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW LSC	25 1	0.42	0.89	2.12	57.00

3.2. Months 12-18

Data quality veto safety for months 12 to 18 of the low mass CBC search.

H1					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
CORRUPTED RDS C03 LX	0 0	0.00	NA	NA	NA
MISSING RDS C03 L2	0 0	0.00	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA
Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.37	100.00	272.75	3139.00
INJECTION UNBLINDED	0 0	0.00	NA	NA	NA
SEVERE LSC OVERFLOW	8 8	0.01	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.01	0.00	0.00	0.00
ASI CORR OVERFLOW	8 8	0.00	NA	NA	NA
ASC Overflow	8 8	0.06	0.00	0.00	0.00
MASTER OVERFLOW ASC	8 8	0.06	0.70	11.68	22.00
POWMAG	4 0	0.00	0.00	0.00	0.00
SIDECOIL ETMX	8 8	0.02	0.00	0.00	0.00
SIDECOIL ETMY	8 8	0.18	0.00	0.00	0.00
PD Overflow	8 8	0.01	0.00	0.00	0.00
H2 LOCKGAIN	0 0	2.11	0.32	0.15	10.00
H2 LOCKLOSS	0 0	0.69	0.32	0.46	10.00
TIDAL SERVO DESATURATION	0 0	0.01	0.00	0.00	0.00
SIDECOIL ETMX RMS 6HZ	8 8	0.01	0.00	0.00	0.00
SIDECOIL ETMY RMS 6HZ	8 8	0.12	0.00	0.00	0.00
H1H2 SCATTERING	0 0	0.20	0.00	0.00	0.00
SLEDGEHAMMER	0 0	0.00	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.00	0.00	0.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 02 PERCENT	2 2	0.69	0.00	0.00	0.00
Wind Over 30MPH	8 8	0.31	0.00	0.00	0.00
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA
SEVERE LSC OVERFLOW	25 8	0.02	0.00	0.00	0.00
ASI CORR OVERFLOW	25 8	0.00	NA	NA	NA
ASC Overflow	25 8	0.10	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 8	0.10	0.70	6.81	22.00
PD Overflow	25 8	0.02	0.00	0.00	0.00
POWERMAINS DISRUPTION	0 0	0.45	0.00	0.00	0.00
POWERMAINS GLITCH	0 0	0.01	0.00	0.00	0.00
DARM 09 11 dHz LOWTHRESH	0 0	0.20	0.00	0.00	0.00
DARM 11 13 dHz LOWTHRESH	0 0	0.11	0.00	0.00	0.00
DARM 18 24 dHz LOWTHRESH	0 0	0.01	0.00	0.00	0.00
DARM 50 70 dHz LOWTHRESH	0 0	0.00	NA	NA	NA
SEISMIC EY 99PCTL 3 10HZ	10 10	1.06	1.91	1.81	60.00
SEIS DARMERR 5 7HZ	0 0	0.00	NA	NA	NA
SIDECOIL ETMX RMS 6HZ	25 8	0.02	0.00	0.00	0.00
SIDECOIL ETMY RMS 6HZ	25 8	0.19	0.00	0.00	0.00
SIDECOIL ETMX	25 8	0.03	0.00	0.00	0.00
SIDECOIL ETMY	25 8	0.29	0.00	0.00	0.00
SEISMIC X 30 100 mHz HIGHTHRESH	0 0	0.29	0.03	0.11	1.00
SEISMIC Y 30 100 mHz HIGHTHRESH	0 0	0.91	0.32	0.35	10.00
DEWAR GLITCH	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW IOO	8 8	0.00	NA	NA	NA
PRE LOCKLOSS 120 SEC	0 0	0.12	0.03	0.26	1.00
TIDAL SERVO PRESATURATION	0 0	0.00	NA	NA	NA
BN GLITCHINESS	0 0	0.00	NA	NA	NA
CONCRETE WORK	0 0	0.00	NA	NA	NA

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
AIRCRAFT VERY LIKELY	0 0	3.37	3.38	1.00	106.00
AIRCRAFT LIKELY	0 0	3.40	3.38	0.99	106.00
MASTER OVERFLOW SUS MC2	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW SUS RM	25 8	0.00	NA	NA	NA
MASTER OVERFLOW LSC	25 8	0.02	0.03	1.94	1.00
H2 Not Locked	0 15	2.99	0.54	0.18	17.00
HUMAN ACTIVITY	0 0	0.00	NA	NA	NA
LAB ACTIVITY	0 0	0.00	NA	NA	NA
MACHINE ACTIVITY	0 0	1.98	0.16	0.08	5.00
VEHICULAR ACTIVITY	0 0	2.23	0.06	0.03	2.00
OTHER ACTIVITY	0 0	1.99	0.29	0.14	9.00
SEISMIC X 30 100 mHz LOWTHRESH	0 0	1.15	0.13	0.11	4.00
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	3.89	0.86	0.22	27.00
NO CALIB LINE	0 0	0.00	NA	NA	NA
COMMISSIONING ELOG	0 0	0.03	0.03	1.04	1.00
COSMIC RAY	0 0	0.00	0.00	0.00	0.00
EARTHQUAKE ELOG	0 0	0.14	0.00	0.00	0.00
CHECKSUM MISMATCH	0 0	0.00	NA	NA	NA
PROCESSOR TROUBLE ELOG	0 0	0.85	0.00	0.00	0.00
COIL UPCONVERSION	0 0	1.84	0.00	0.00	0.00
ETMX COIL OVERFLOW	0 0	0.00	NA	NA	NA
ETMY COIL OVERFLOW	0 0	0.00	NA	NA	NA

H2					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
PEM INJECTION	0 0	0.00	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA

Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.41	100.00	243.52	3458.00
INJECTION UNBLINDED	0 0	0.00	NA	NA	NA
SEVERE LSC OVERFLOW	8 8	0.01	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	NA	NA	NA
CALIB GLITCH ZG	10 0	0.00	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.00	0.00	0.00	0.00
ASI CORR OVERFLOW	8 8	0.02	0.00	0.00	0.00
ASC Overflow	8 8	0.06	0.00	0.00	0.00
MASTER OVERFLOW ASC	8 8	0.06	0.00	0.00	0.00
POWMAG	4 0	0.00	0.00	0.00	0.00
PD Overflow	8 8	0.01	0.00	0.00	0.00
H1 LOCKGAIN	0 0	1.48	0.17	0.12	6.00
H1 LOCKLOSS	0 0	1.15	0.09	0.08	3.00
MMT3 OPTLEVER	0 0	0.00	NA	NA	NA
OSEM GLITCH	2 0	0.00	NA	NA	NA
ISCT10 TABLE GLITCH	10 0	0.00	NA	NA	NA
ISCT10 TABLE GLITCH MILD	10 0	0.00	NA	NA	NA
H1H2 SCATTERING	0 0	0.16	0.00	0.00	0.00
SLEDGEHAMMER	0 0	0.00	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.00	0.00	0.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 04 PERCENT	2 2	2.68	1.21	0.45	42.00
Wind Over 30MPH	8 8	0.19	0.00	0.00	0.00
CALIB BAD COEFFS 60	0 0	0.13	0.00	0.00	0.00
SEVERE LSC OVERFLOW	25 8	0.02	0.00	0.00	0.00
ASI CORR OVERFLOW	25 8	0.03	0.00	0.00	0.00
ASC Overflow	25 8	0.09	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 8	0.09	0.00	0.00	0.00
PD Overflow	25 8	0.02	0.00	0.00	0.00
POWERMAINS DISRUPTION	0 0	0.45	0.00	0.00	0.00
POWERMAINS GLITCH	0 0	0.01	0.00	0.00	0.00
DEWAR GLITCH	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW IOO	8 8	0.00	NA	NA	NA
PRE LOCKLOSS 120 SEC	0 0	0.28	0.03	0.10	1.00
CONCRETE WORK	0 0	0.00	NA	NA	NA
OSEM GLITCH	25 8	0.00	NA	NA	NA
SICK	0 0	1.87	0.84	0.45	29.00
ROUTE10 TRAFFIC	0 0	0.01	0.00	0.00	0.00
SENSEMON RANGE STEP	0 0	0.00	NA	NA	NA
ASC TROUBLE	0 0	0.00	NA	NA	NA
BALING ACTIVITY	0 0	0.06	0.00	0.00	0.00
EARTHQUAKE GLITCHINESS	0 0	0.00	NA	NA	NA
FM ROLLMODE EXCITED	0 0	2.36	4.54	1.92	157.00
ISCT10 TROUBLE	0 0	0.00	NA	NA	NA
STACK RESONANCE	0 0	0.01	0.00	0.00	0.00
TCS TROUBLE	0 0	0.00	NA	NA	NA
BADMONTH	0 0	45.86	68.57	1.50	2371.00

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
AIRCRAFT VERY LIKELY	0 0	3.31	3.18	0.96	110.00
AIRCRAFT LIKELY	0 0	3.33	3.18	0.95	110.00
MASTER OVERFLOW SUS MC2	0 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW LSC	25 8	0.02	0.00	0.00	0.00
H1 Not Locked	0 15	1.76	0.03	0.02	1.00
HUMAN ACTIVITY	0 0	0.00	NA	NA	NA
MACHINE ACTIVITY	0 0	1.93	0.46	0.24	16.00
VEHICULAR ACTIVITY	0 0	2.22	0.06	0.03	2.00
OTHER ACTIVITY	0 0	1.51	0.17	0.11	6.00
SEISMIC X 30 100 mHz LOWTHRESH	0 0	1.05	0.06	0.05	2.00
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	3.39	0.67	0.20	23.00
NO CALIB LINE	0 0	0.13	0.00	0.00	0.00
LIGHTDIP 04 PERCENT	8 8	5.98	2.89	0.48	100.00
COMMISSIONING ELOG	0 0	0.12	0.09	0.69	3.00
COSMIC RAY	0 0	0.00	0.00	0.00	0.00
EARTHQUAKE ELOG	0 0	0.06	0.00	0.00	0.00
CHECKSUM MISMATCH	0 0	0.00	NA	NA	NA
PROCESSOR TROUBLE ELOG	0 0	0.98	0.00	0.00	0.00
ETMX COIL OVERFLOW	0 0	0.00	NA	NA	NA
ETMY COIL OVERFLOW	0 0	0.00	NA	NA	NA
MMT3 YAW SATURATION	0 0	0.00	NA	NA	NA
MMT3 GLITCHINESS	0 0	0.00	NA	NA	NA

L1					
Category 1 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
OUT OF LOCK	0 0	0.00	NA	NA	NA
AS TRIGGER	0 0	0.00	NA	NA	NA
INVALID DARMERR	0 0	0.00	NA	NA	NA
CORRUPTED RDS C03 LX	0 0	0.00	NA	NA	NA
MISSING RDS C03 L2	0 0	0.00	NA	NA	NA
MISSING RAW	0 0	0.00	NA	NA	NA

Category 2 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
Injection	64 16	0.41	100.00	244.98	3183.00
INJECTION UNBLINDED	0 0	0.00	0.00	0.00	0.00
SEVERE LSC OVERFLOW	8 8	0.12	0.00	0.00	0.00
CALIB DROPOUT 1SEC	10 0	0.00	NA	NA	NA
CALIB DROPOUT 1SAMPLE	10 0	0.00	0.00	0.00	0.00
CALIB GLITCH ZG	10 0	0.00	0.00	0.00	0.00
CALIB DROPOUT BN	0 0	0.00	NA	NA	NA
CALIB DROPOUT AWG STUCK	10 0	0.00	NA	NA	NA
PHOTODIODE GLITCH	0 4	0.07	0.00	0.00	0.00
ASI CORR OVERFLOW	8 8	0.64	0.00	0.00	0.00
ASC Overflow	8 8	0.05	0.00	0.00	0.00
MASTER OVERFLOW ASC	8 8	0.05	0.00	0.00	0.00
POWMAG	4 0	0.04	0.00	0.00	0.00
PD Overflow	8 8	0.12	0.00	0.00	0.00
BAD SENSING	0 0	0.00	NA	NA	NA
RAILED RBS PZT	0 0	0.00	NA	NA	NA
DAQ ERROR	0 0	0.00	NA	NA	NA
TCS GLITCH LOUD	4 0	0.00	0.00	0.00	0.00

Category 3 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
LIGHTDIP 04 PERCENT	2 2	3.55	1.57	0.44	50.00
TRAIN LIKELY	-360 -360	0.54	0.03	0.06	1.00
BS OPTLEVER GAINPEAKING	0 0	0.00	NA	NA	NA
CALIB BAD COEFFS 60	0 0	0.00	NA	NA	NA
SEVERE LSC OVERFLOW	25 8	0.22	0.00	0.00	0.00
ASI CORR OVERFLOW	25 8	1.00	0.09	0.09	3.00
ASC Overflow	25 8	0.08	0.00	0.00	0.00
MASTER OVERFLOW ASC	25 8	0.08	0.00	0.00	0.00
PD Overflow	25 8	0.23	0.00	0.00	0.00
MASTER OVERFLOW IOO	8 8	0.00	0.00	0.00	0.00
PRE LOCKLOSS 120 SEC	0 0	0.26	0.09	0.36	3.00
BADRANGE GLITCHINESS	0 0	0.00	NA	NA	NA
ELEVATED GLITCHINESS	0 0	0.47	0.09	0.20	3.00
SEVERE GLITCHINESS	0 0	0.01	0.00	0.00	0.00
EARTHQUAKE GLITCHINESS	0 0	0.18	0.13	0.68	4.00
HURRICANE GLITCHINESS	0 0	0.00	NA	NA	NA
BAD SERVO	0 0	0.00	NA	NA	NA
AUTOBURT GLITCHES	0 0	0.63	0.35	0.55	11.00
SEC LOGGING	0 0	0.00	NA	NA	NA
SEISMIC X 30 100 mHz MEDTHRESH	0 0	1.16	2.39	2.05	76.00
SEISMIC Y 30 100 mHz MEDTHRESH	0 0	1.40	1.76	1.26	56.00
SEISMIC X 30 100 mHz HIGHTHRESH	0 0	0.62	0.03	0.05	1.00
SEISMIC Y 30 100 mHz HIGHTHRESH	0 0	0.70	0.16	0.23	5.00
BS OPTLEVER HIGHRMS	0 0	0.00	NA	NA	NA
BS OPTLEVER	0 0	0.00	0.00	0.00	0.00
BS OPTLEVER GAINPEAKING	0 0	0.00	NA	NA	NA
LVEA NOISY	0 0	0.00	NA	NA	NA

Category 4 veto safety					
Name	Padding(s)	Deadtime(%)	Efficiency(%)	R_{ED}	N_V
AIRCRAFT VERY LIKELY	0 0	1.22	3.17	2.61	101.00
AIRCRAFT LIKELY	0 0	1.25	3.17	2.53	101.00
TRAIN LIKELY	-60 -60	1.84	3.42	1.86	109.00
MASTER OVERFLOW SUS MC2	2 2	0.37	0.00	0.00	0.00
MASTER OVERFLOW SUS RM	2 0	0.00	0.00	0.00	0.00
MASTER OVERFLOW LSC	25 8	0.23	0.38	1.61	12.00
NO CALIB LINE	0 0	0.00	NA	NA	NA
EX LOGGING	0 0	0.00	NA	NA	NA
SEISMIC X 30 100 mHz LOWTHRESH	0 0	3.86	5.81	1.51	185.00
SEISMIC Y 30 100 mHz LOWTHRESH	0 0	5.10	7.98	1.57	254.00
PHOTODIODE OFF	0 0	0.00	NA	NA	NA
BSOPLEV 3p6HZOSCILLATIONS	0 0	0.00	NA	NA	NA
MOVED LVEA SEIS	0 0	0.00	NA	NA	NA
TCS ITMX LIGHTDIP 10 PERCENT	4 0	0.00	0.00	0.00	0.00
TCS ITMX LIGHTDIP 20 PERCENT	4 0	0.00	0.00	0.00	0.00
BAD CALIBRATION NEAR 7KHZ	0 0	0.00	NA	NA	NA
SPOB GLITCHINESS	0 0	0.00	NA	NA	NA

4. Data Quality Veto Histograms

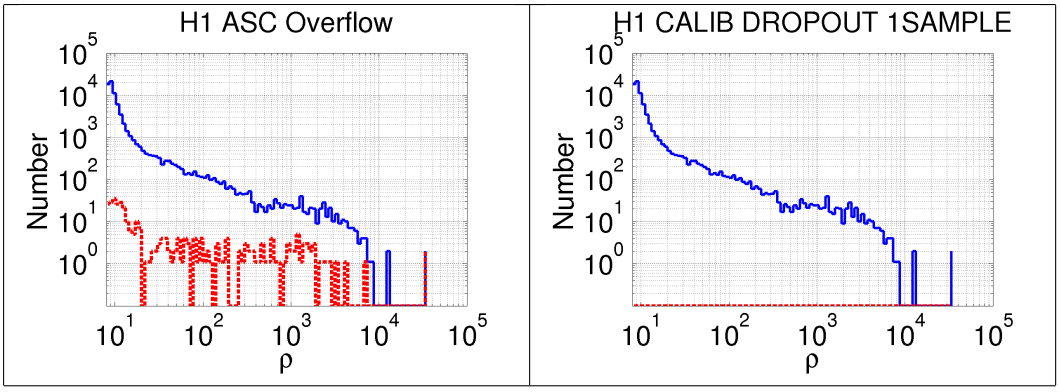
4.1. First year

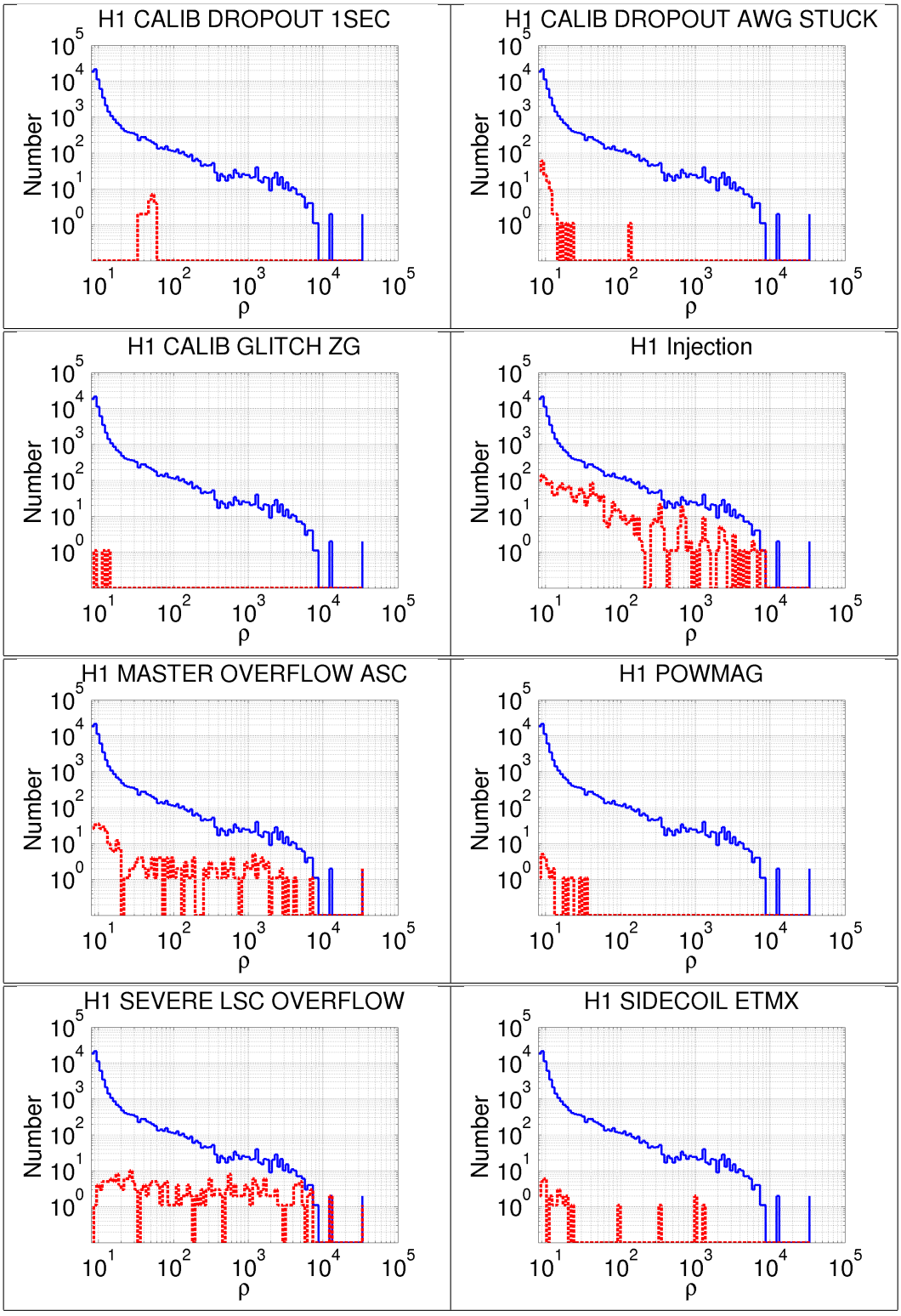
Data quality veto histograms of all triggers and vetoed triggers for the first year, low mass, CBC search.

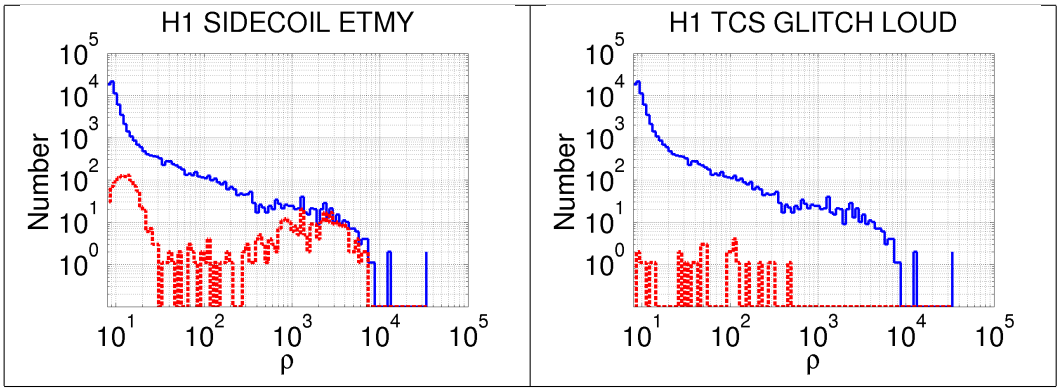
4.2. Histograms for H1 first calendar year vetoes

4.2.1. Category 1

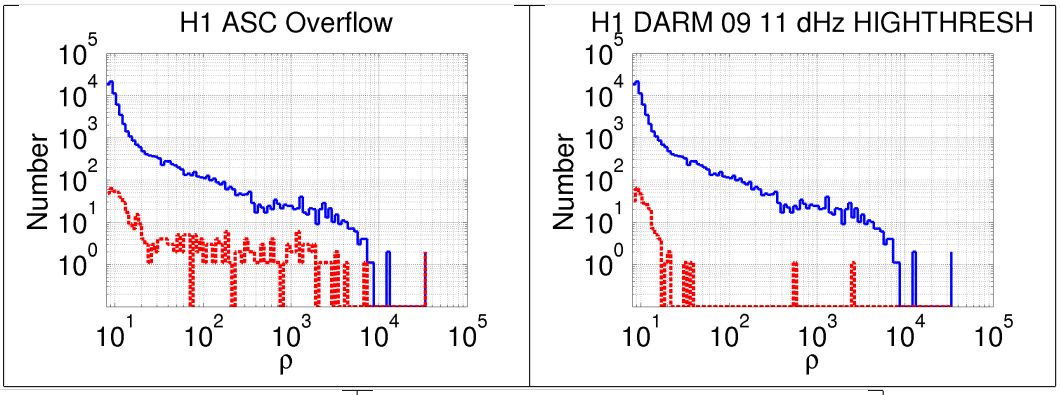
4.2.2. Category 2

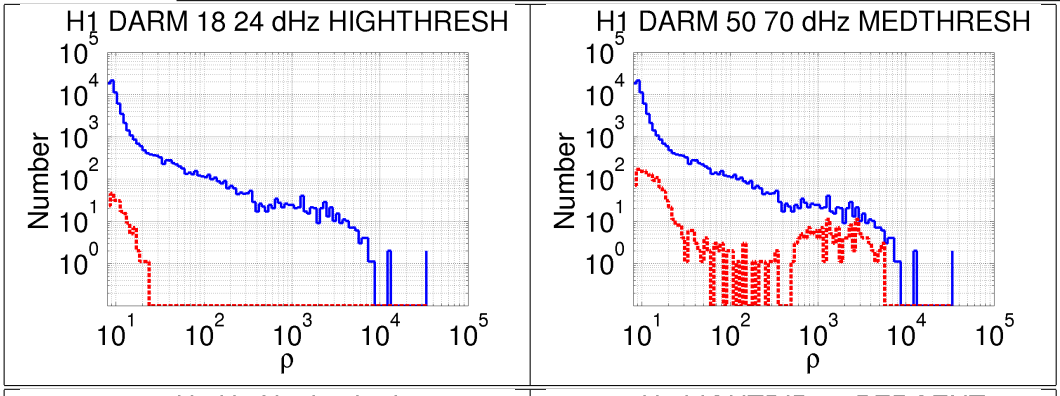


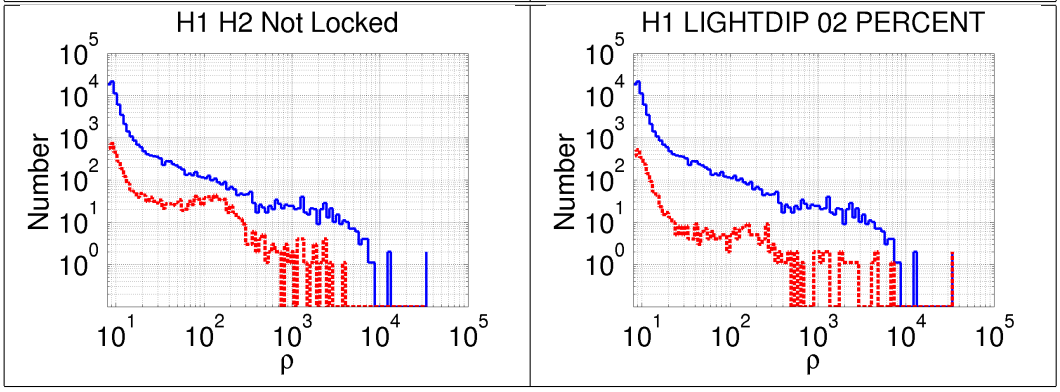

H1 CALIB DROPOUT 1SEC
H1 CALIB DROPOUT AWG STUCK
H1 CALIB GLITCH ZG
H1 Injection
H1 MASTER OVERFLOW ASC
H1 POWMAG
H1 SEVERE LSC OVERFLOW
H1 SIDECOIL ETMX
Number
ρ

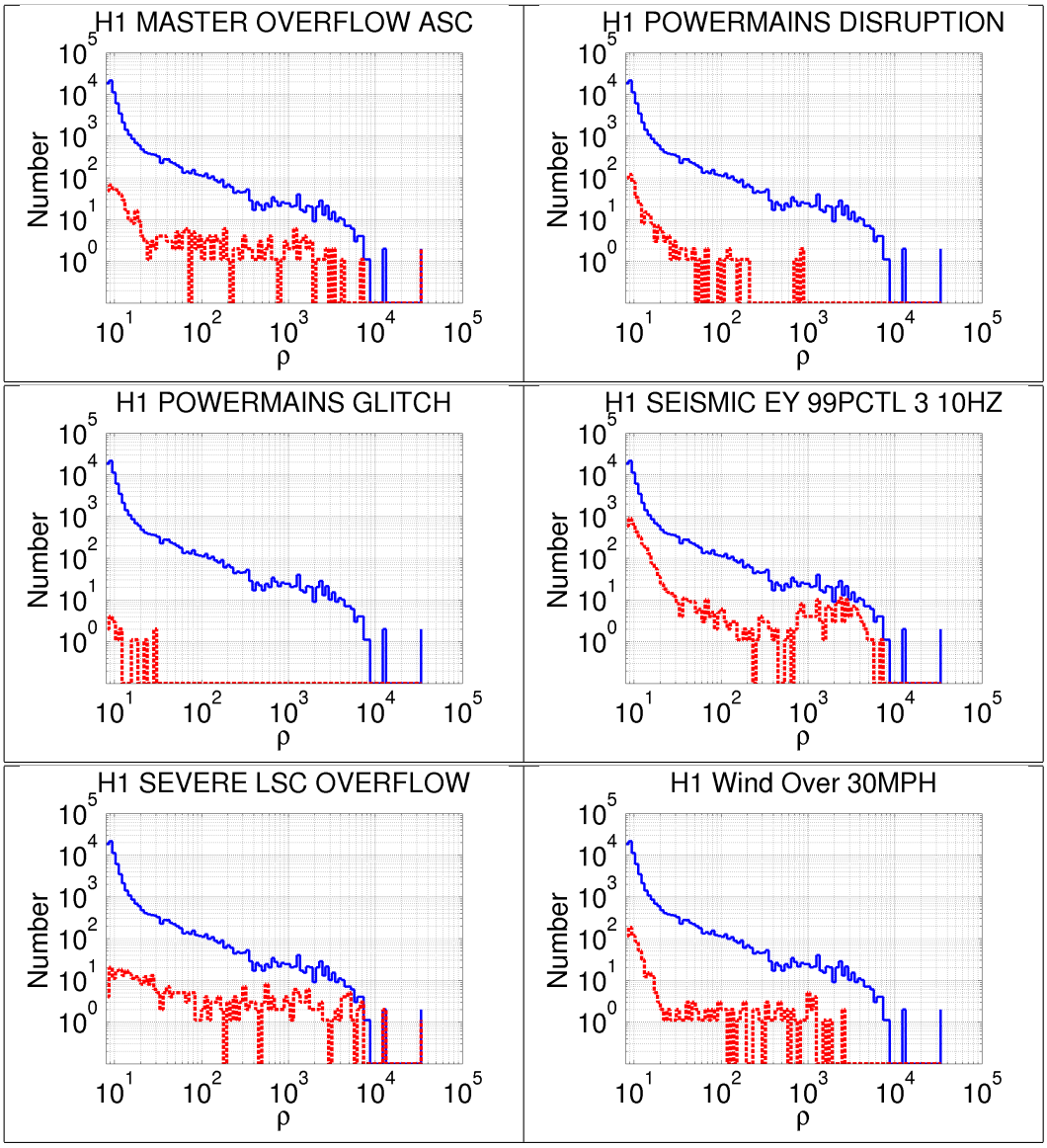


4.2.3. Category 3

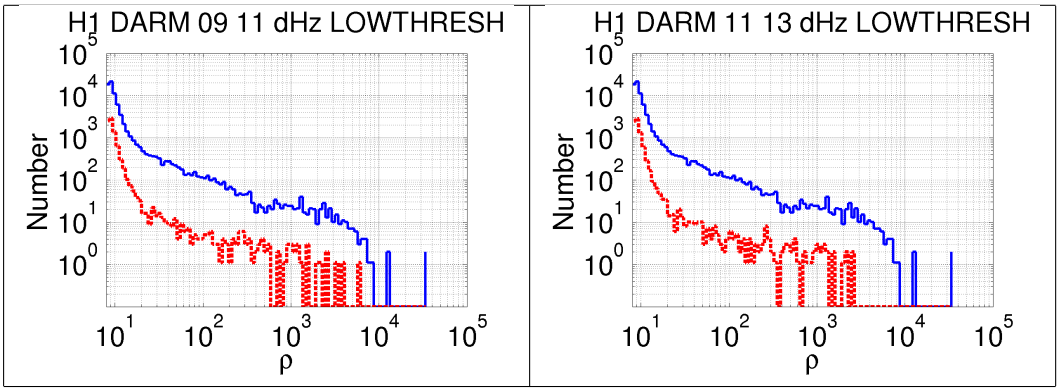


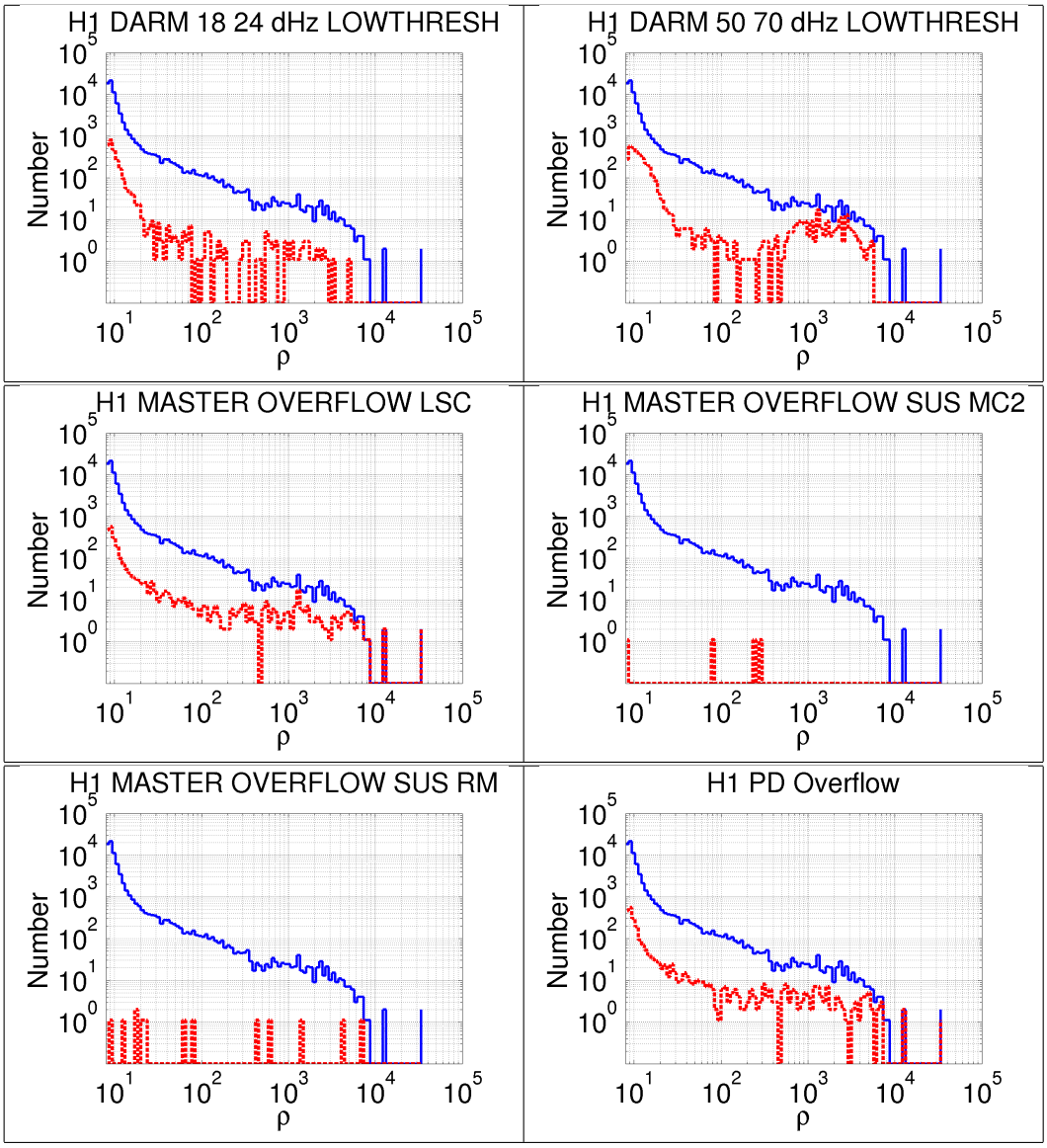






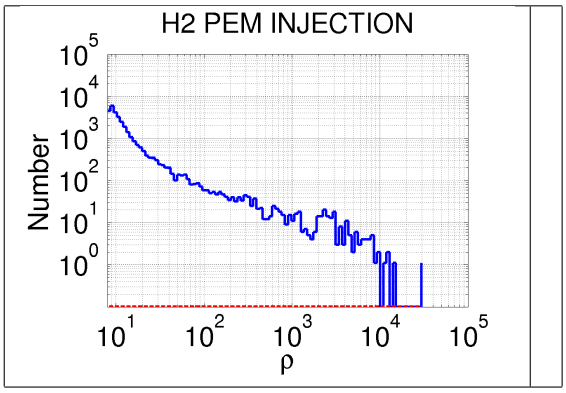
4.2.4. Category 4



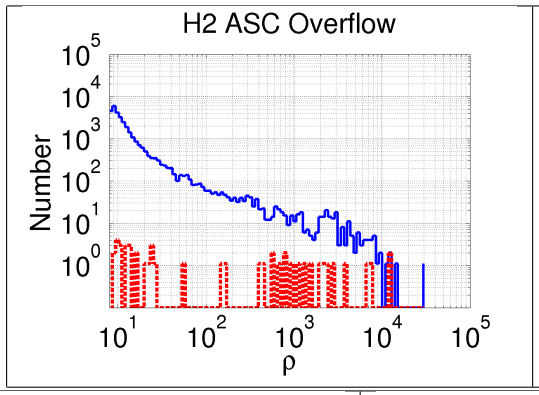

H1 DARM 18 24 dHz LOWTHRESH
H1 DARM 50 70 dHz LOWTHRESH
H1 MASTER OVERFLOW LSC
H1 MASTER OVERFLOW SUS MC2
H1 MASTER OVERFLOW SUS RM
H1 PD Overflow
Number
ρ

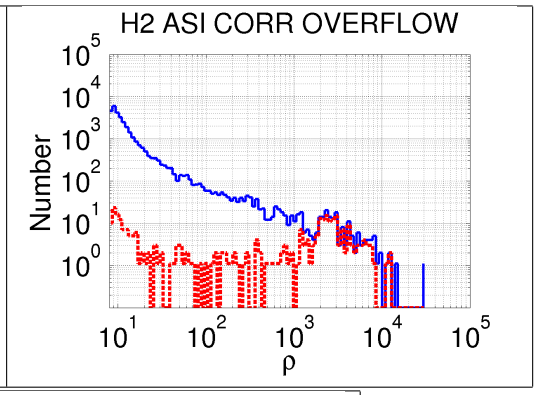
4.3. Histograms for H2 first calendar year vetoes

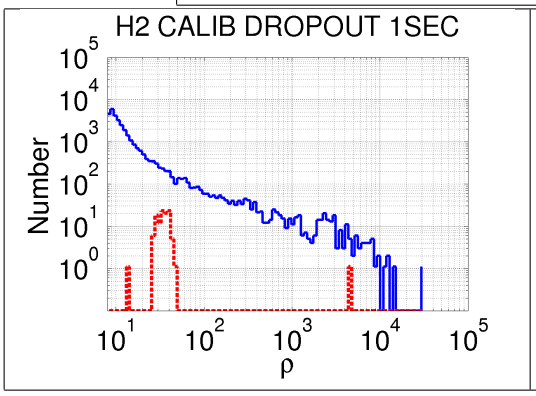
4.3.1. Category 1

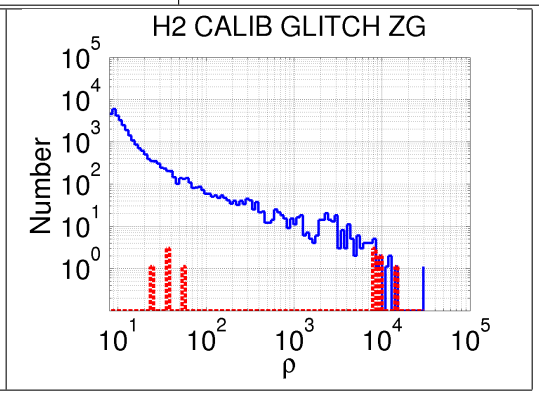


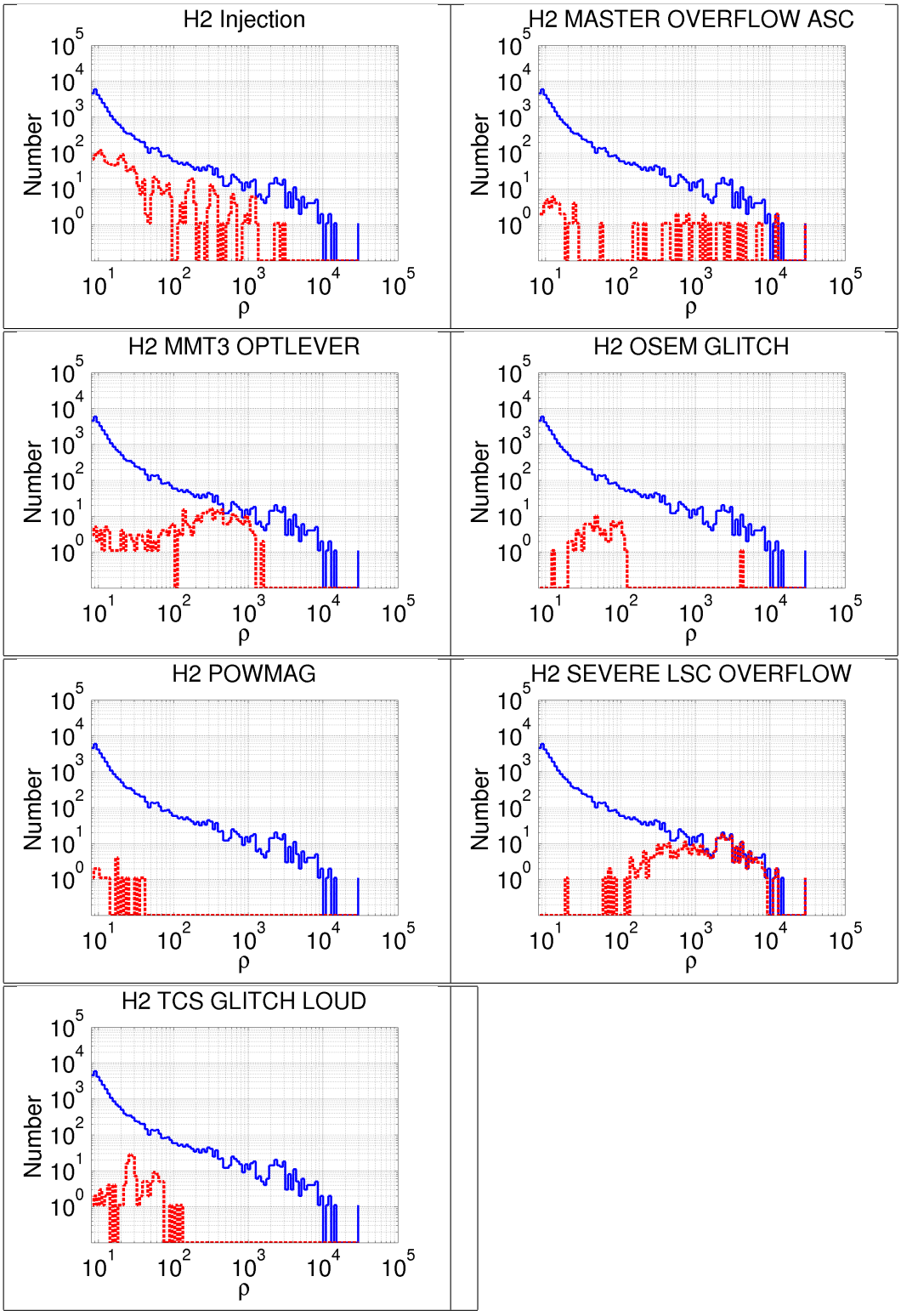
4.3.2. Category 2



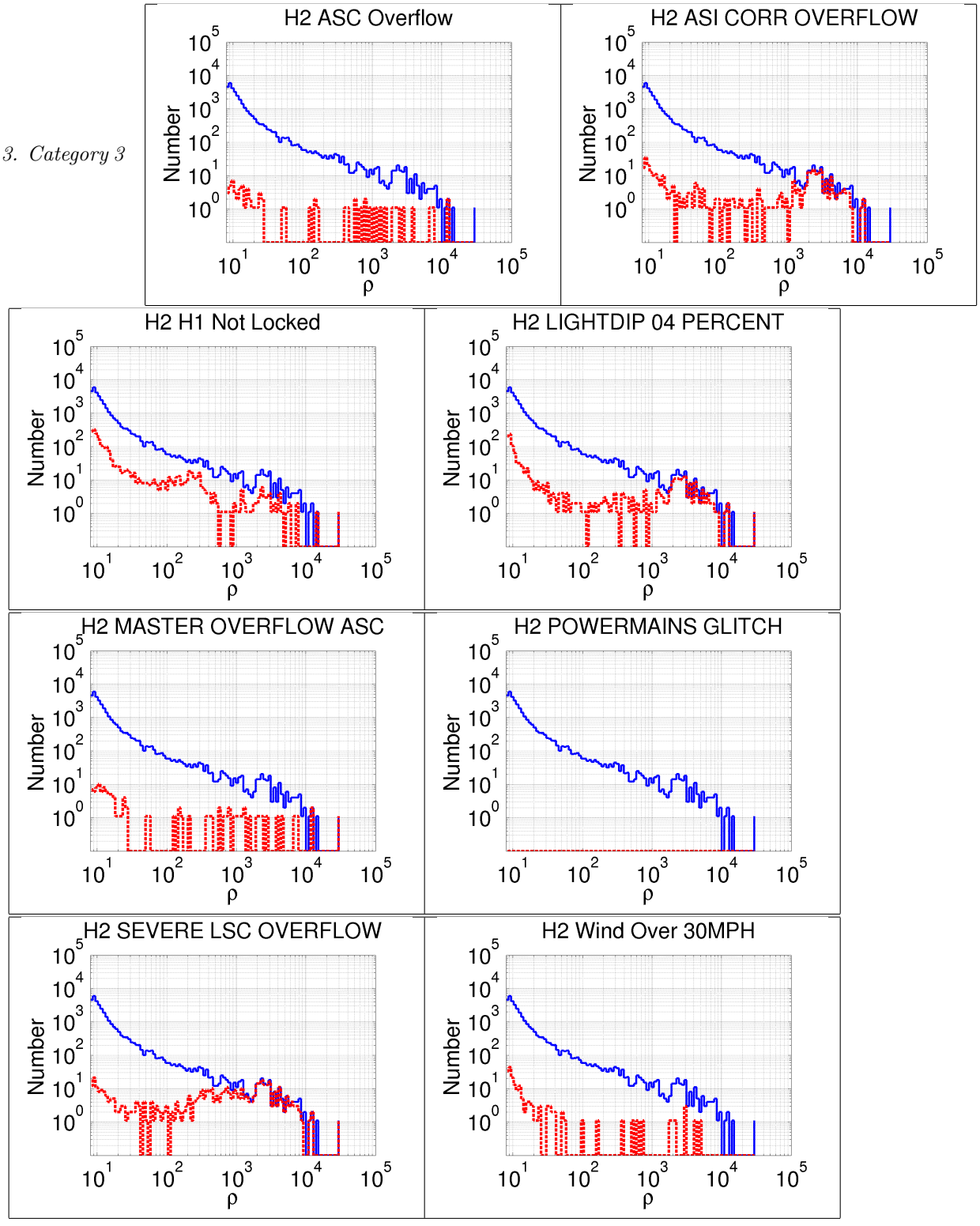




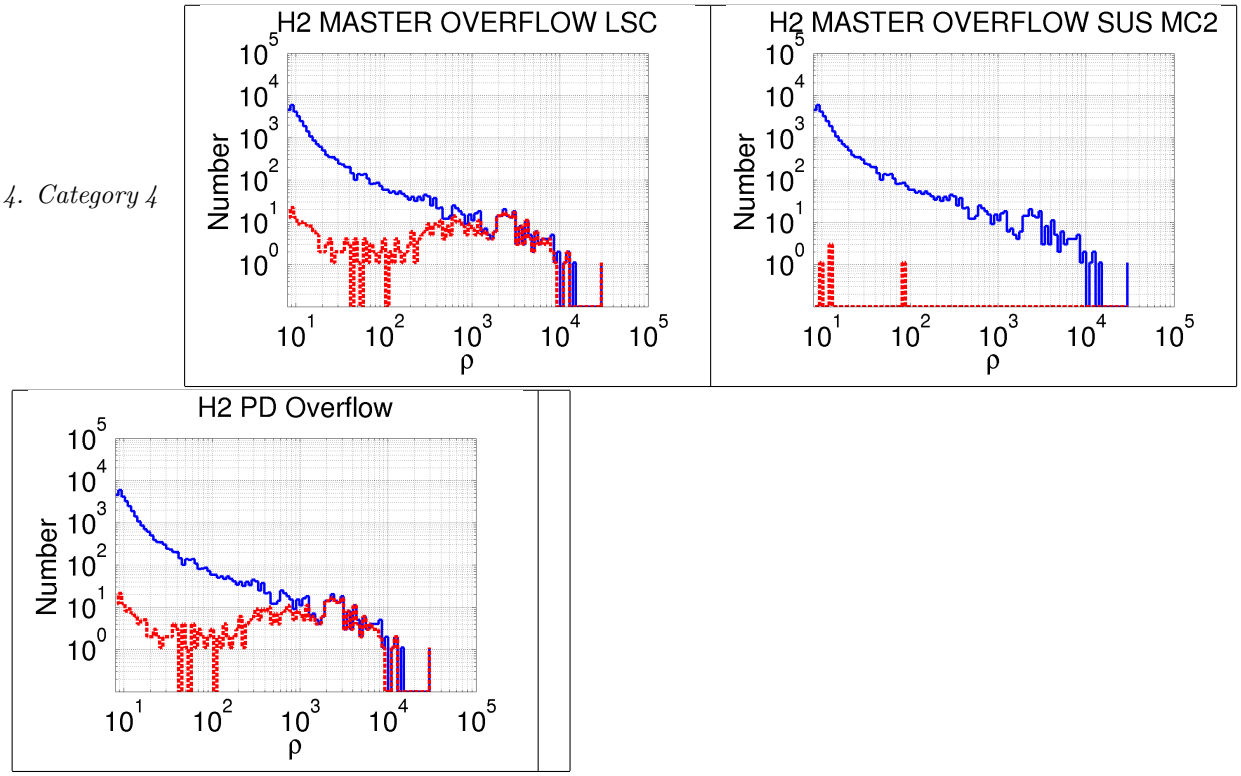



H2 Injection
H2 MASTER OVERFLOW ASC
H2 MMT3 OPTLEVER
H2 OSEM GLITCH
H2 POWMAG
H2 SEVERE LSC OVERFLOW
H2 TCS GLITCH LOUD
Number
ρ

4.3.3. Category 3

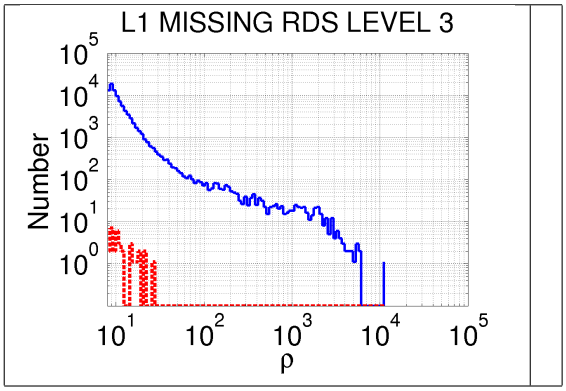


4.3.4. Category 4

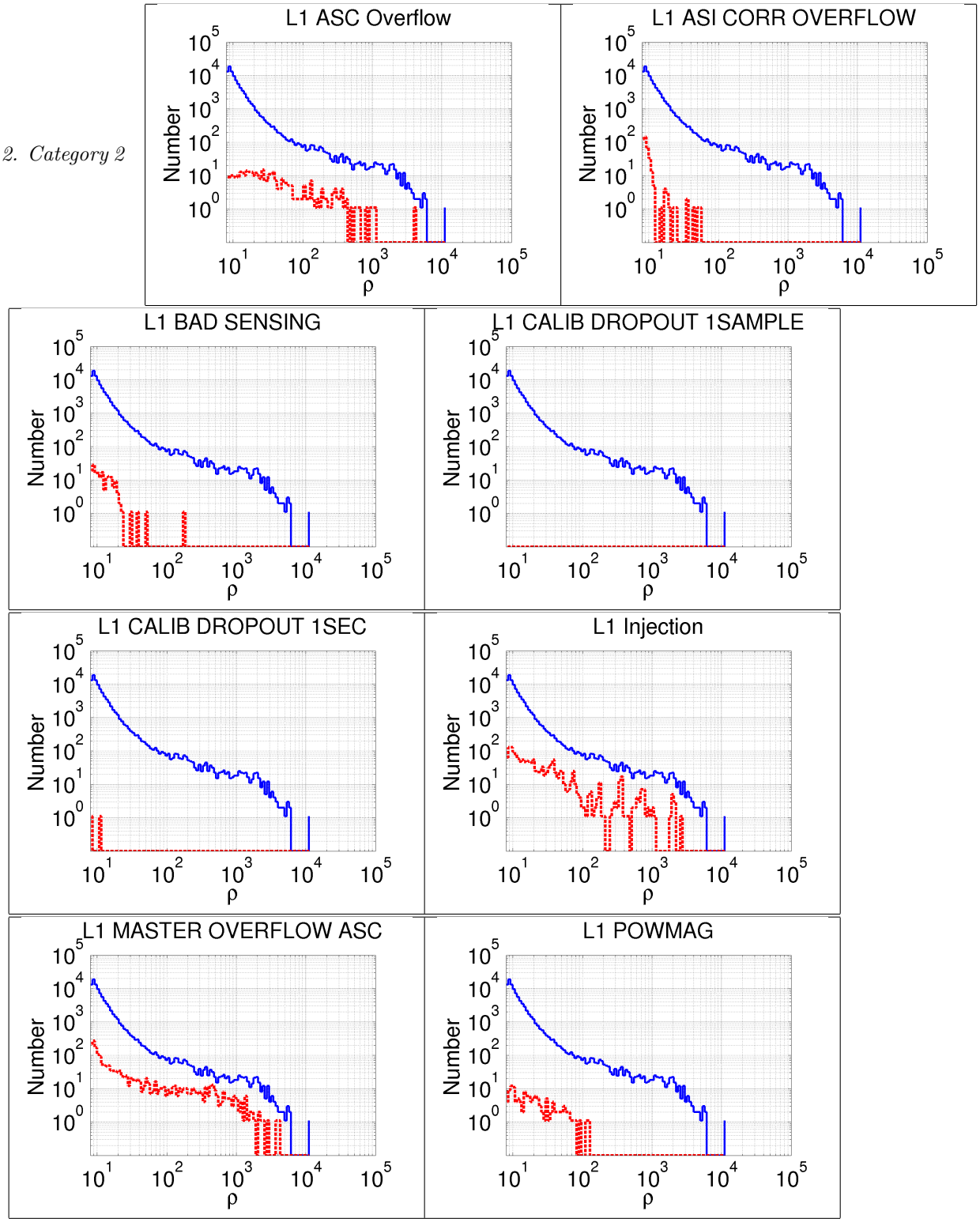


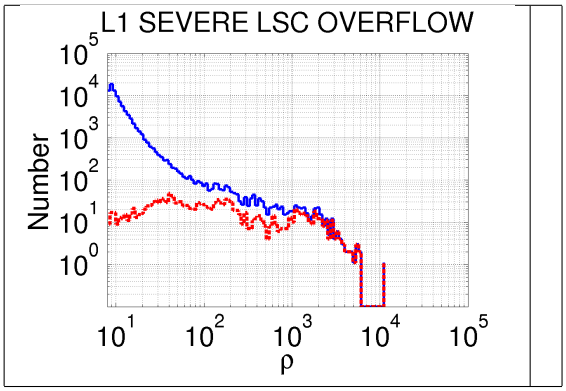
4.4. Histograms for L1 first calendar year vetoes

4.4.1. Category 1

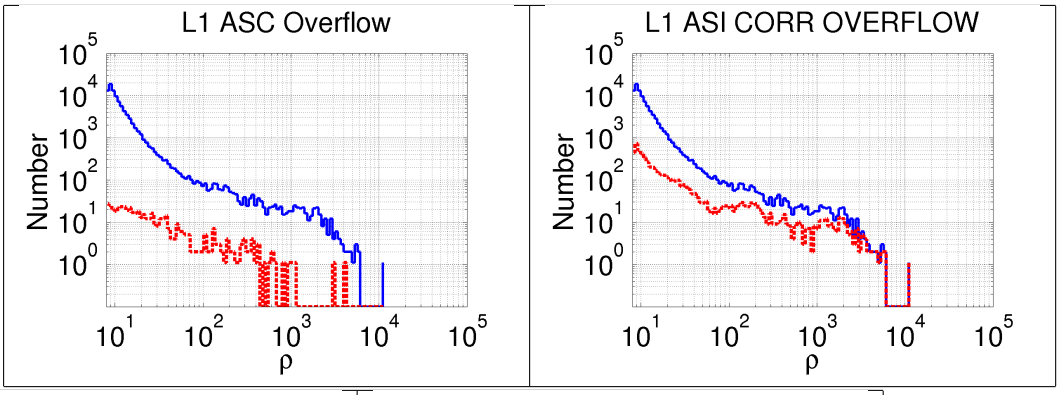


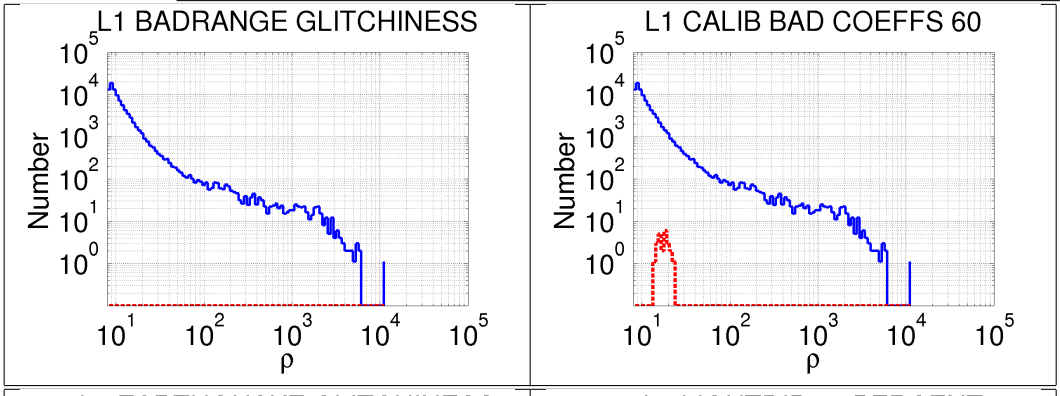
4.4.2. Category 2

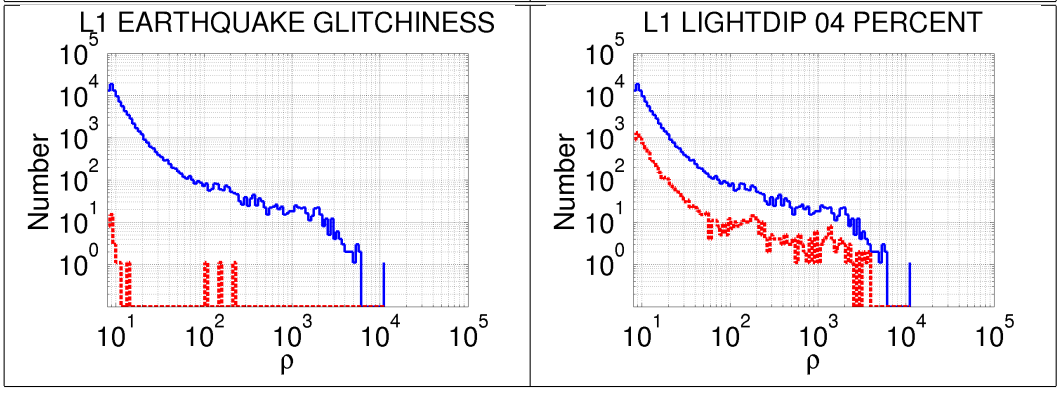


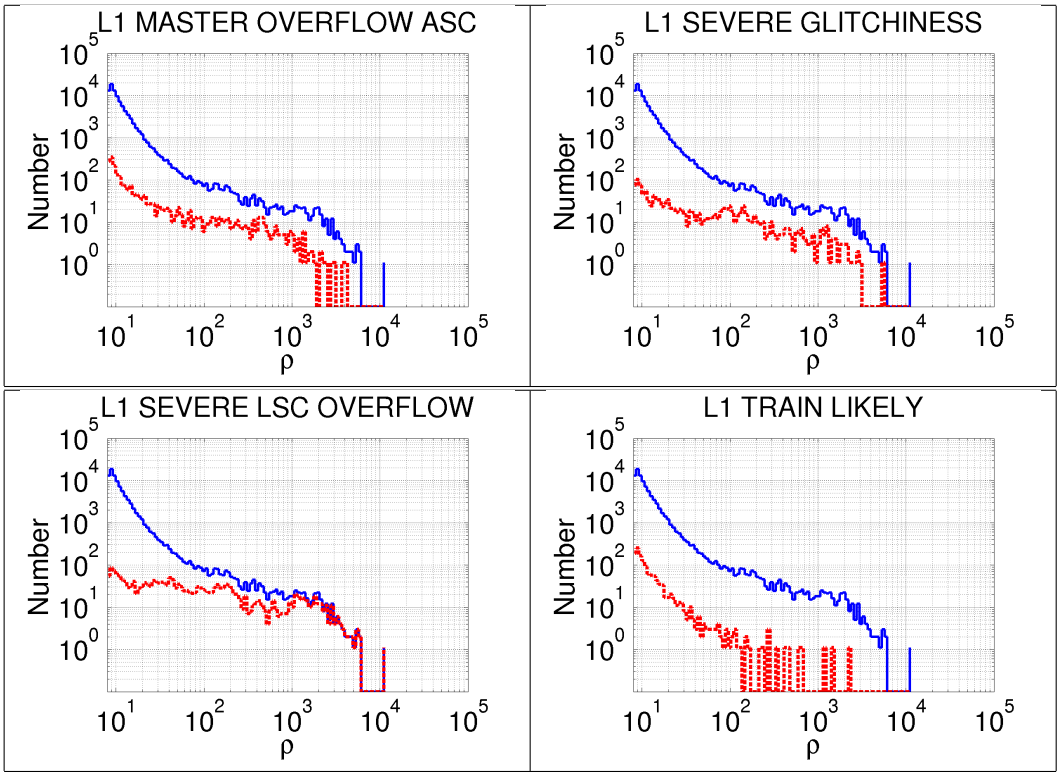


4.4.3. Category 3

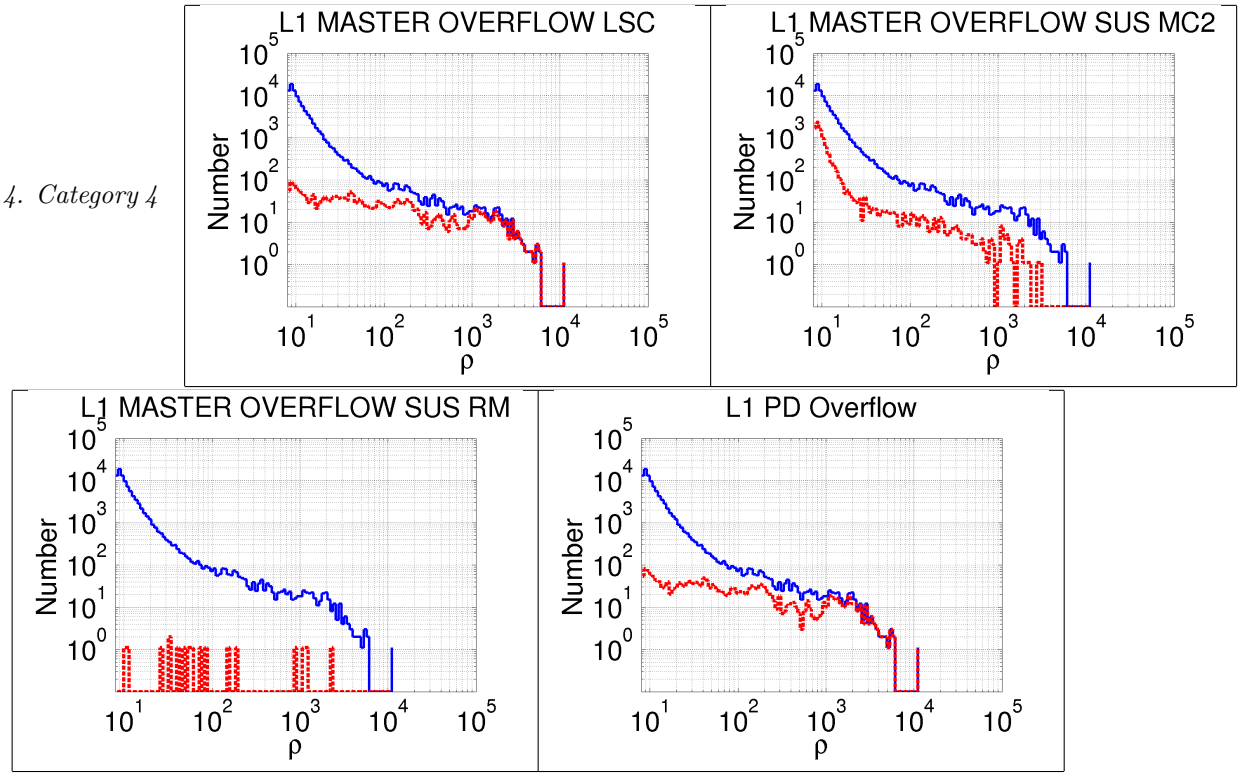


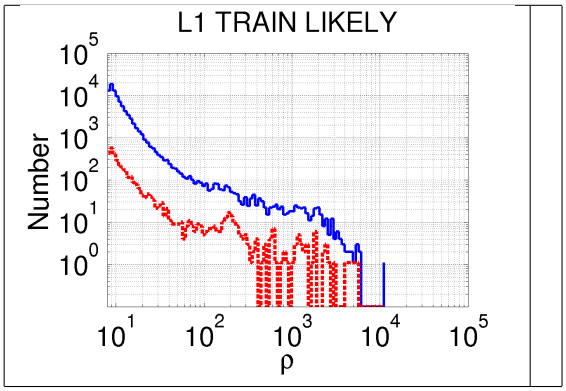






4.4.4. Category 4





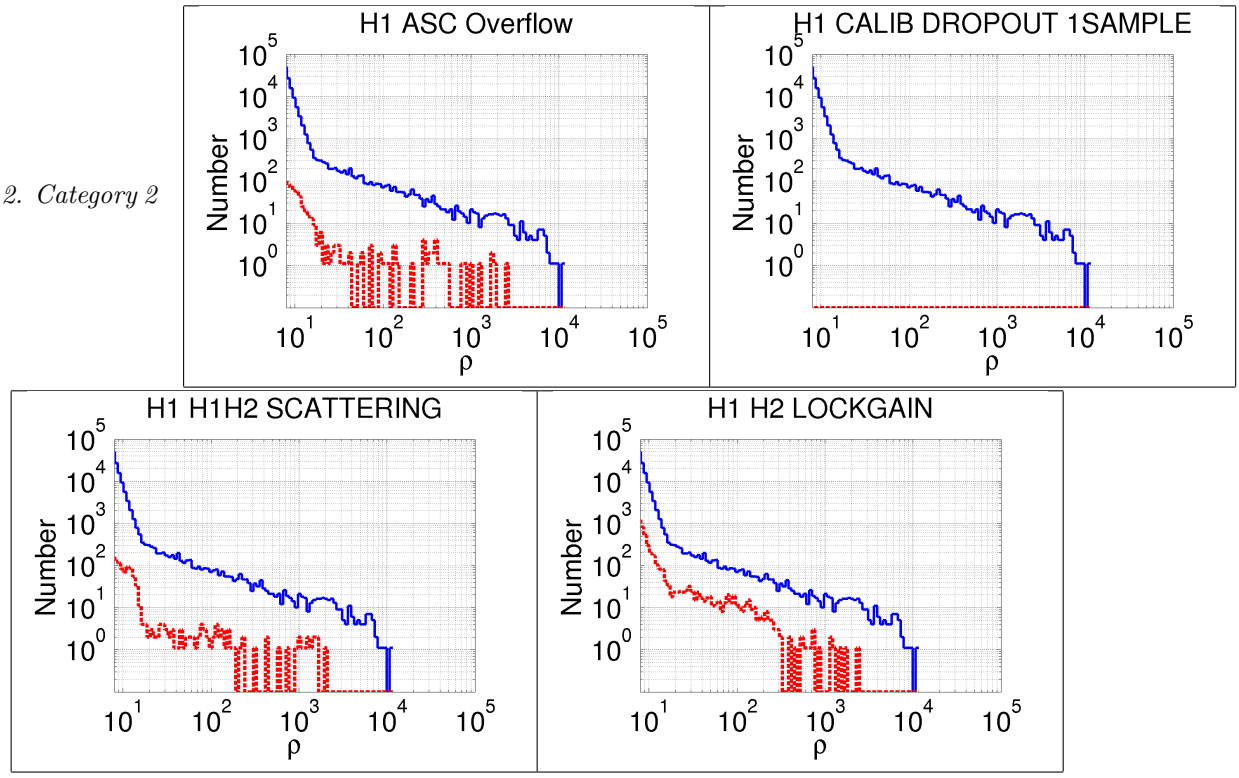
4.5. Months 12-18

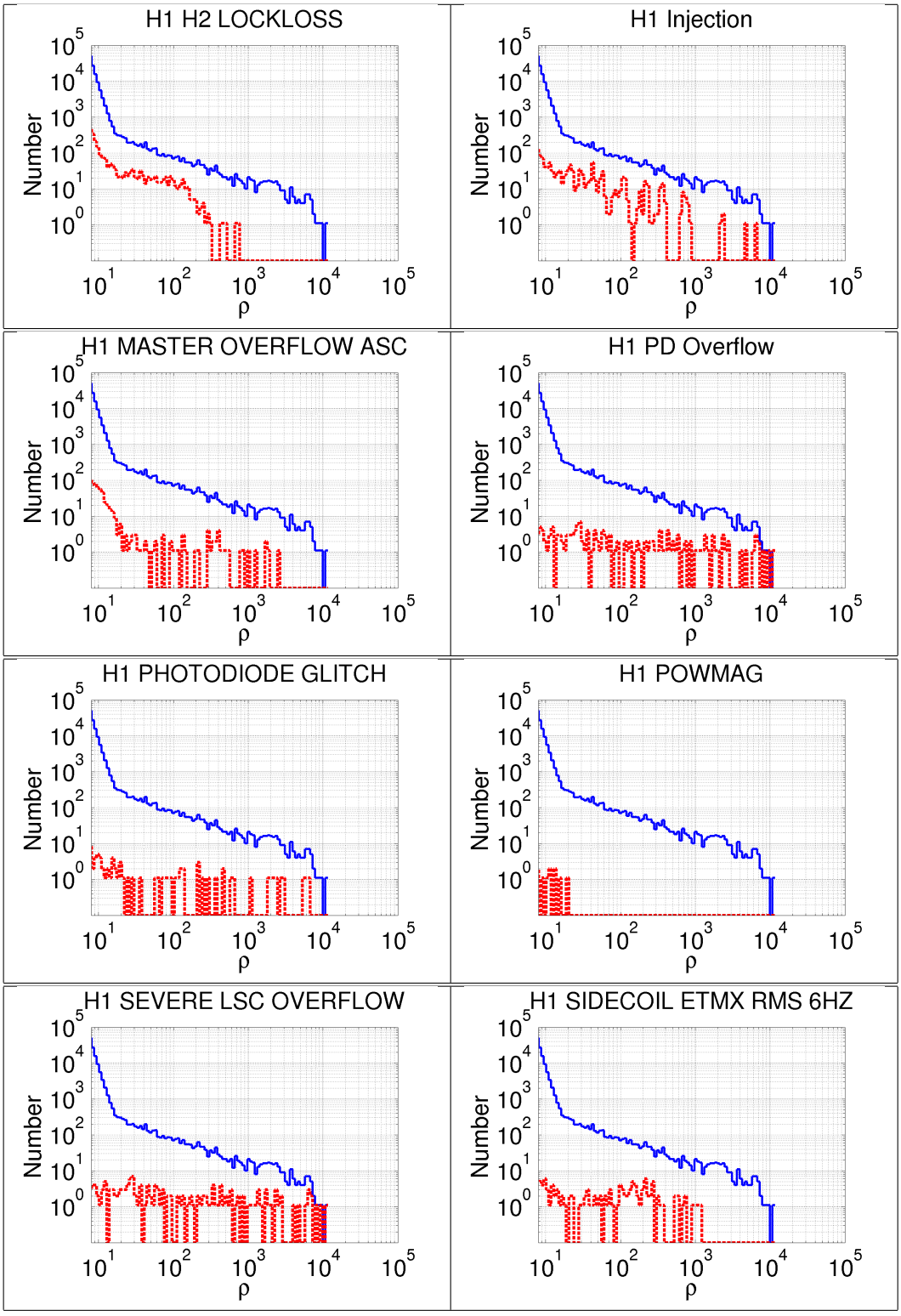
Data quality veto histograms of all triggers and vetoed triggers for months 12 to 18 of the low mass CBC search.

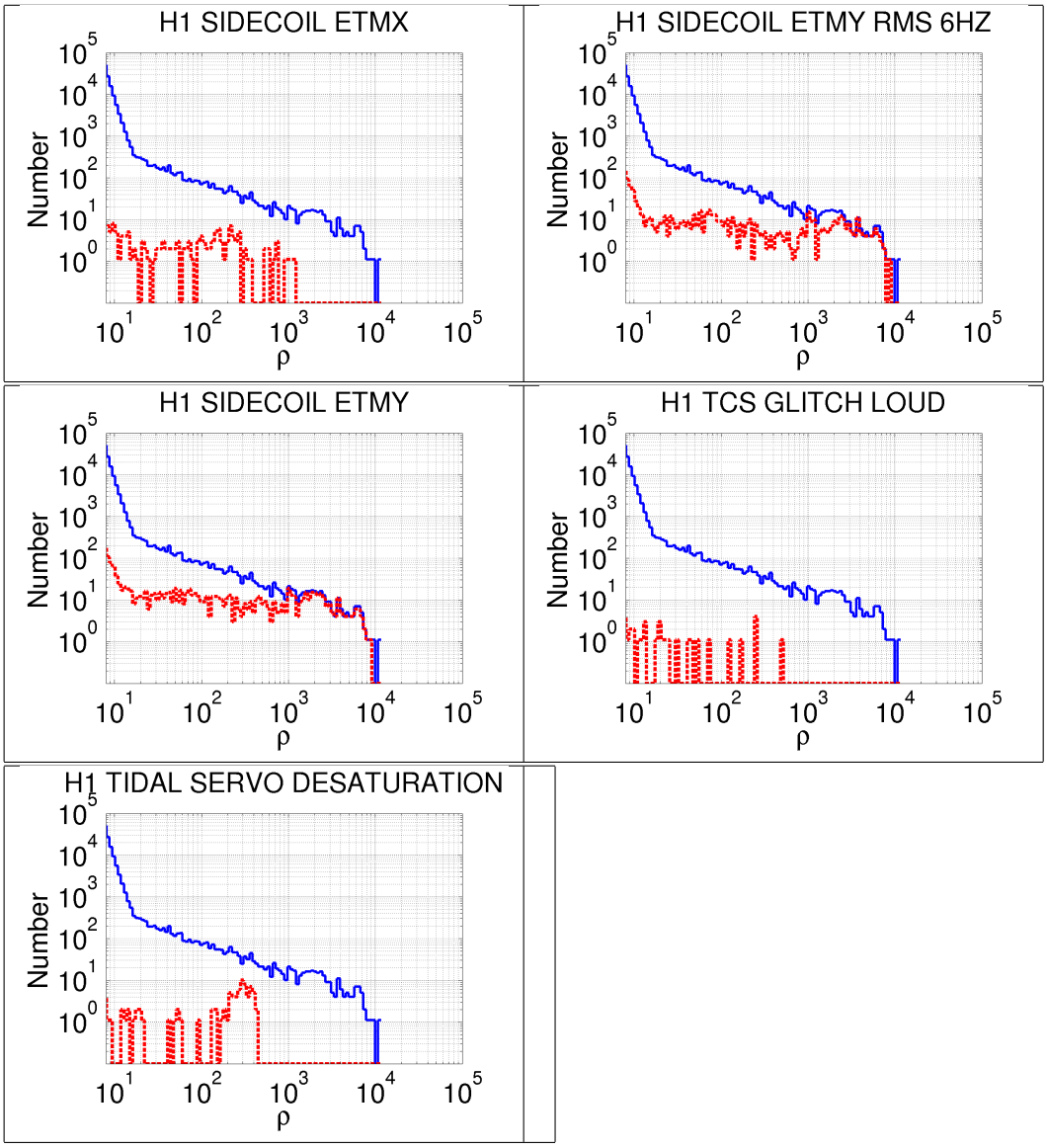
4.6. Histograms for H1 months 12 to 18 vetoes

4.6.1. Category 1

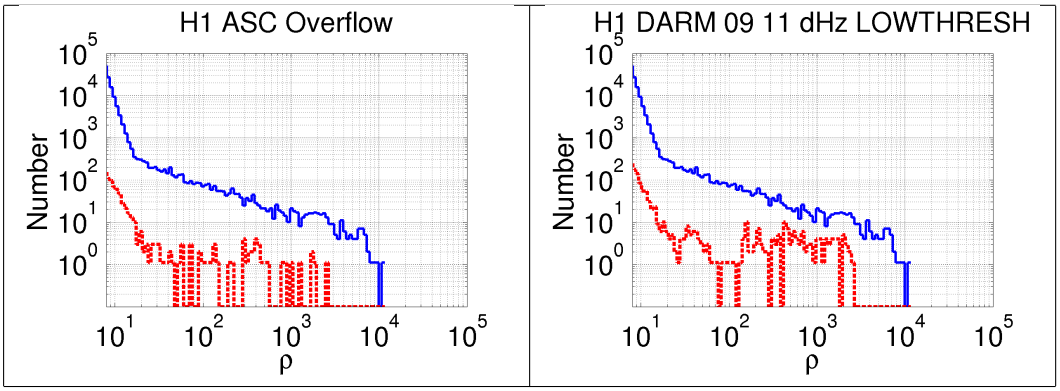
4.6.2. Category 2

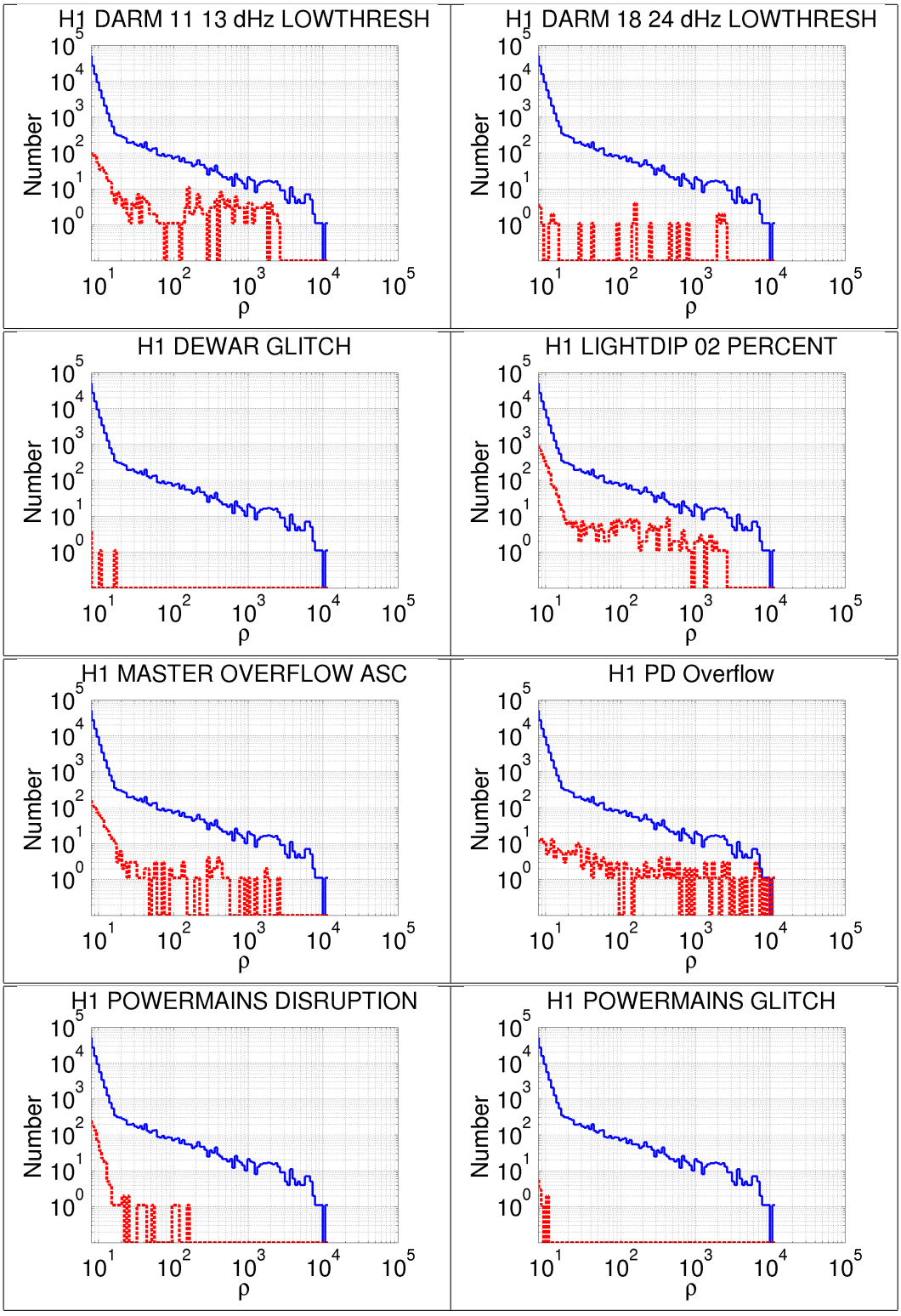


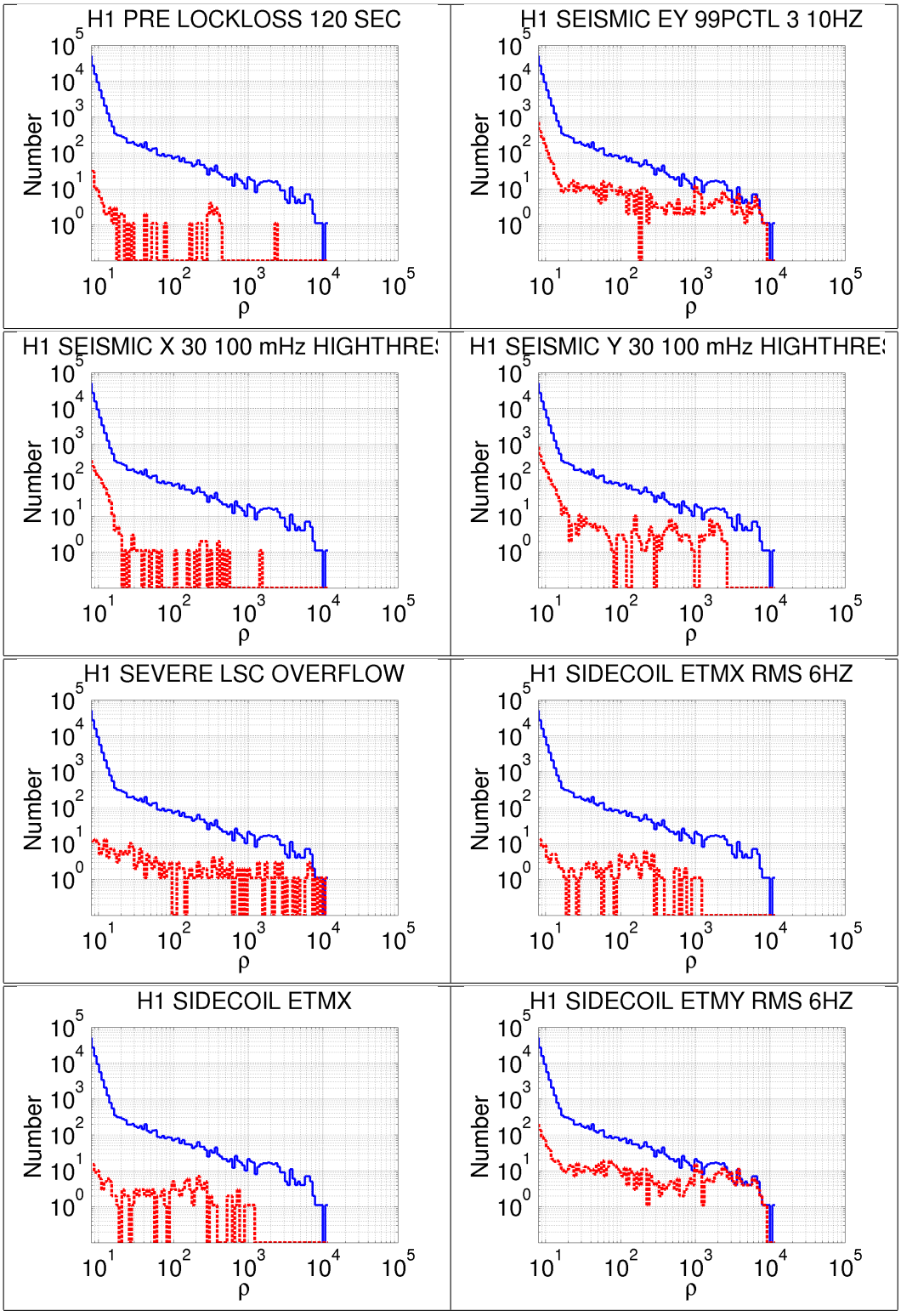

H1 H2 LOCKLOSS
H1 Injection
H1 MASTER OVERFLOW ASC
H1 PD Overflow
H1 PHOTODIODE GLITCH
H1 POWMAG
H1 SEVERE LSC OVERFLOW
H1 SIDECOIL ETMX RMS 6HZ
Number
ρ

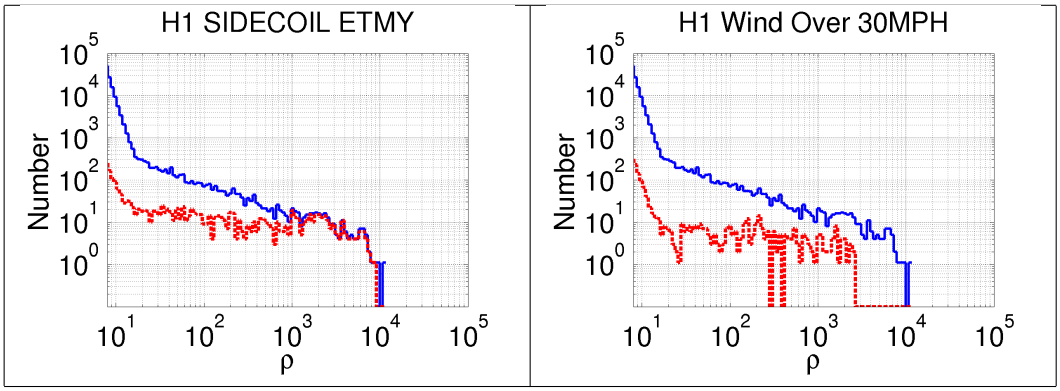


4.6.3. Category 3

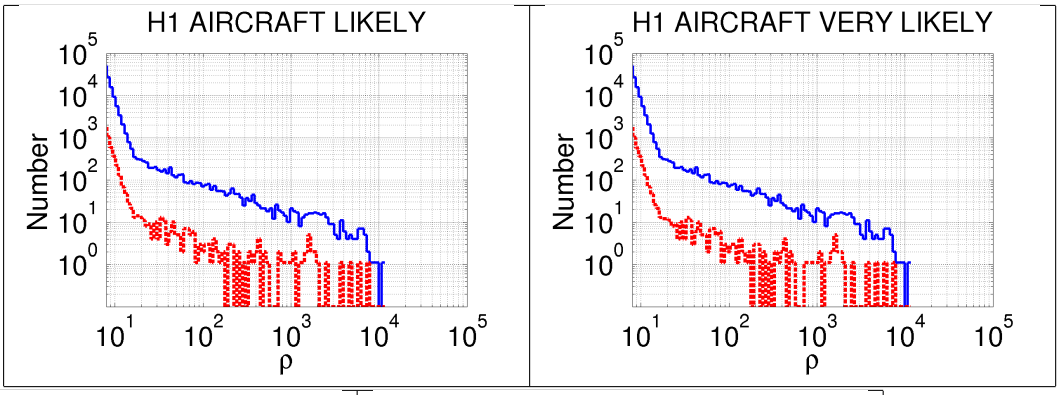


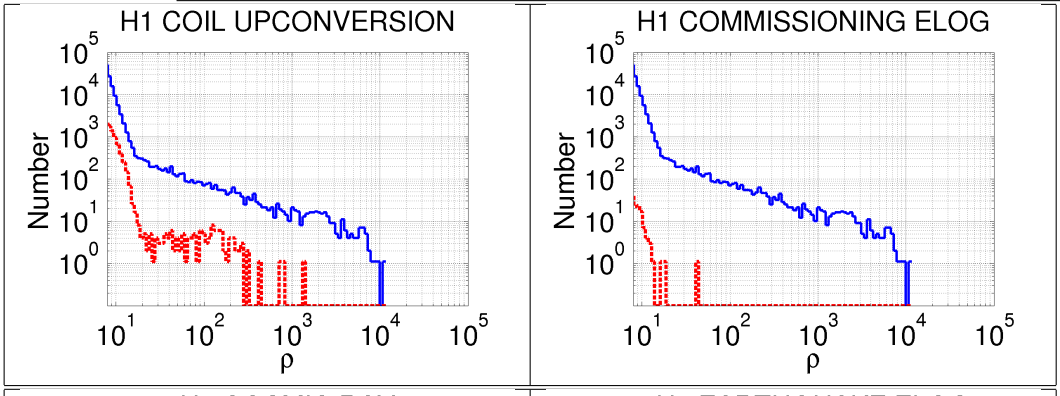

H1 DARM 11 13 dHz LOWTHRESH
H1 DARM 18 24 dHz LOWTHRESH
H1 DEWAR GLITCH
H1 LIGHTDIP 02 PERCENT
H1 MASTER OVERFLOW ASC
H1 PD Overflow
H1 POWERMAINS DISRUPTION
H1 POWERMAINS GLITCH
Number
ρ

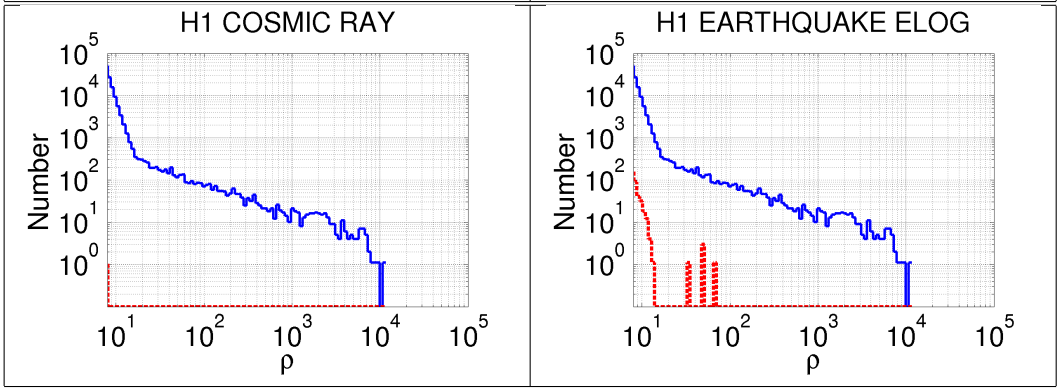

H1 PRE LOCKLOSS 120 SEC
H1 SEISMIC EY 99PCTL 3 10HZ
H1 SEISMIC X 30 100 mHz HIGHTHRE
H1 SEISMIC Y 30 100 mHz HIGHTHRE
H1 SEVERE LSC OVERFLOW
H1 SIDECOIL ETMX RMS 6HZ
H1 SIDECOIL ETMX
H1 SIDECOIL ETMY RMS 6HZ
Number
ρ

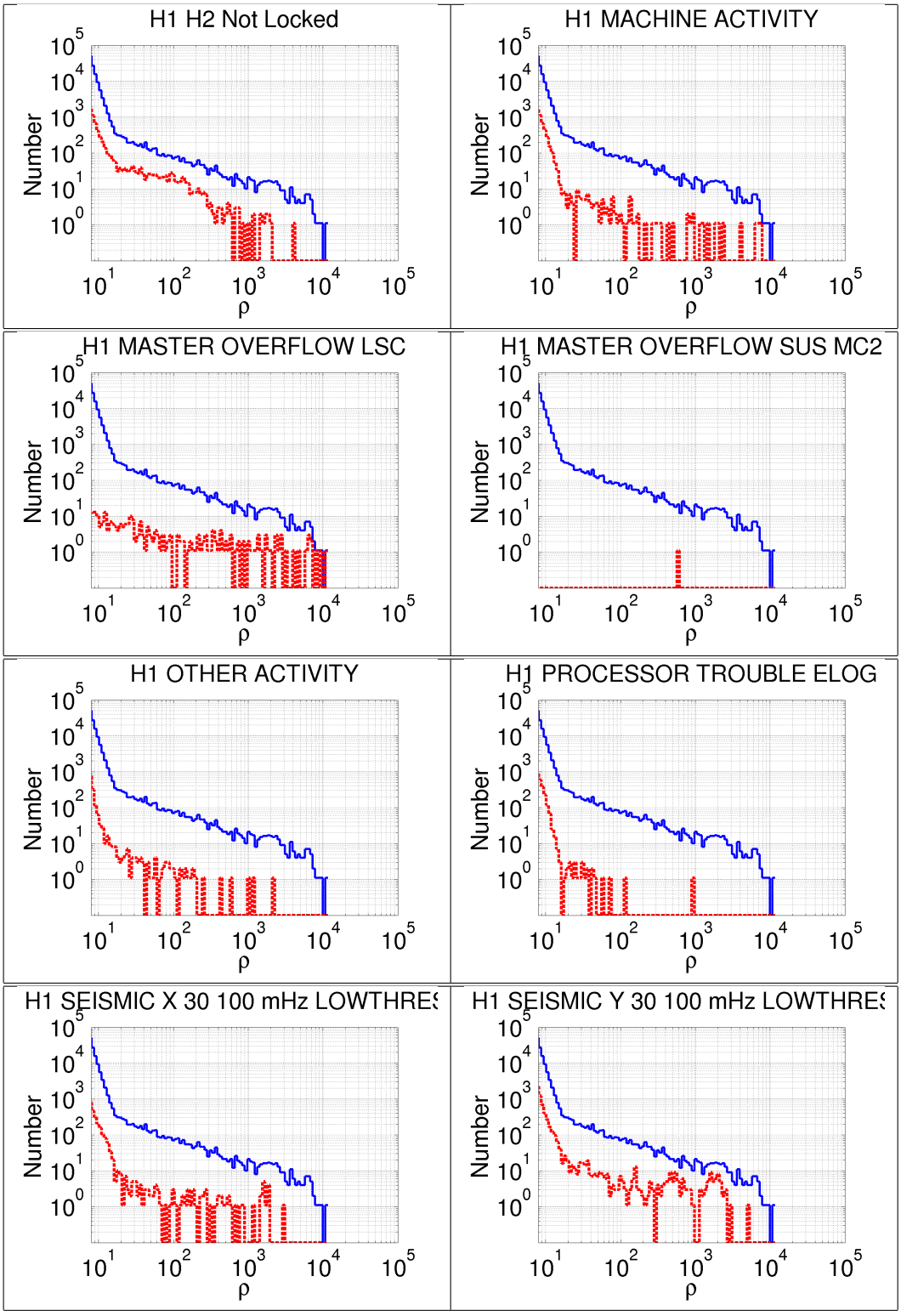


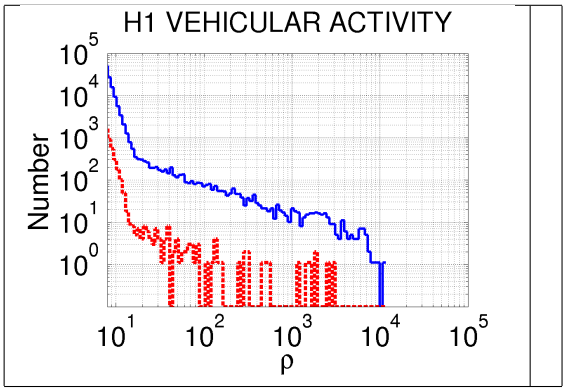
4.6.4. Category 4







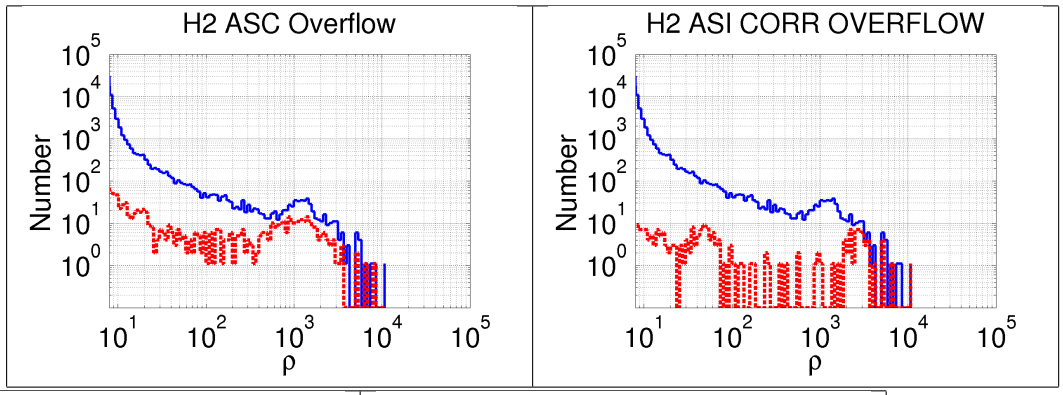

H1 H2 Not Locked
H1 MACHINE ACTIVITY
H1 MASTER OVERFLOW LSC
H1 MASTER OVERFLOW SUS MC2
H1 OTHER ACTIVITY
H1 PROCESSOR TROUBLE ELOG
H1 SEISMIC X 30 100 mHz LOWTHRES
H1 SEISMIC Y 30 100 mHz LOWTHRES
Number
ρ

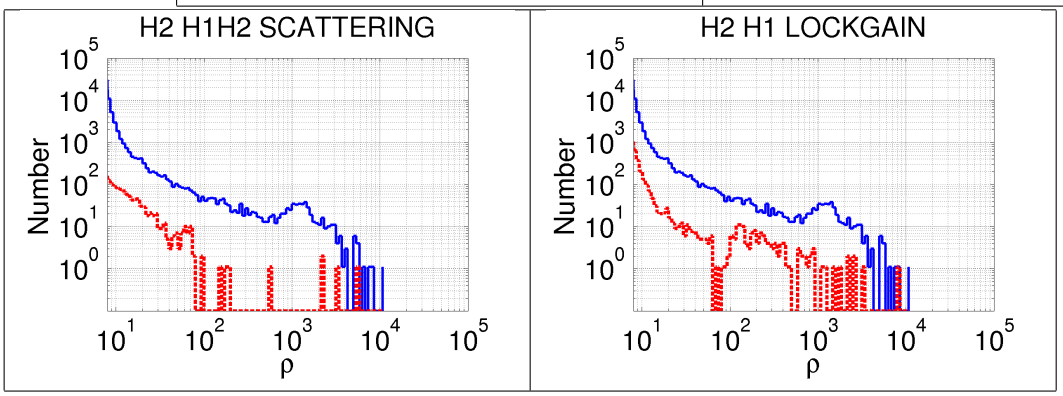


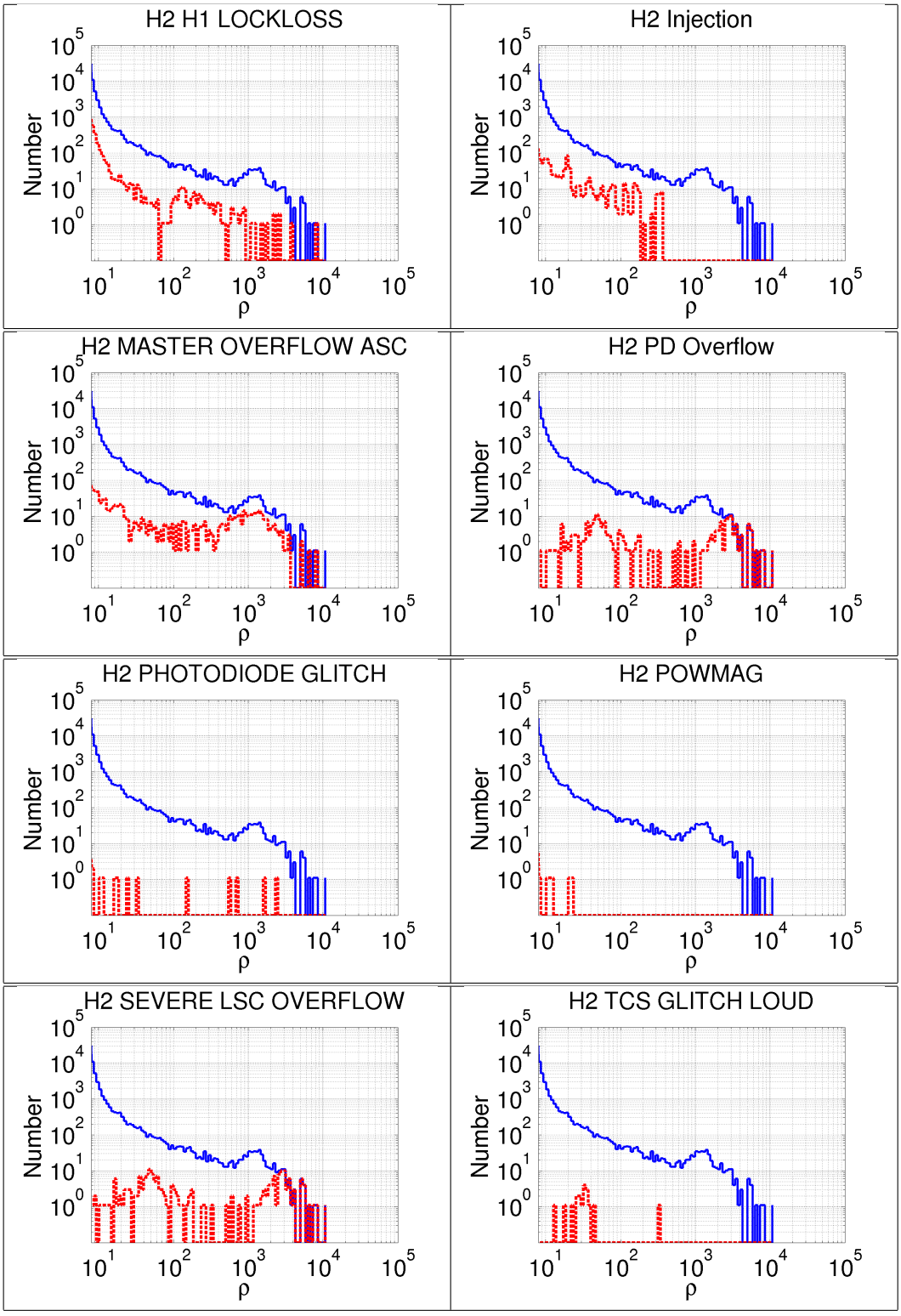
4.7. Histograms for H2 months 12 to 18 vetoes

4.7.1. Category 1

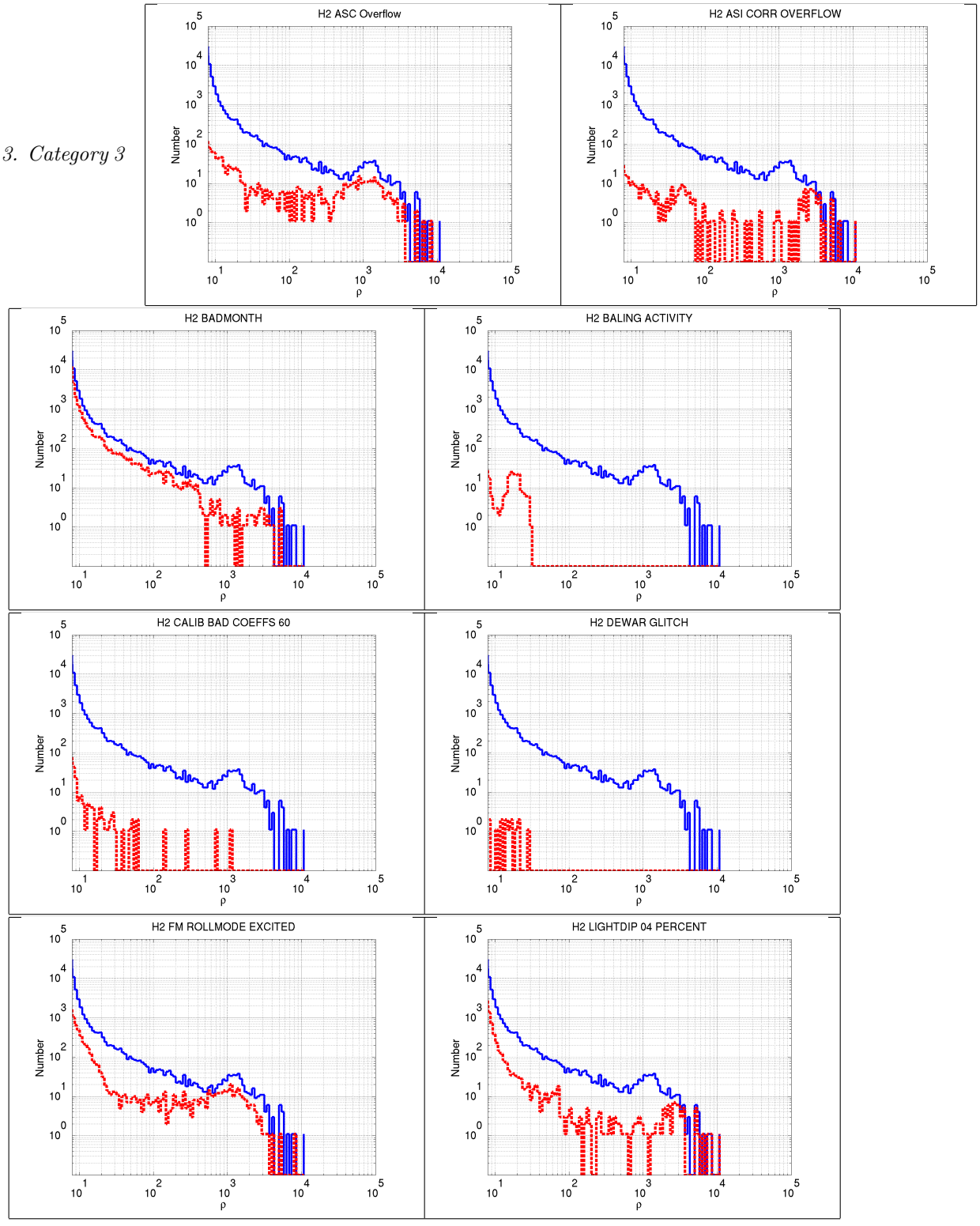
4.7.2. Category 2

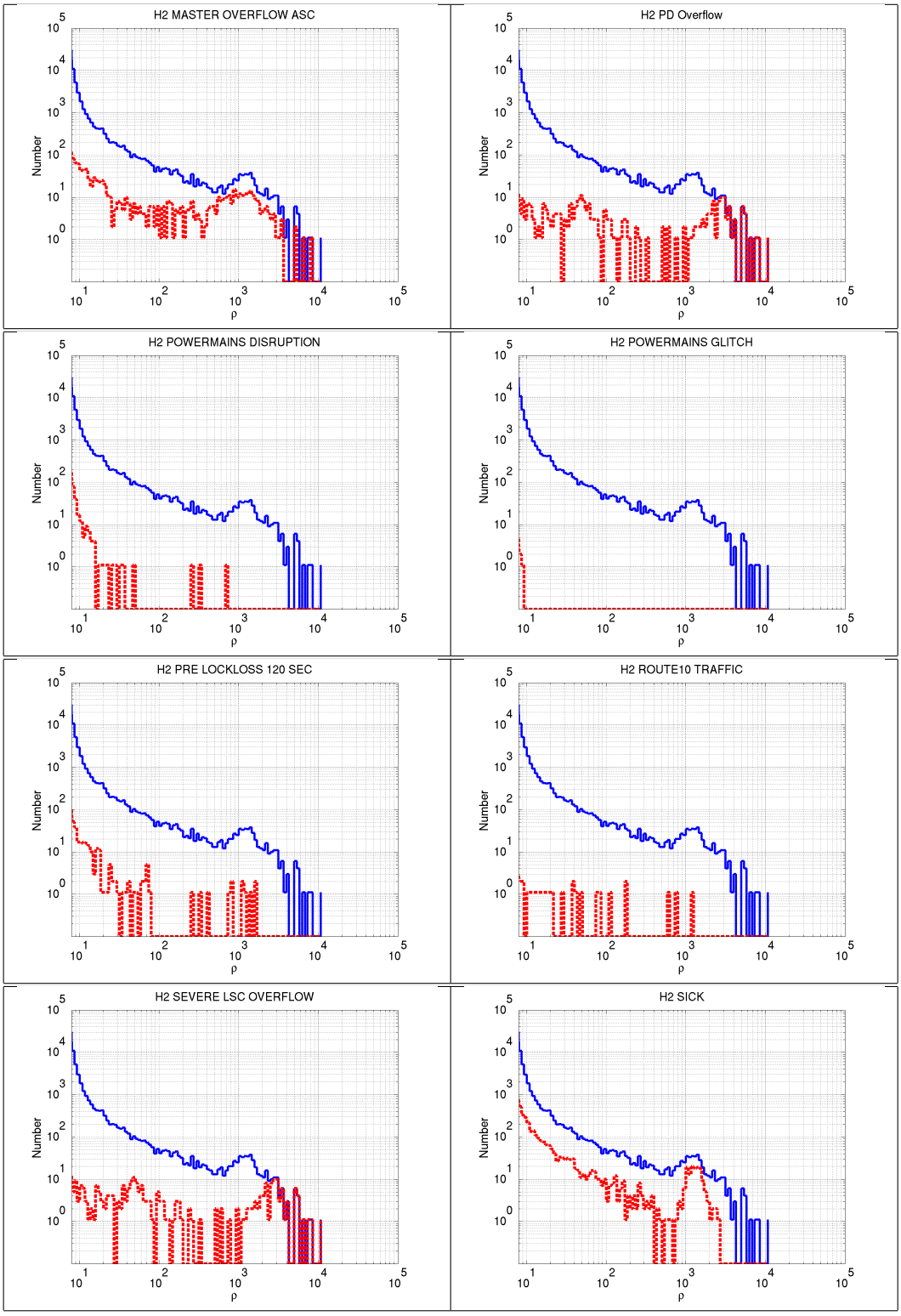


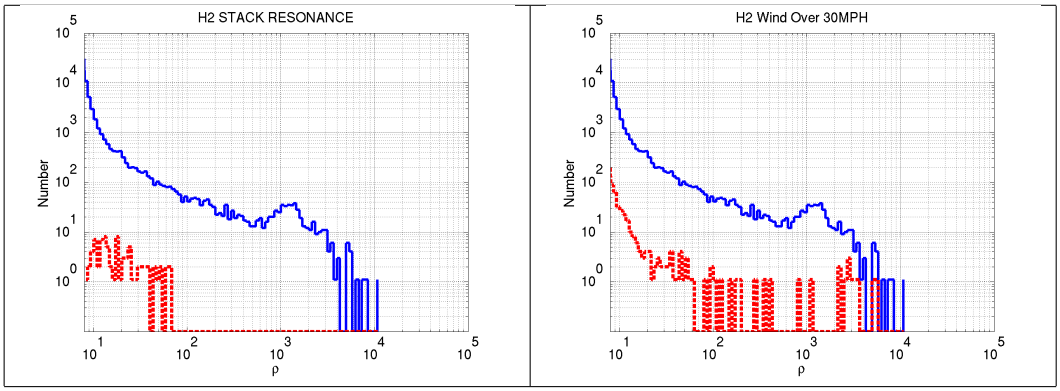



H2 H1 LOCKLOSS
H2 Injection
H2 MASTER OVERFLOW ASC
H2 PD Overflow
H2 PHOTODIODE GLITCH
H2 POWMAG
H2 SEVERE LSC OVERFLOW
H2 TCS GLITCH LOUD
Number
ρ

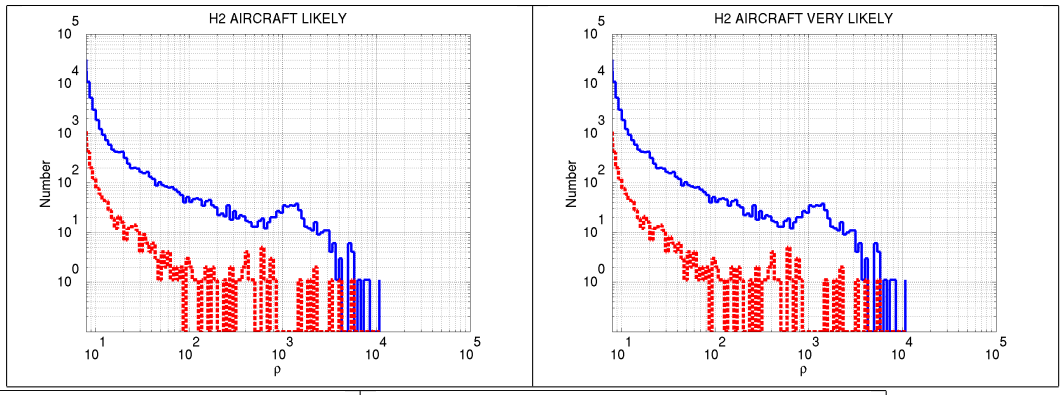
4.7.3. Category 3

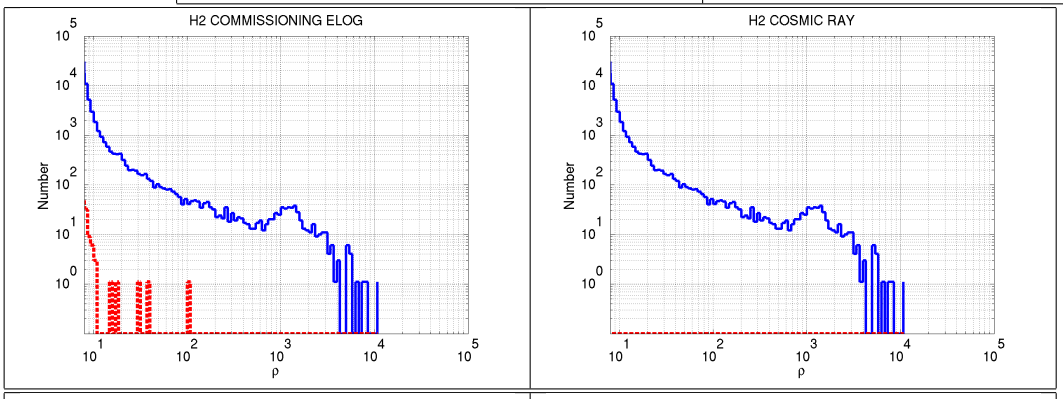


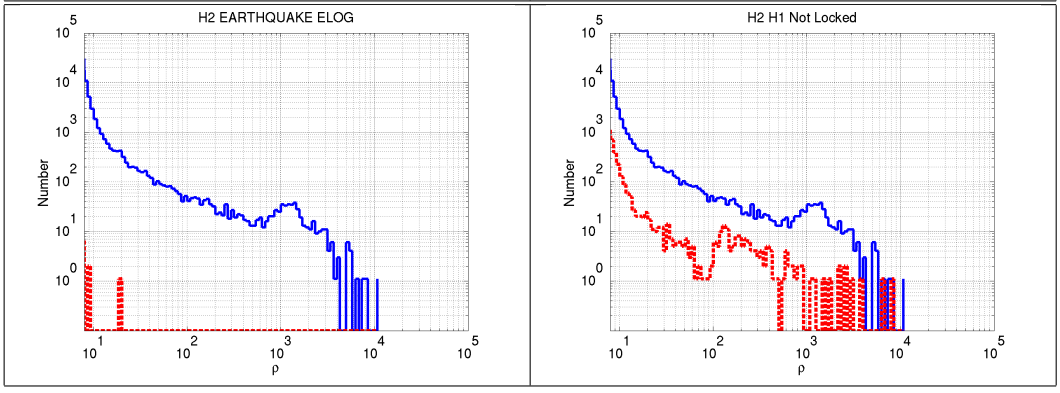

H2 MASTER OVERFLOW ASC
H2 PD Overflow
H2 POWERMAINS DISRUPTION
H2 POWERMAINS GLITCH
H2 PRE LOCKLOSS 120 SEC
H2 ROUTE10 TRAFFIC
H2 SEVERE LSC OVERFLOW
H2 SICK
Number
ρ

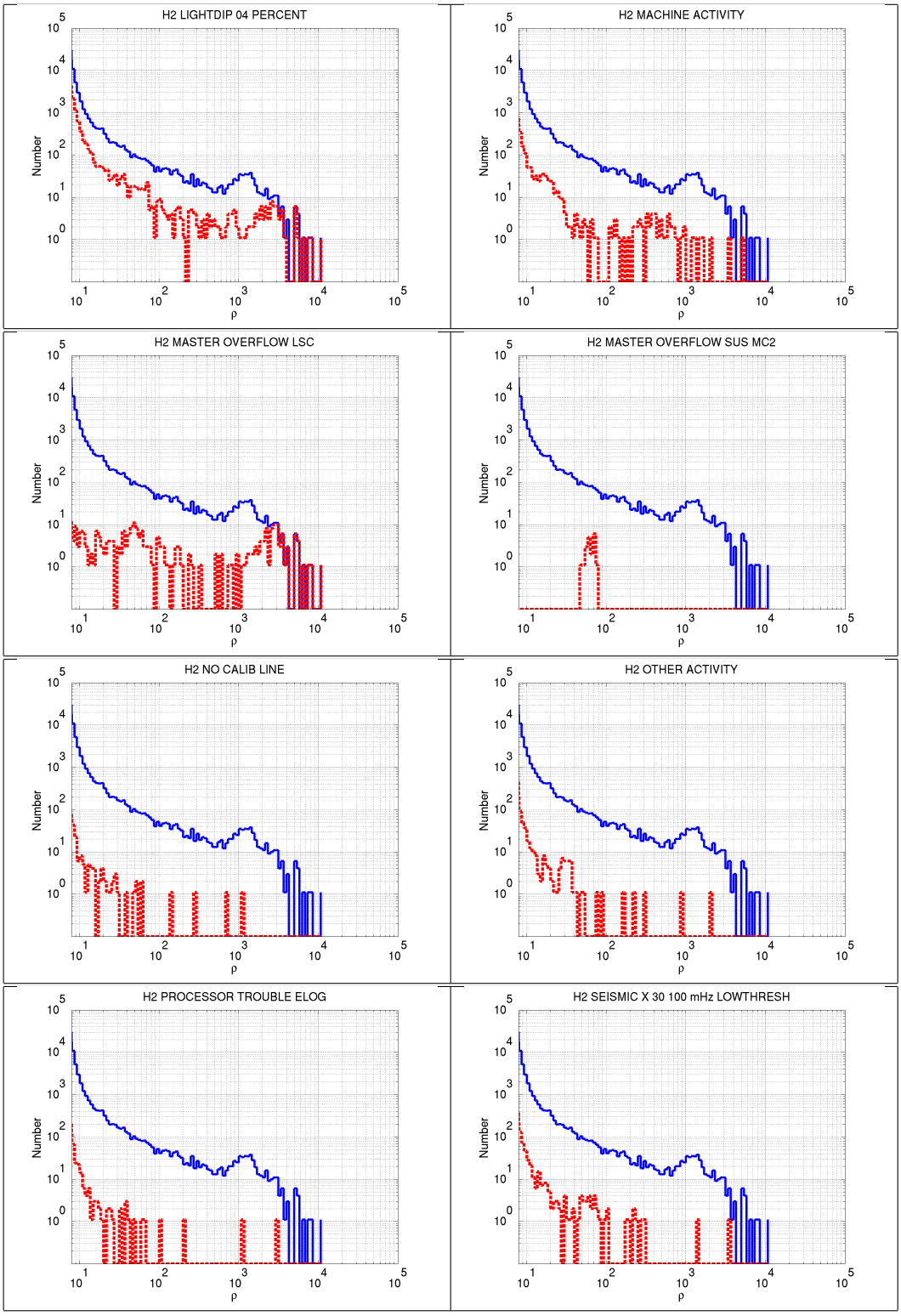


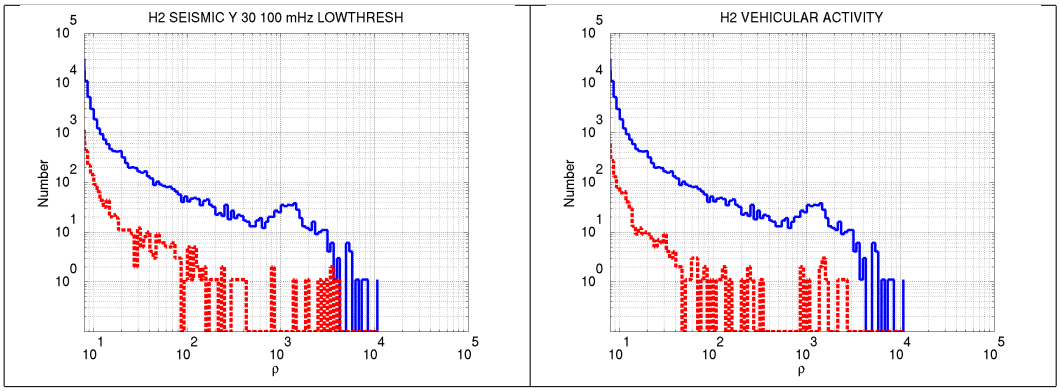
4.7.4. Category 4







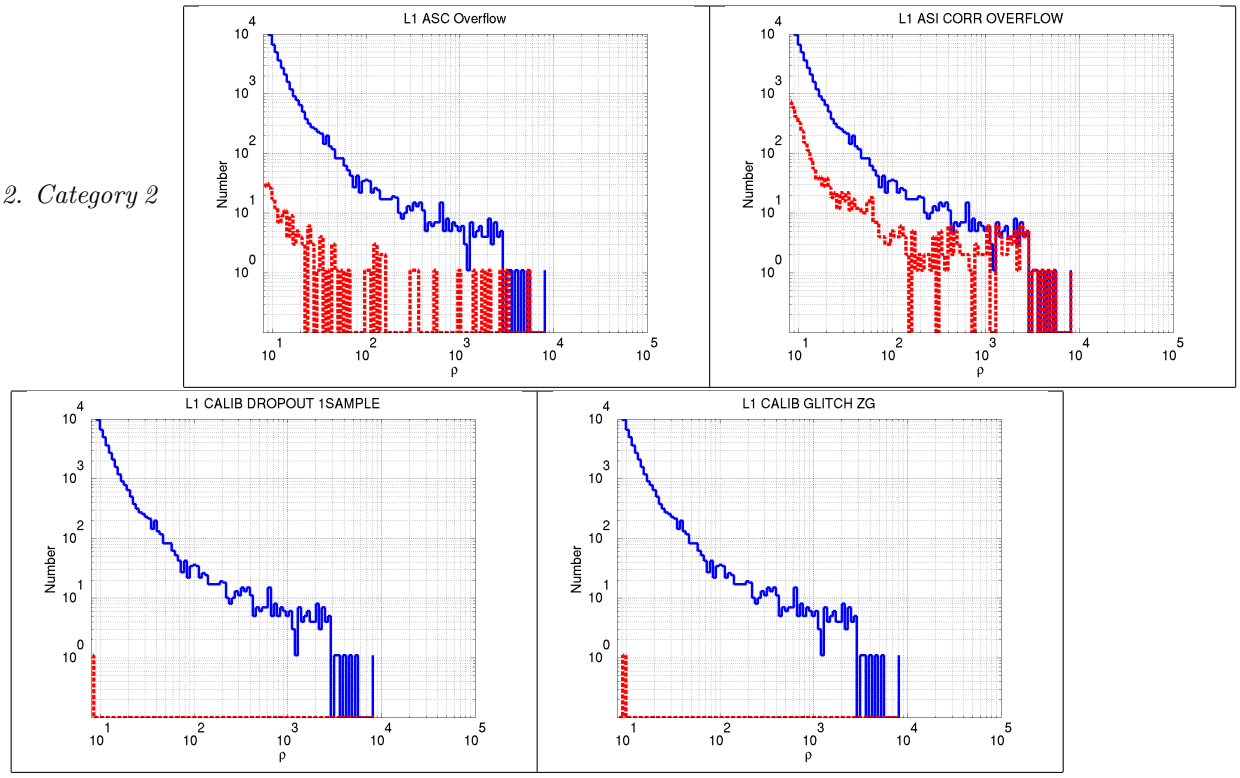

H2 LIGHTDIP 04 PERCENT
H2 MACHINE ACTIVITY
H2 MASTER OVERFLOW LSC
H2 MASTER OVERFLOW SUS MC2
H2 NO CALIB LINE
H2 OTHER ACTIVITY
H2 PROCESSOR TROUBLE ELOG
H2 SEISMIC X 30 100 mHz LOWTHRESH
Number
ρ

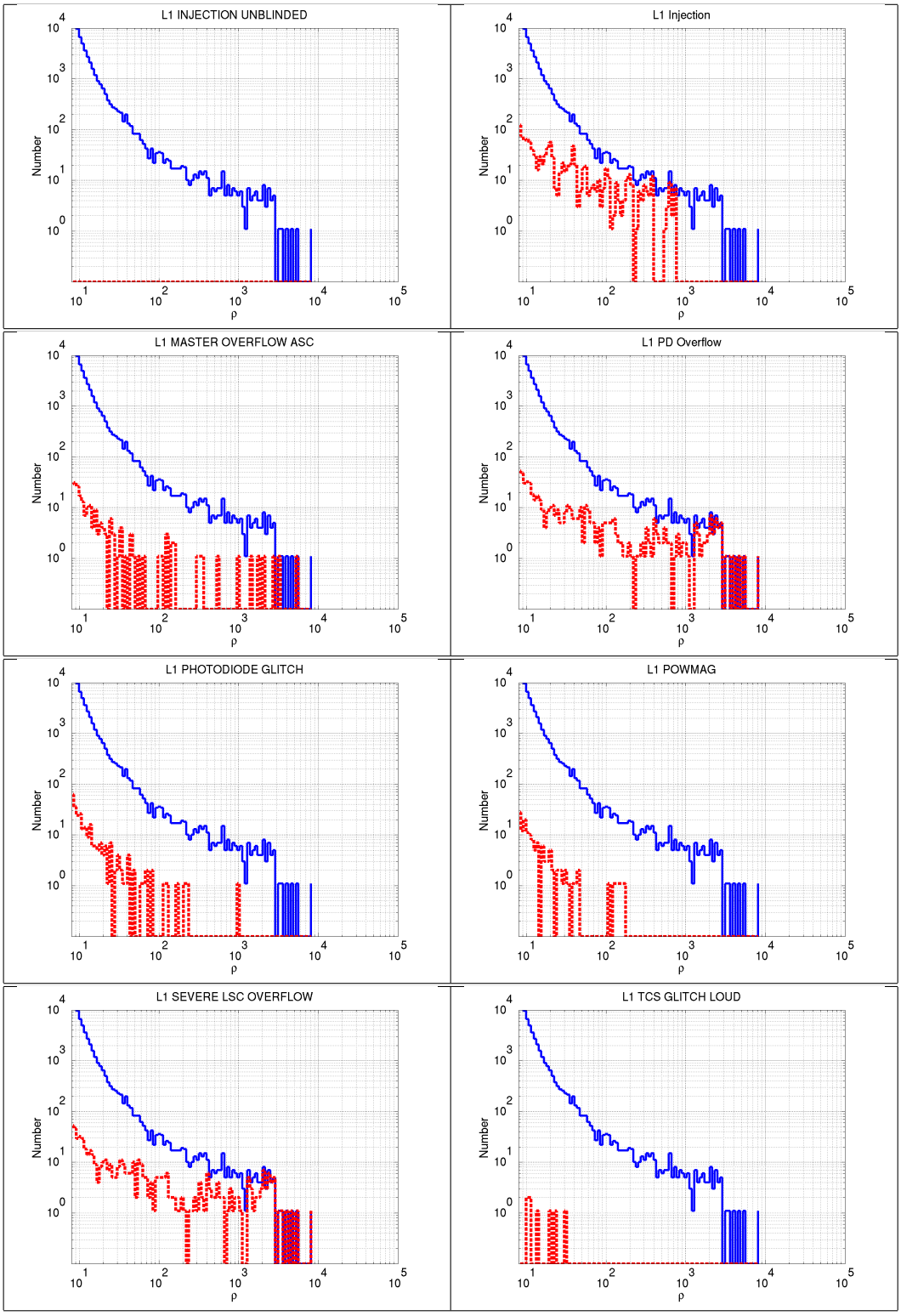


4.8. Histograms for L1 months 12 to 18 vetoes

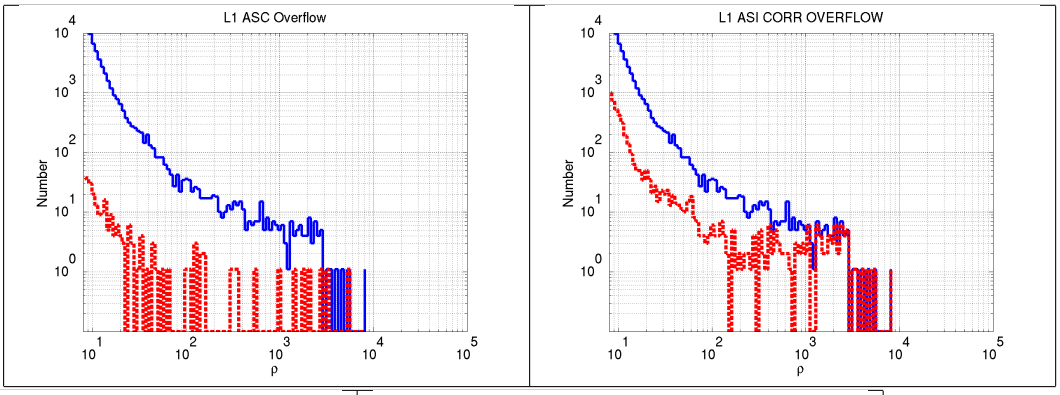
4.8.1. Category 1

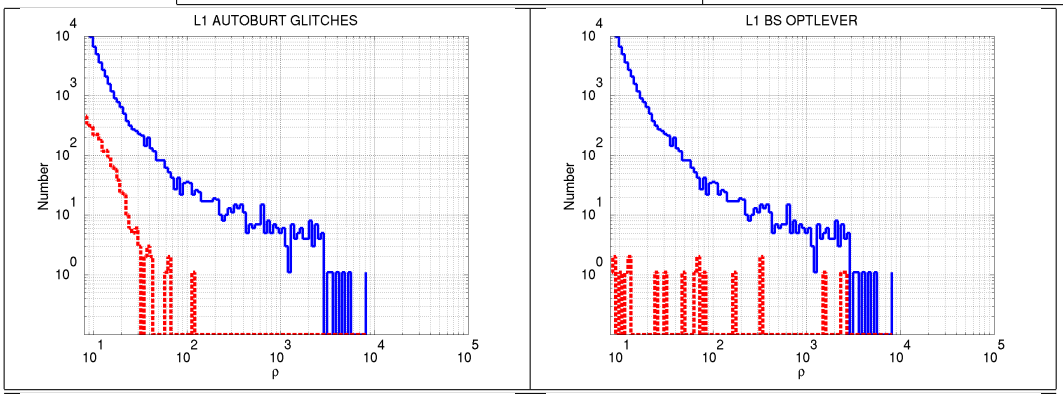
4.8.2. Category 2

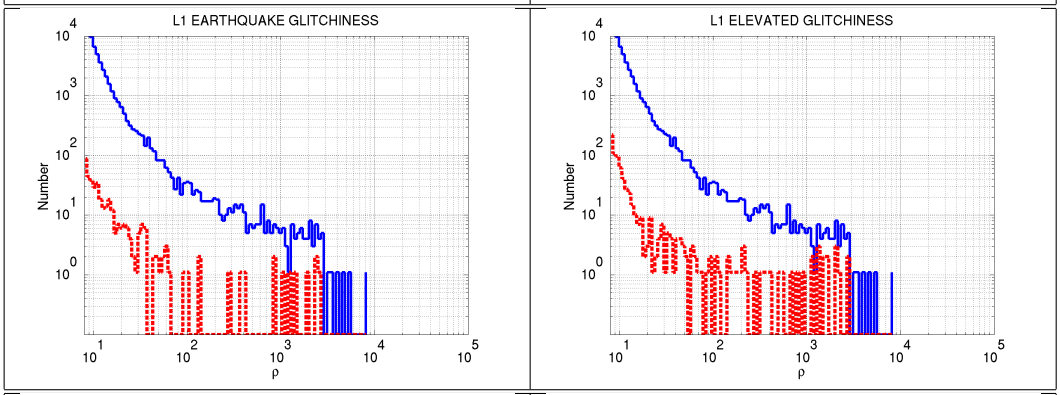


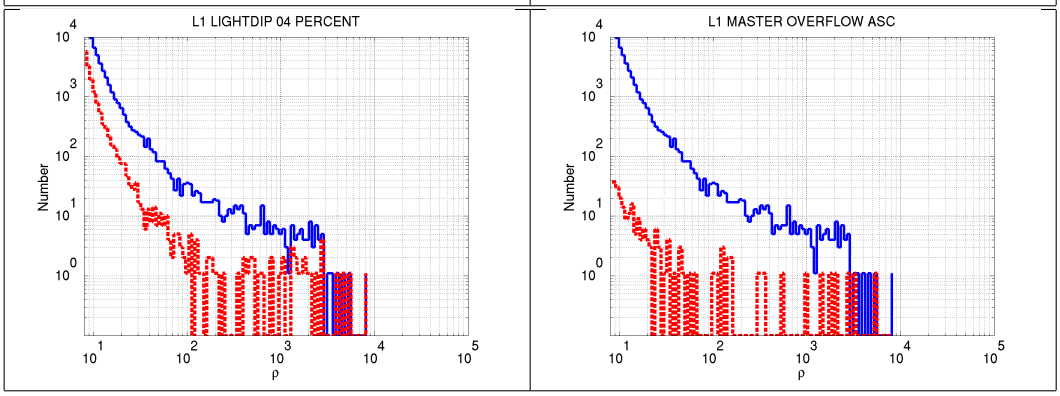

L1 INJECTION UNBLINDED
L1 Injection
L1 MASTER OVERFLOW ASC
L1 PD Overflow
L1 PHOTODIODE GLITCH
L1 POWMAG
L1 SEVERE LSC OVERFLOW
L1 TCS GLITCH LOUD
Number
ρ

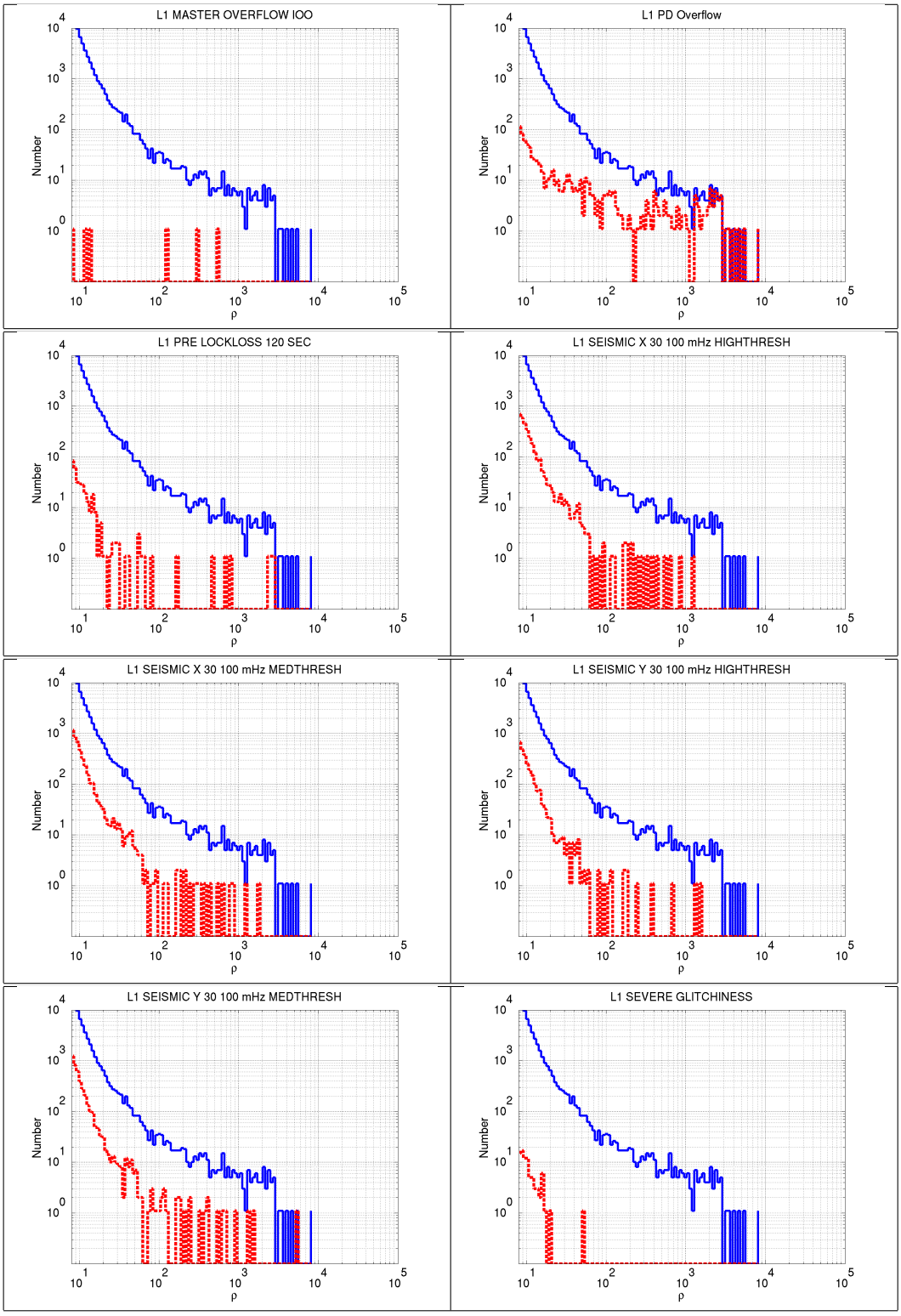
4.8.3. Category 3

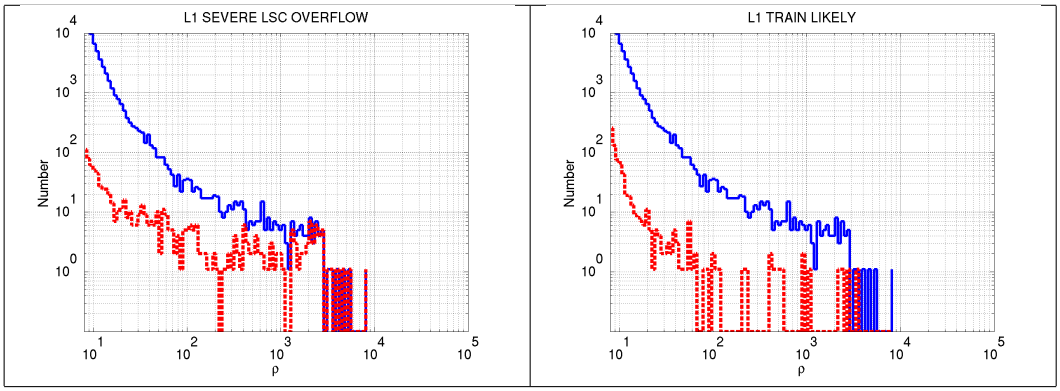




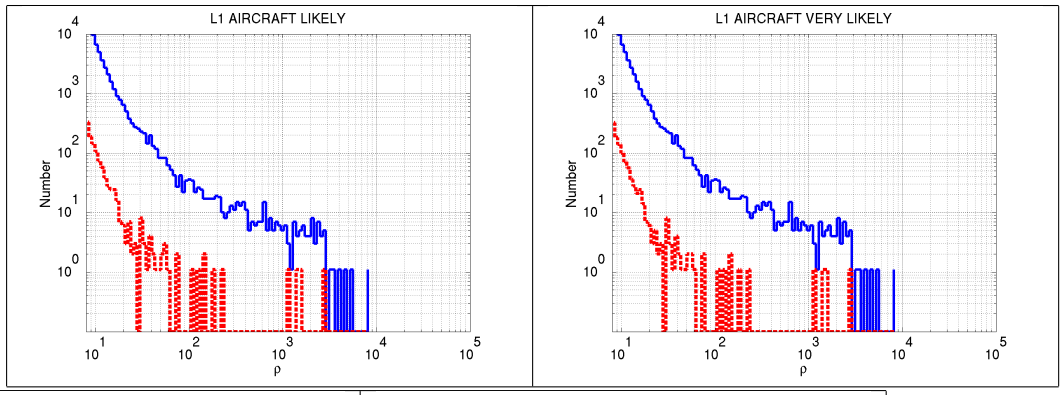


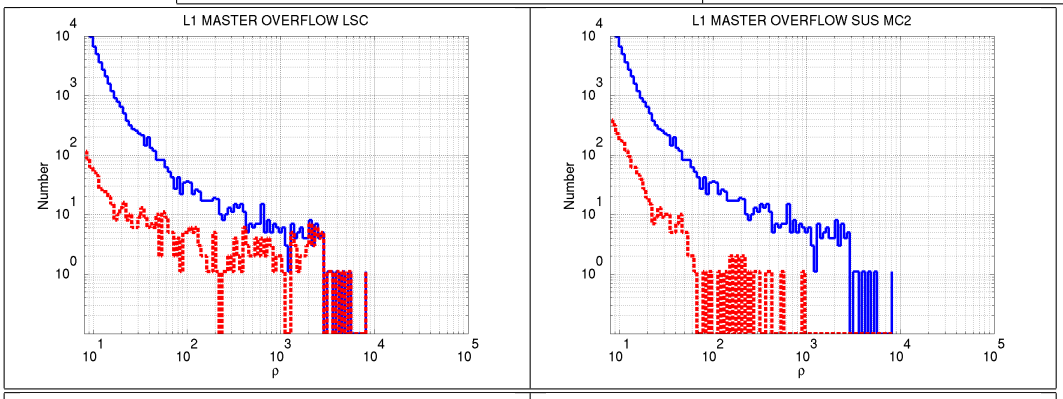


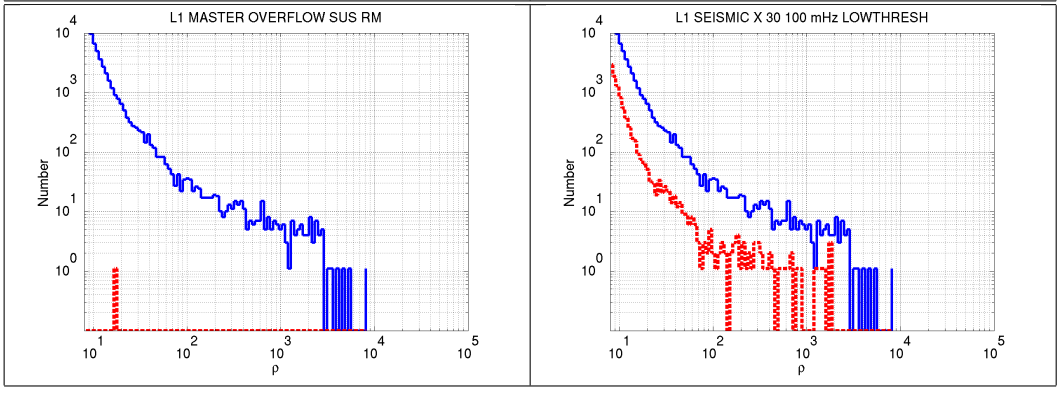

L1 MASTER OVERFLOW IOO
L1 PD Overflow
L1 PRE LOCKLOSS 120 SEC
L1 SEISMIC X 30 100 mHz HIGHTHRESH
L1 SEISMIC X 30 100 mHz MEDTHRESH
L1 SEISMIC Y 30 100 mHz HIGHTHRESH
L1 SEISMIC Y 30 100 mHz MEDTHRESH
L1 SEVERE GLITCHINESS
Number
ρ

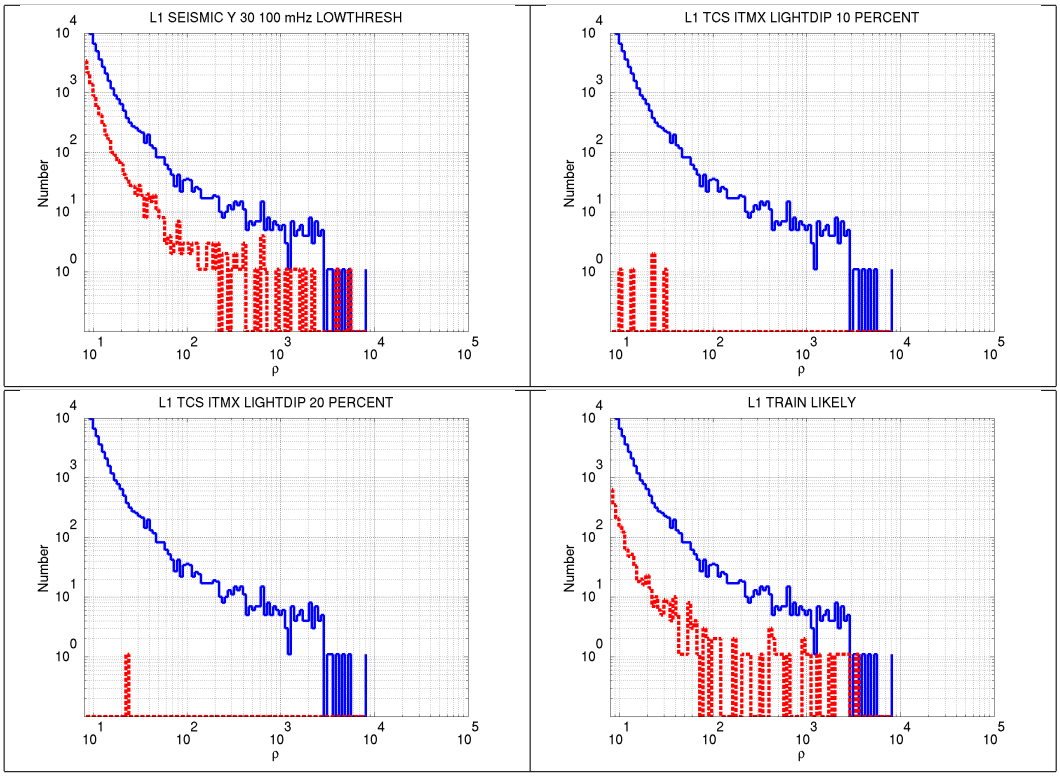


4.8.4. Category 4









5. Auxiliary Channel Used Percentage Vetoes

By definition, the KW based vetoes had a large used percentage, always greater than 50%. All of the vetoes for H1 over year 1 of S5 produced a total deadtime of 29905 s, with a deadtime percentage of 0.09% for the first 6-month period, and 0.018% over the second 6-months. The most important H1 veto based on an interferometer control channel, the feedback loop that keeps the recycling cavity resonant, had a veto efficiency 2.0% with respect to the clustered CBC triggers with total mass from 25 to 100 solar masses. The most important H1 veto based on an environmental channel, an accelerometer located near the y-arm input Fabry-Perot mirror, had a veto efficiency 0.017% with respect to the clustered triggers. All of the vetoes for H2 over year 1 of S5 produced a total deadtime of 7430 s, with a deadtime percentage of 0.04% for the first 6-month period, and 0.02% over the second 6-months. The most important H2 veto based on an interferometer control channel, that of the quadrature-phase of 9 the light between the recycling mirror and the beam splitter, had a veto efficiency 1.1% with respect to the clustered triggers. All of the vetoes for L1 over year 1 of S5 produced a total deadtime of 115050 s, with a deadtime percentage of 0.28% for the first 6-month period, and 0.91% over the second 6-months. The most important L1 veto based on an interferometer control channel, the servo loop controlling the differential distance between the beam-splitter and the input mirrors of the long Fabry-Perot arm cavities, had a veto efficiency 5.2% with respect to the clustered triggers. The most important L1 veto based on an environmental channel, the magnetometers located at the end of the Y-arm , had a veto efficiency 1.45% with respect to the clustered triggers.

The tables that follow contain columns for the Channel name, KW threshold

on the auxiliary channel, veto window used to find coincidence, number of triggers available in auxiliary channel, number of coincidences found, the used percentage for the DARM_ERR triggers, and the resulting deadtime of the veto. These figures exclude all times when category 1 or two data quality vetoes were in effect, and are for the first year search. The same channels were found to be useful in the second year.

5.1. H1 Auxiliary Channel Used Percentage Vetoes

Vetoes for H1:LSC-DARM_ERR KW Triggers, DQ Cat 1 and 2 Times Excluded						
Channel	Threshold	Padding	Nt	Used Triggers	Used	D
H1:LSC-REFL_Q	575	± 1s	1790	1548	86.5%	0.018%
H1:LSC-MICH_CTRL	975	± 1s	981	860	87.7%	0.010%
H1:LSC-POB_I	875	± 1s	1336	997	74.6%	0.013%
H1:LSC-POB_Q	975	± 1s	970	844	87.0%	0.01%
H1:LSC-PRC_CTRL	875	± 1s	1358	1040	76.6%	0.014%
H1:LSC-REFL_DC	475	± 1s	1483	1574	106.1%	0.015%
H1:SUS-BS_OPLEV_PERROR	200	± 5s	120	80	66.7%	0.0012%
H1:SUS-BS_OPLEV_YERROR	325	± 5s	120	77	64.2%	0.0012%
H1:ASC-BS_P	100	± 5s	199	231	116.1%	0.010%
H1:ASC-BS_Y	150	± 5s	305	356	116.7%	0.015%
H1:ASC-ETMX_Y	360	± 5s	265	373	140.8%	0.013%
H1:SUS-ITMX_OPLEV_PERROR	370	± 5s	130	75	57.7%	0.0065%
H1:SUS-ITMX_OPLEV_YERROR	300	± 5s	26	29	111.5%	0.0013%
H1:ASC-ITMX_P	395	± 5s	226	316	139.8%	0.0113%
H1:ASC-ITMX_Y	415	± 5s	236	349	147.9%	0.0118%
H1:SUS-ITMY_OPLEV_PERROR	635	± 5s	141	105	74.5%	0.0070%
H1:SUS-ITMY_OPLEV_YERROR	305	± 5s	109	104	95.4%	0.0054%
H1:ASC-ITMY_P	500	± 5s	74	129	174.3%	0.0037%
H1:ASC-ITMY_Y	500	± 5s	106	201	189.6%	0.0053%
H1:SUS-MMT3_OPLEV_PERROR	200	± 5s	167	120	71.9%	0.0083%
H1:SUS-MMT3_OPLEV_YERROR	275	± 5s	112	76	67.9%	0.0056%
H1:SUS-RM_OPLEV_PERROR	560	± 5s	163	93	57.1%	0.0081%
H1:SUS-RM_OPLEV_YERROR	450	± 5s	169	98	58.0%	0.0084%
H1:ASC-RM_P	425	± 5s	162	221	136.4%	0.0081%
H1:ASC-RM_Y	790	± 5s	34	81	238.2%	0.0017%
H1:ASC-WFS1_QP	350	± 2s	214	225	105.1%	0.0043%
H1:ASC-WFS1_QY	415	± 2s	203	233	114.5%	0.0041%
H1:ASC-WFS2_IY	265	± 2s	413	524	126.9%	0.0083%
H1:ASC-WFS2_IP	200	± 2s	471	419	89.0%	0.0094%
H1:ASC-WFS2_QP	200	± 2s	368	491	133.4%	0.0074%
H1:ASC-WFS2_QY	325	± 2s	360	484	134.4%	0.0072%
H0:PEM-BSC1_ACCY	450	± 1s	158	85	53.8%	0.0016%
H0:PEM-BSC2_ACCX	505	± 1s	147	79	53.7%	0.0015%
H0:PEM-BSC2_ACCY	475	± 1s	142	88	62.0%	0.0014%
H0:PEM-BSC3_ACCX	405	± 1s	152	84	55.3%	0.0015%
H0:PEM-BSC4_ACCY	680	± 1s	104	64	61.5%	0.0010%
H0:PEM-BSC7_ACCX	480	± 1s	139	80	57.6%	0.0014%
H0:PEM-BSC8_ACCY	575	± 1s	106	60	56.6%	0.0011%
H0:PEM-HAM3_ACCX	600	± 1s	143	74	51.8%	0.0014%
H0:PEM-HAM1_ACCZ	1060	± 1s	114	57	50.0%	0.001%
H0:PEM-HAM7_ACCX	575	± 1s	81	49	60.5%	0.0008%
H0:PEM-HAM7_ACCZ	650	± 1s	88	54	61.4%	0.0009%
H0:PEM-HAM9_ACCX	850	± 1s	79	49	62.0%	0.0008%
H0:PEM-ISCT1_ACCX	600	± 1s	114	56	49.1%	0.0011%
H0:PEM-ISCT1_ACCY	1075	± 1s	48	32	66.7%	0.0005%
H0:PEM-ISCT1_ACCZ	925	± 1s	113	61	54.0%	0.0011%
H0:PEM-ISCT4_ACCY	1060	± 1s	88	53	60.2%	0.0009%
H0:PEM-ISCT4_ACCZ	1075	± 1s	97	56	57.7%	0.001%
H0:PEM-HAM3_ACCX	600	± 1s	143	74	51.8%	0.0014%
H0:PEM-PSL1_ACCX	325	± 1s	80	56	70.0%	0.0008%
H0:PEM-LVEA_SEISY	360	± 1s	101	60	59.4%	0.001%
H0:PEM-LVEA_SEISZ	310	± 1s	129	77	59.7%	59.7%

5.2. H2 Auxiliary Channel Used Percentage Vetoes

Vetoes for H2:LSC-DARM_ERR KW Triggers, DQ Cat 1 and 2 Times Excluded						
Channel	Threshold	Padding	Nt	Used Triggers	Used	D
H2:LSC-MICH_CTRL	350	± 1s	297	282	95.0%	0.0030%
H2:LSC-POB_I	335	± 1s	596	451	75.7%	0.0060%
H2:LSC-POB_Q	350	± 1s	294	268	91.2%	0.0029%
H2:TCS-ITMY_PD1AC	1250	± 2s	346	181	52.3%	0.0069%
H2:TCS-ITMY_PD2AC	900	± 2s	469	253	53.9%	0.014%

5.3. L1 Auxiliary Channel Used Percentage Vetoes

Vetoes for L1:LSC-DARM_ERR KW Triggers, DQ Cat 1 and 2 Times Excluded						
Channel	Threshold	Padding	Nt	Used Triggers	Used	D
L1:LSC-MICH_CTRL	365	± 1s	9237	8422	91.2%	0.0924%
L1:ASC-ITMX_Y	350	± 5s	337	869	257.9%	0.0169%
L1:ASC-ITMY_Y	300	± 5s	362	856	236.5%	0.0181%
L0:PEM-EY_MAGY	500	± 0.6 s	2846	947	33.6%	$1.7E-2\%$

6. References

[1] B. Abbott et al. Search for Gravitational Waves from Low Mass Binary Coalescences in the First Year of LIGO's S5 Data. *Phys. Rev. D*, 79(12), 2009.

[2] LIGO Scientific Collaboration. Tuning matched filtering searches for compact binary systems. *http://www.lsc-group.phys.uwm.edu/ligovirgo/cbc/protected/papers/s3s4-tuning/paper.pdf*, 2007.

[3] L Blackburn et al. The LSC glitch group: monitoring noise transients during the fifth LIGO science run. *Classical and Quantum Gravity*, 2008.

[4] S Chatterji et al. Multiresolution techniques for the detection of gravitational-wave bursts. *Classical and Quantum Gravity 21, S1809*, 2004.

[5] N. Christensen. Veto studies for LIGO inspiral triggers. *Classical and Quantum Gravity 22 S1059-S1068*, 2005.

[6] N. Christensen, P. Shawhan, and G. González. Vetoes for inspiral triggers in LIGO data. *Classical and Quantum Gravity 21, S1747*, 2004.

[7] J. Slutsky, L. Blackburn, D. Brown, L. Cadonati, J. Cain, M. Cavaglià, S. Chatterji, N. Christensen, M. Coughlin, S. Desai, G. González, T. Isogai, E. Katsavounidis, B. Rankins, T. Reed, K. Riles, P. Saulson, P. Shawhan, J. Smith, N. Zotov, J. Zweizig. Methods for Reducing False Alarms in Searches for Compact Binary Coalescences in LIGO Data. *To be submitted to Classical and Quantum Gravity*, 2010.

[8] B. Abbott et al. LIGO: The Laser Interferometer Gravitational-Wave Observatory. *http://arxiv.org/abs/0711.3041*, 2009.

[9] D. Brown. Searching for Gravitational Radiation from Binary Black Hole MACHOs in the Galactic Halo. *PhD Thesis, University of Wisconsin-Milwaukee*, 2004.

[10] B. Abbott et al. Search for gravitational-wave bursts in the first year of the fifth LIGO science run. *Submitted Phys Rev. D*, 2009.