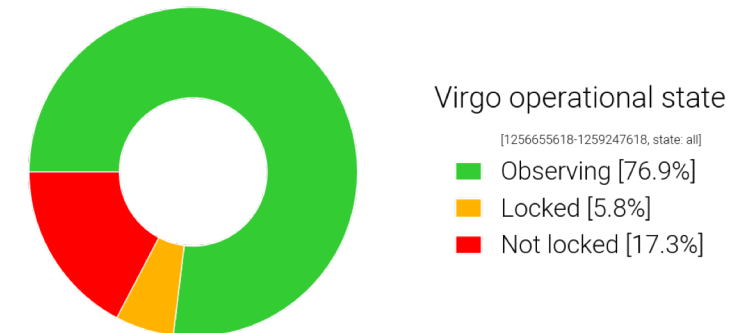
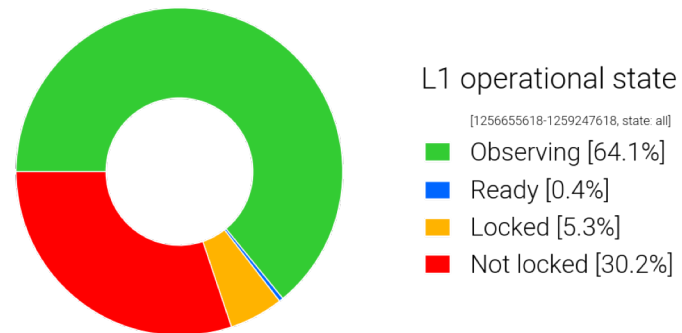
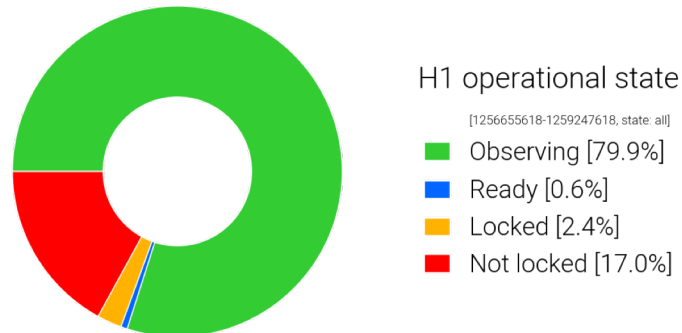
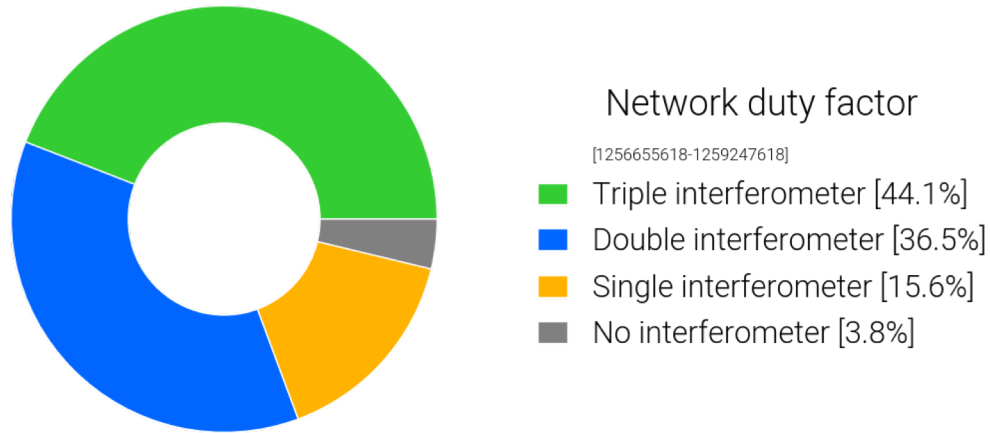


03 LIGO-Virgo-KAGRA update

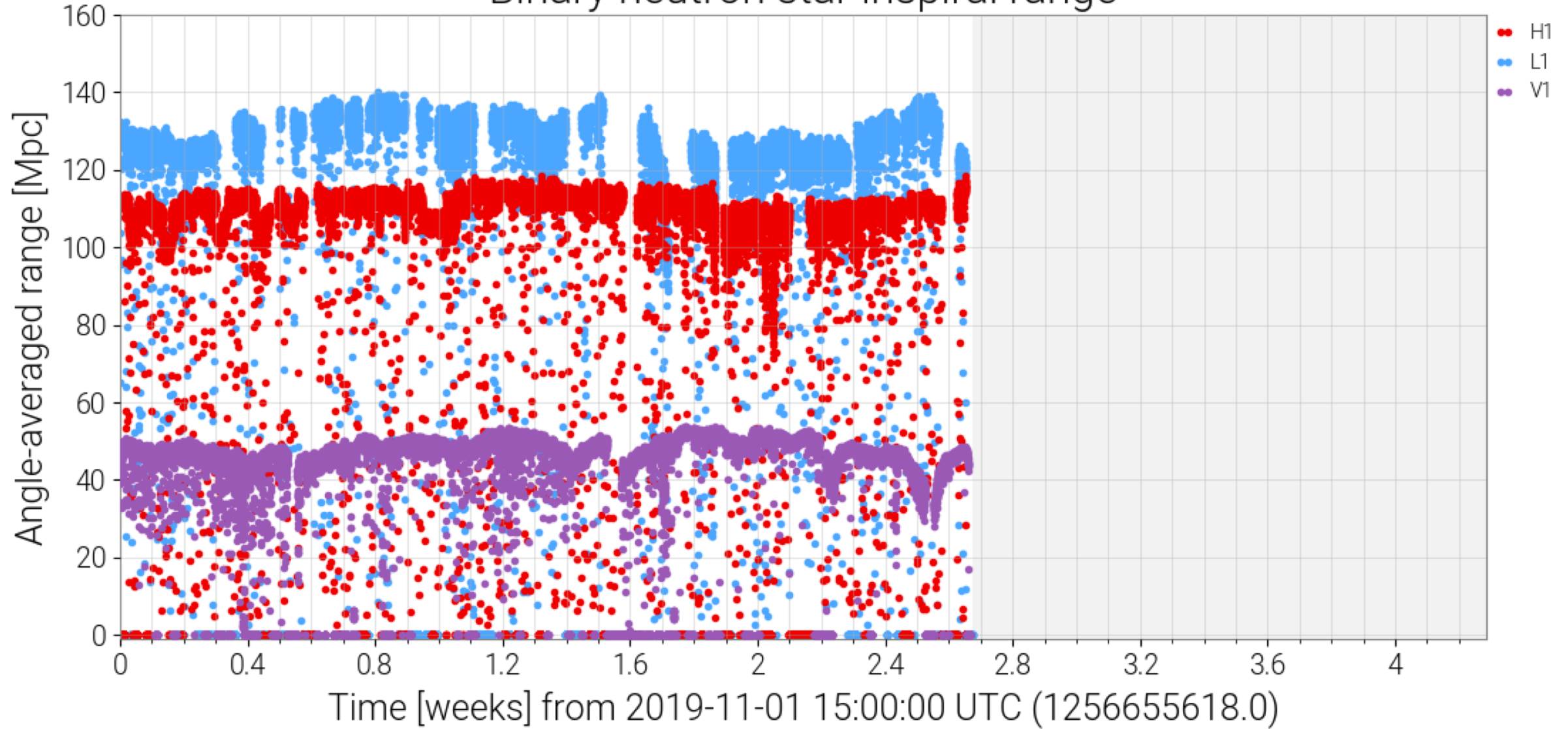
Keita Kawabe, Shinji Miyoki, Brian O'Reilly, Alessio Rocchi,
David Shoemaker, Matteo Tacca

Detector Performance: O3b Cumulative Duty Factor

- 44.1% Triple IFOs
- 80.6% Double or Triple
- 3.8% zero IFO
- (Downtime includes everything including but not limited to maintenance)

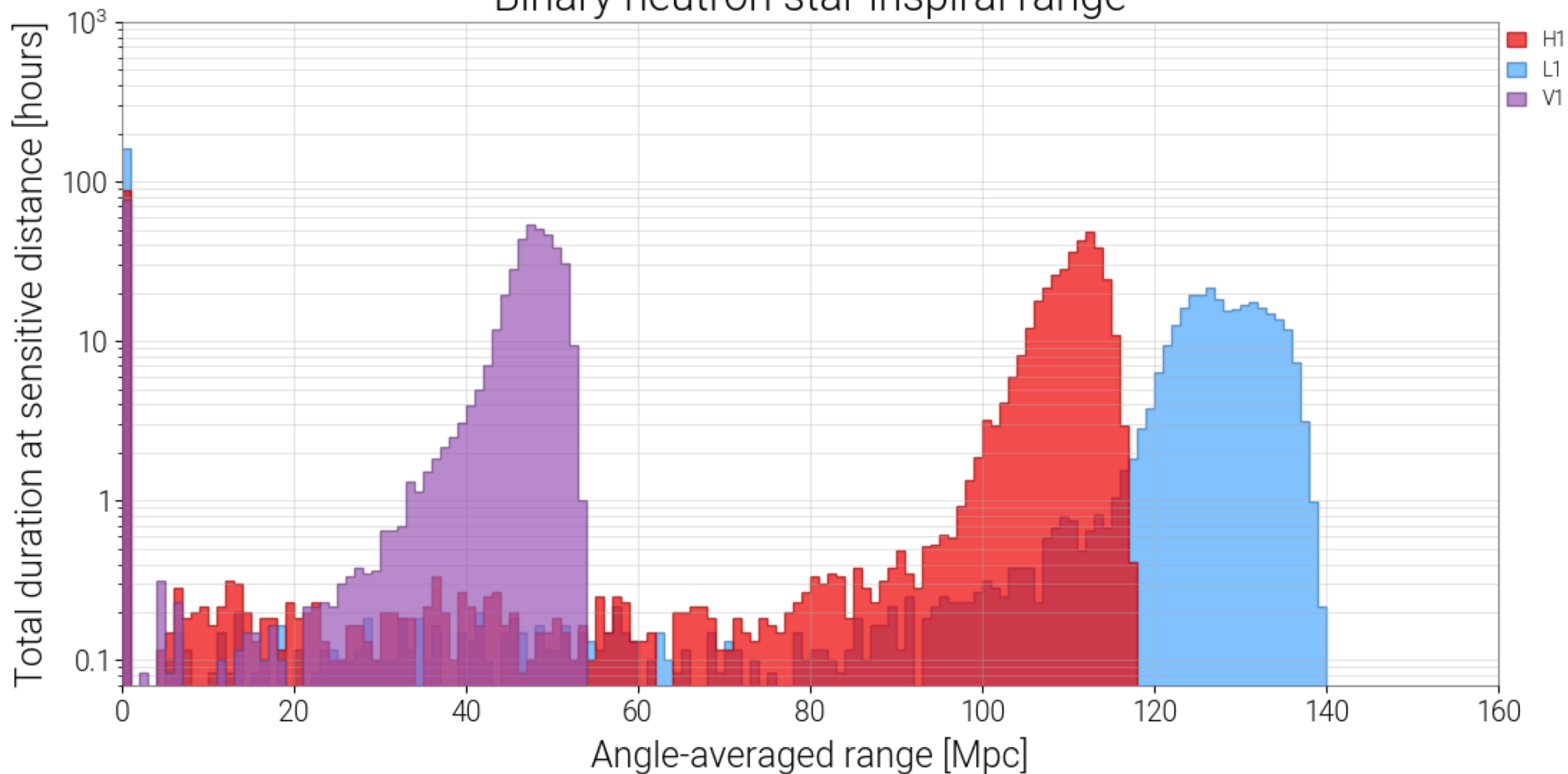


Binary neutron star inspiral range



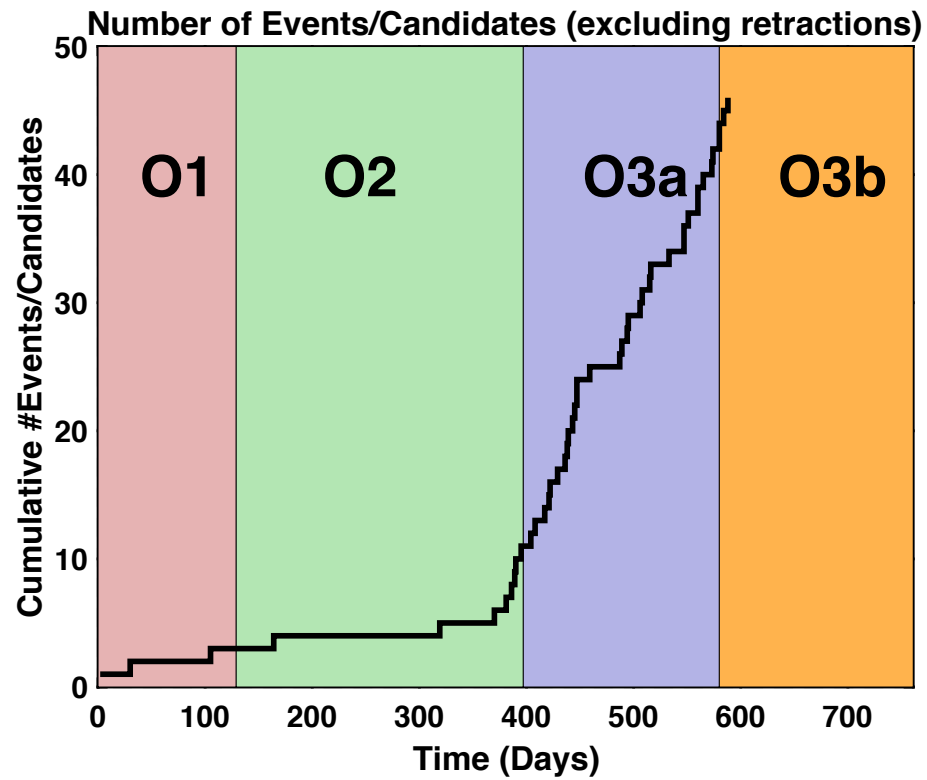
[1256655618-1259247618, state: all]

Binary neutron star inspiral range

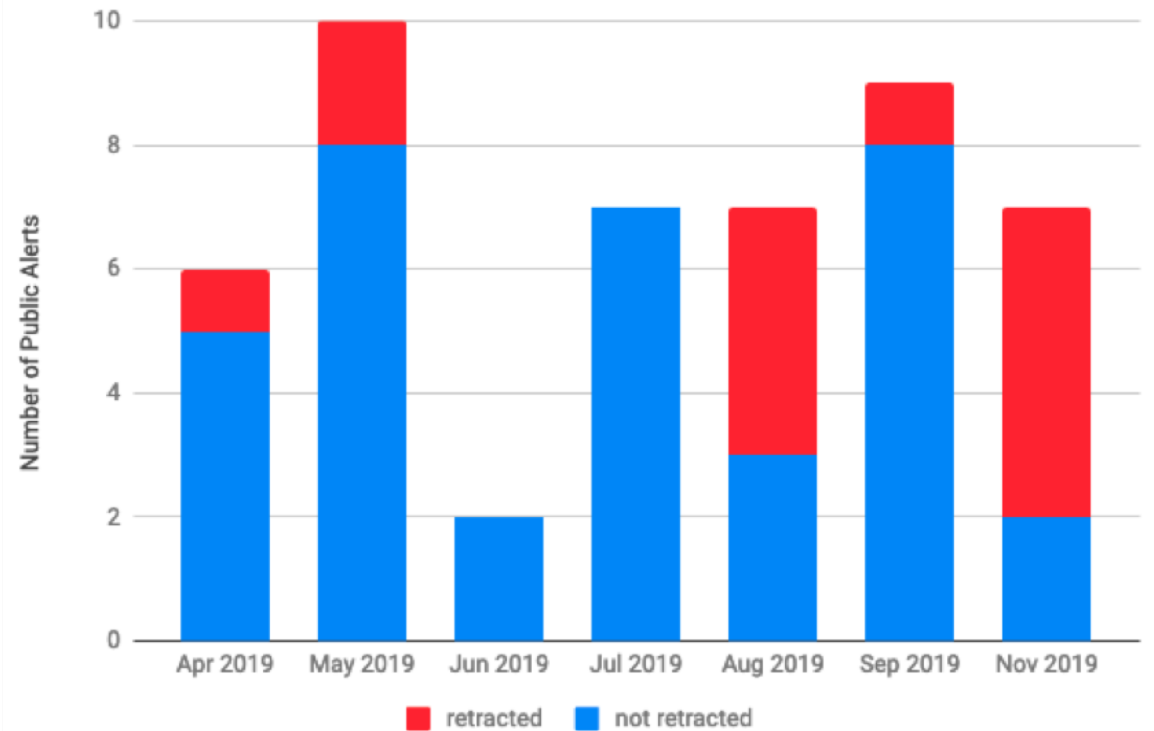


7 alerts including 5 retractions since the beginning of O3b.
You'll hear about these in Deep's presentation later:

- S191105e -> BBH
- S191109d -> BBH
- S191110x -> retracted (CBC, took ~ 18 minutes), Loud glitch in LLO
- S191110af -> retracted (burst, took ~ 3 days 23 hours), Veto + reanalysis
- S191117j -> retracted (CBC, took ~ 4 minutes), Loud glitch in LLO
- S191120aj -> retracted (CBC, took ~ 9 minutes), Environmental glitches in LLO
- S191120at -> retracted (CBC, took ~ 3 minutes), Loud glitch in LLO

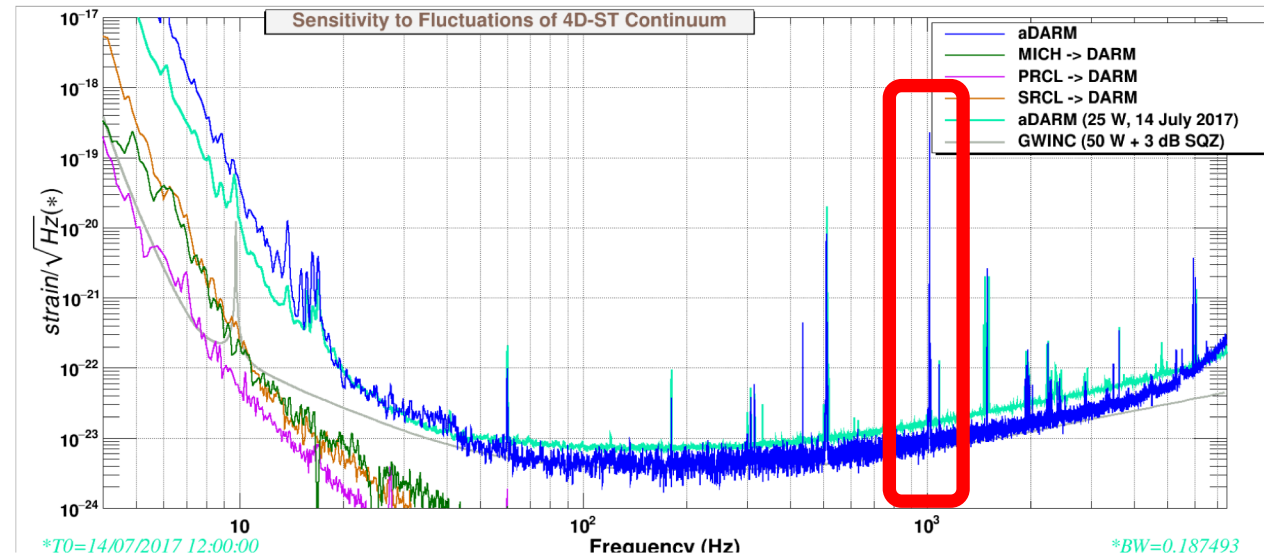


O3 Public Alerts by Month



LLO status

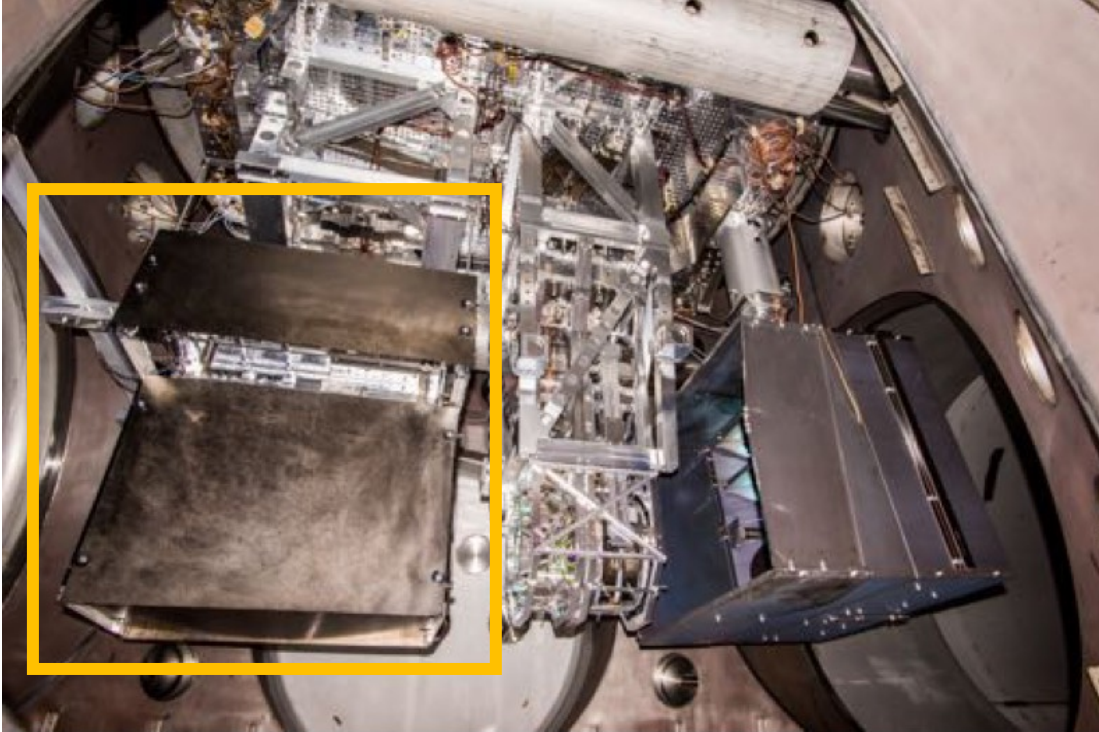
- Lost ~4.5% optical efficiency from before the break.
 - Suspect new point absorbers on the end test mass
 - Investigations ongoing.
 - Some compensation for lost range by improved squeezer tuning.
- Also dealing with large outside temperature variations (~75F to 25 F over a couple of days). Changes alignment, may have contributed to troublesome “ring up” of suspension fiber violin modes.



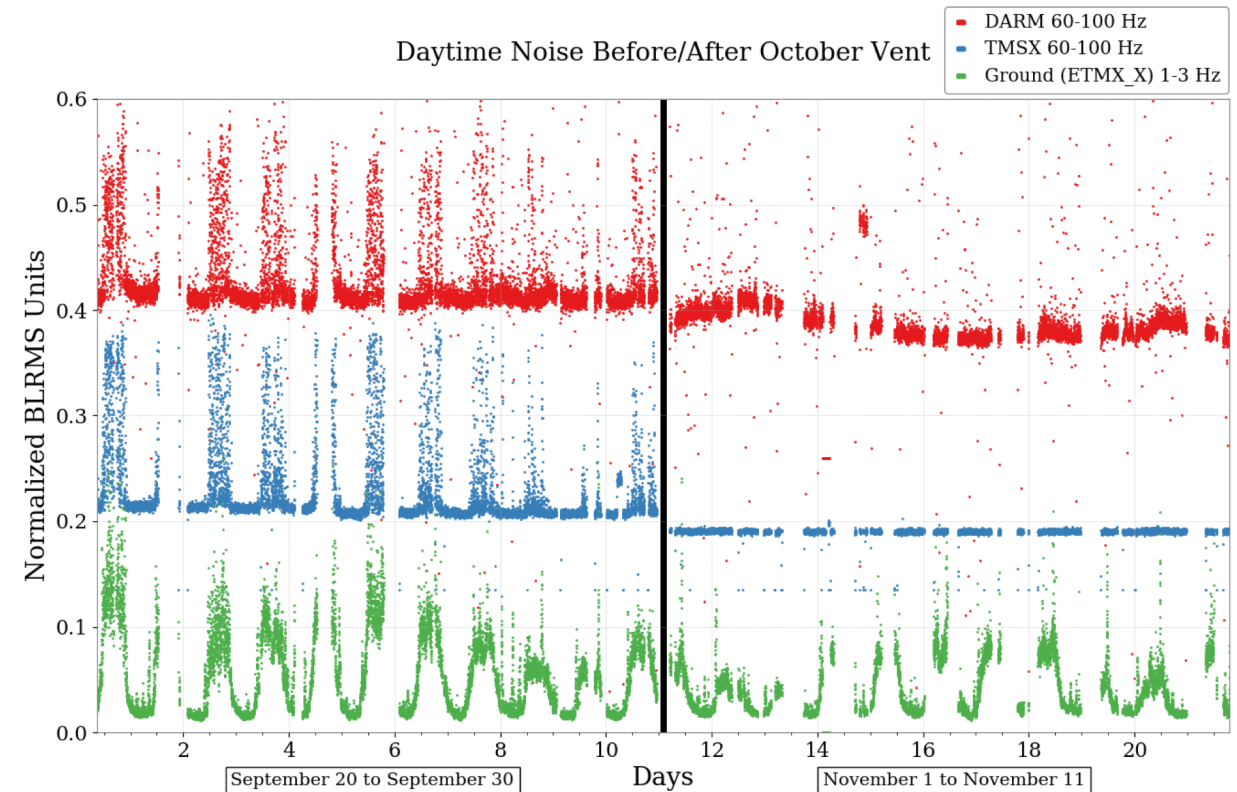
- Damping the violin mode and cold/bad weather are the main reasons for the lower duty cycle at the start of O3b (~76% in O3a, ~65% so far in O3b).

Improvements in Scattering Noise at LLO

During O3a we saw range drops that correlated with increased daytime noise.

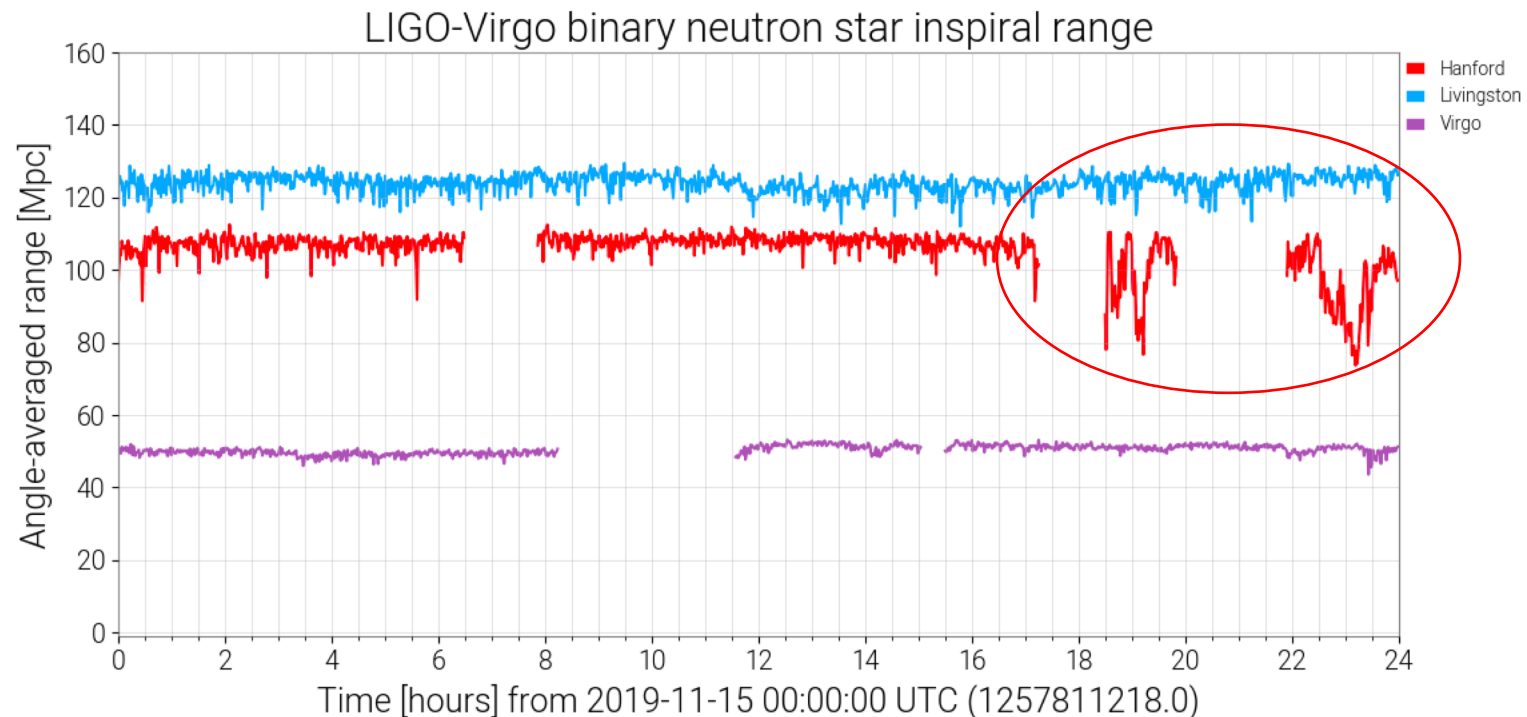


Installed shroud around TMSX (Transmission Monitor Suspension at X-end) and baffles on the photon calibrator periscope and on viewport nozzles. After the break the correlation with daytime noise is gone. [See alog entry here.](#)



LHO status

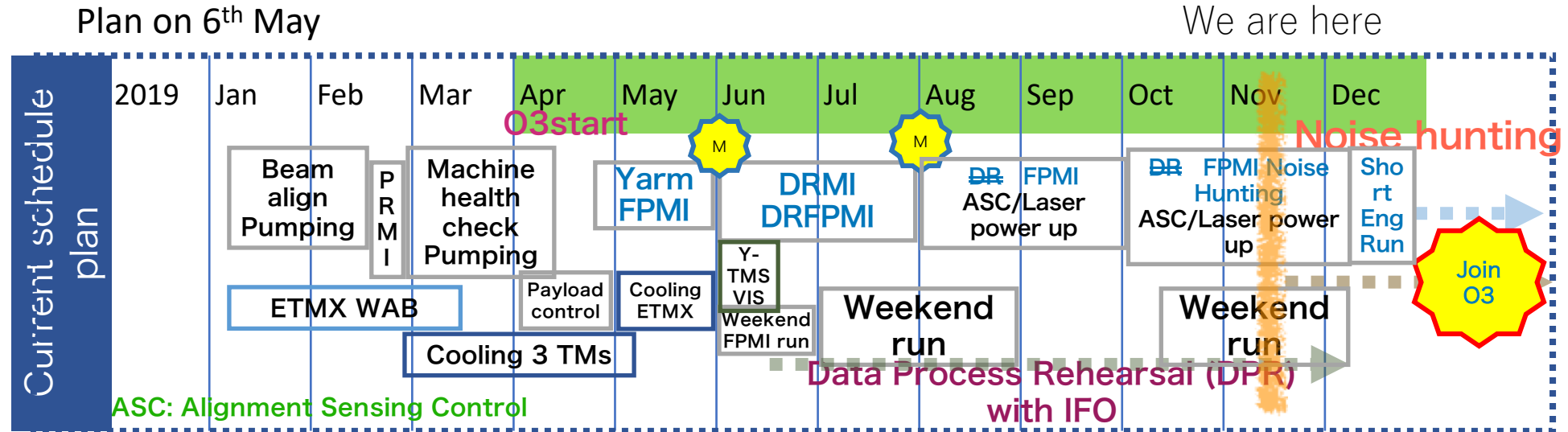
- Good duty cycle (**~80%** so far in O3b, **~71%** in O3a)
- Wind fence installation is being delayed further. Noisiest activities are over.
- Not much impact on run time, apparent impact on the data during the noisiest activities.



Virgo status

- Virgo is running steadily with almost 40 % higher power
- Good duty cycle despite the very bad weather in the last weeks (strong wind, sea activity, storm, rain, possible flood)
- At the begin of November high impact of misalignment and drift troubles in the laser system (high glitch rate) -> solved upgrading the cooling system to decrease the temperature of the laser amplifier
- Some hints to make further investigations on the limiting noise in the mid-frequency range

KAGRA Present Status



- Noise hunting is undergoing with FPMI configuration. About 2 orders improvement is necessary to reach \sim “1” Mpc Binary range. (The target is 8 \sim 25Mpc in O3)
- (PR)FPMI configuration will be used for Observation. We gave up DRFPMI configuration.
- Several systems (VIS, AOS, DGS, MIF) in KAGRA are now under optimization.