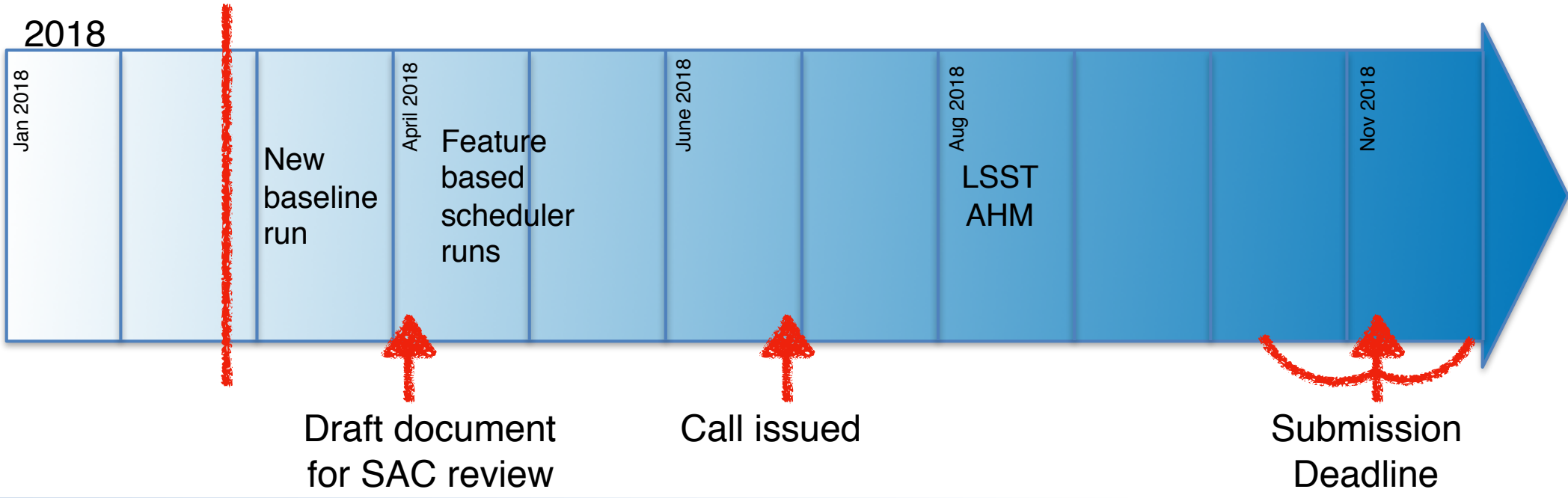
Call for White Papers, Cadence Simulations, & MAF Progress

Lynne Jones

SAC meeting
Feb 21, 2018

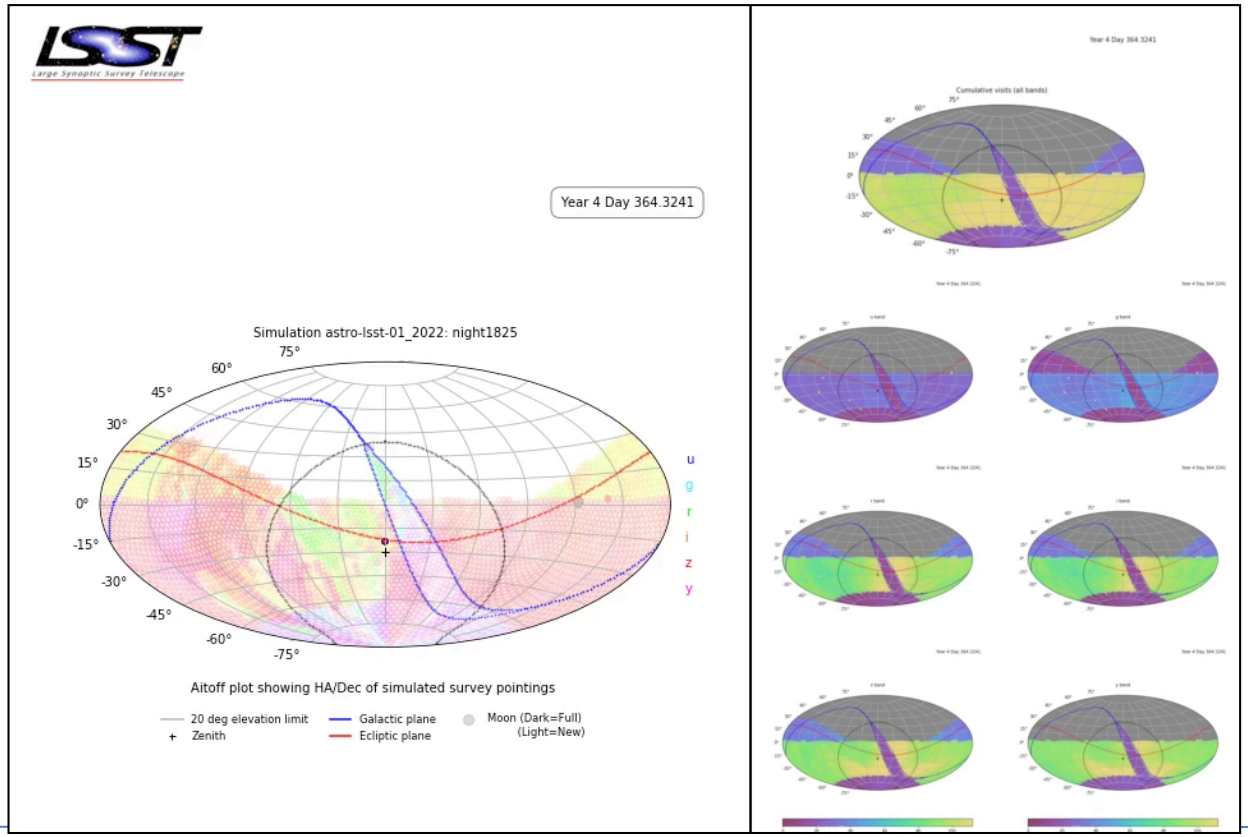
Call for white papers

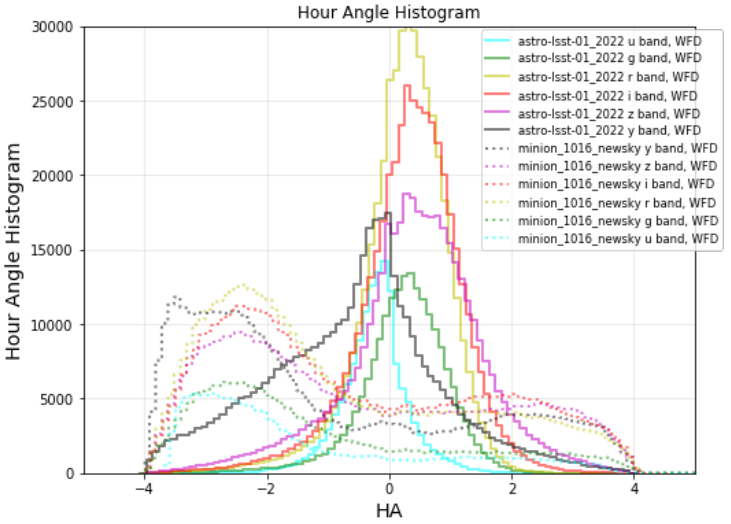
- Combined call for white papers on deep drilling and mini survey strategies (as suggested by SAC)
  - Call issued June 2018
  - White paper deadline November 2018 +/- month

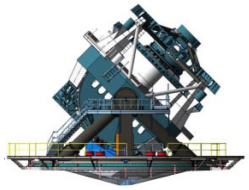


Cadence Simulations

- New baseline run with opsim v4 - “astro-lsst-01_2022”
  - New sky brightness model, time balancing between proposals, and preference for observing near meridian
  - MAF standard analysis @ http://astro-lsst-01:8081

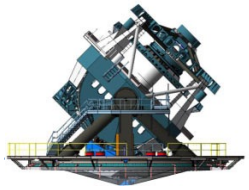






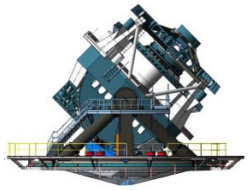
Cadence Simulations

- Next: start work with the feature-based scheduler (see Tiago's talk)
  - Baseline run
  - Rolling cadence variations
  - Deep drilling modifications (5 fields, 10 fields, faster cadence)
  - Mini survey variations (WFD across galactic plane, no mini surveys)



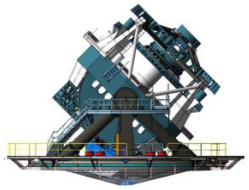
MAF progress

- Run-to-run/runs comparison
- Additional abstractions to allow standard analysis scripts to run on v3 or v4 databases (or other non-standard database)
- Next:
  - Improvements in run/runs comparison
  - More documentation about available metrics / scripts
  - Deep-drilling specific analysis scripts
  - Additional metrics for time-dependent cadence evaluation

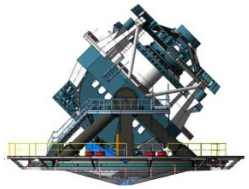


Questions for SAC

- Feedback on the call for white paper timeline
- Concerns about information included in the call?
- New opsim v4.1.0.10 baseline will be going to change control board within a few weeks; then we swap to feature-based scheduler. Any concerns with this process or timing?
- Feedback always welcome on MAF metrics for analysis



Additional Material



Call for white papers

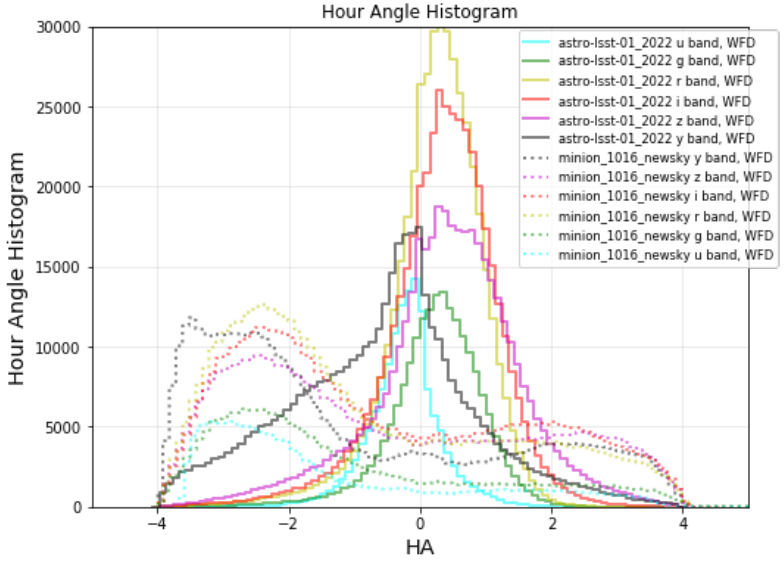
- WIP - example of consolidating constraints:
  - Also pointing, filter change, exposure, data processing & survey constraints

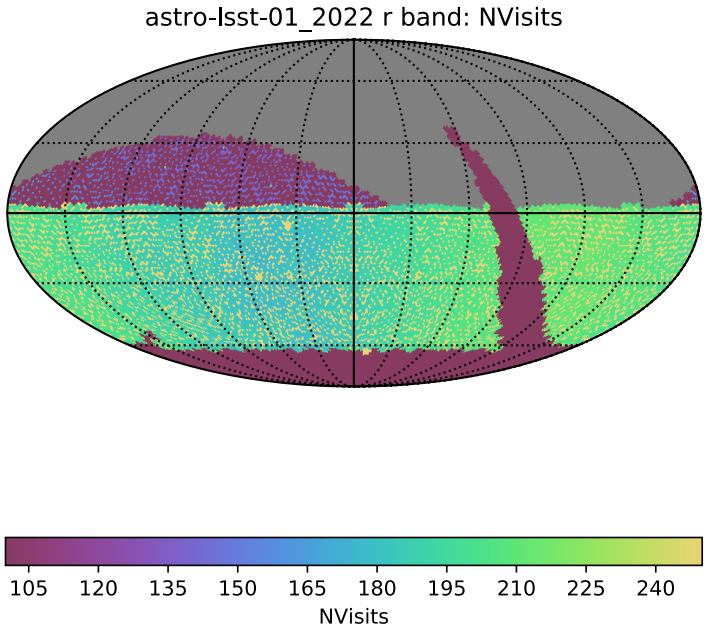
Survey constraints

- The footprint for the WFD must be at least 18,000 sq degrees with 825 visits per field (per SRD requirements). The cadence for these observations is still flexible and rolling cadence options will be considered. There are metrics in MAF (the `fOMetric`) that will evaluate if the footprint/visit requirement is met.
- Proper motion and parallax requirements impose some requirements on the overall cadence of the WFD. For example, a sufficient time baseline is required for proper motion measurements, requiring visits to a given field to be spread over many years. There are metrics in MAF for proper motion and parallax that will signal if these requirements are met.
- Rapid revisit intervals, uniformly distributed on timescales between 40 seconds and 30 minutes, are required over at least 2000 sq degrees of the survey footprint. Note that these do not have to be consecutive visits, but this area must be sampled over these timescales over the lifetime of the survey. There are metrics in MAF regarding rapid revisits that will signal if this requirement is met.
- Deep drilling field positions. 4 of the potential deep drilling fields have been announced; these positions are fixed. The number of remaining deep drilling fields and their cadence of observations is still flexible.
- Minisurvey observations. The current baseline includes Deep Drilling, North Ecliptic Spur, Galactic Plane, and South Celestial Pole regions as minisurveys. There are many good reasons to include these regions, however their observation (or even, lack of observation) is flexible and part of the driver for this call for white papers.

Cadence Simulations

- New baseline run with opsim v4 - “astro-lsst-01_2022”

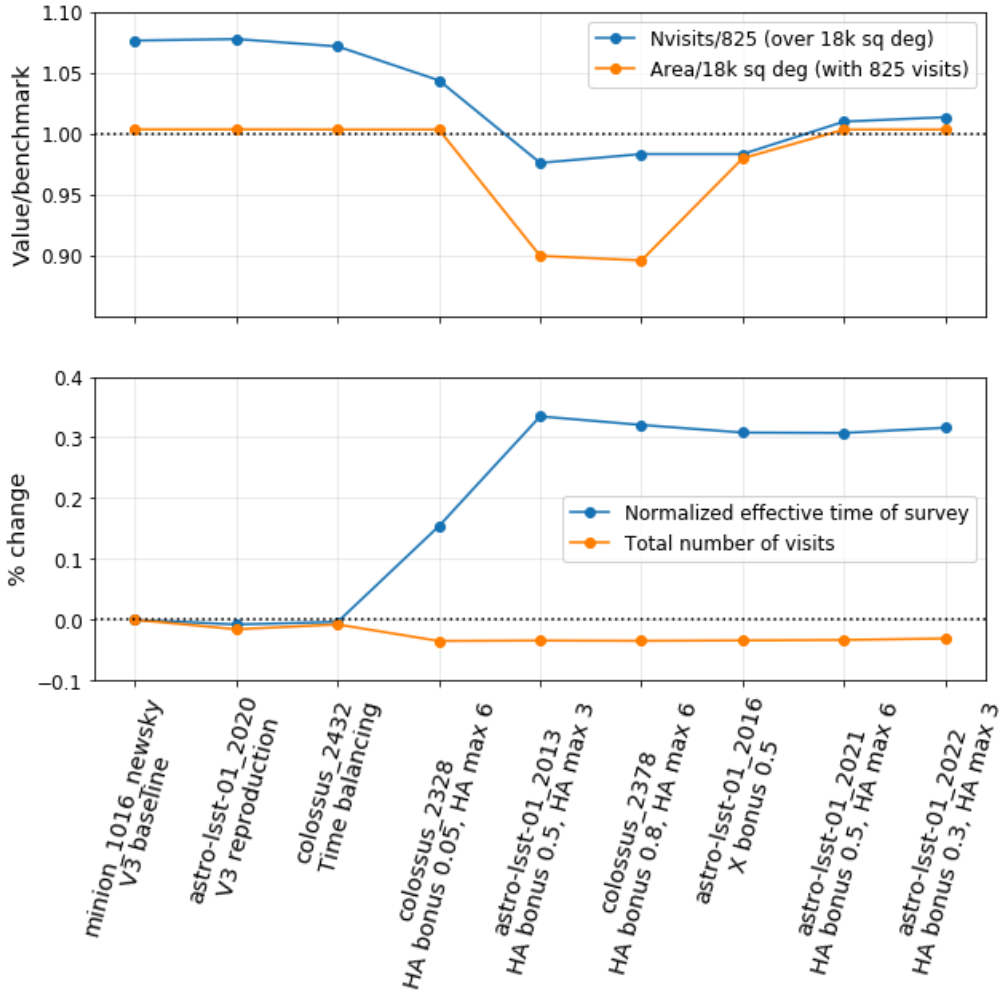


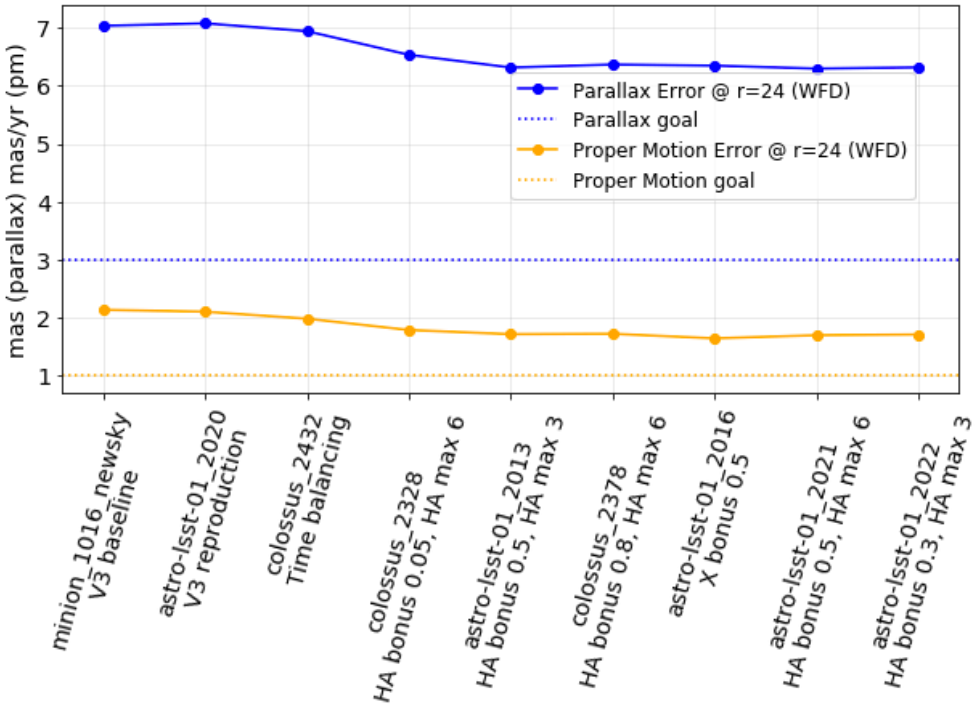


	minion_1016_newsky	astro-lsst-01_2022	Delta (%)
fOArea: Nvisits/benchmark fO All visits HealpixSlicer	1.076	1.013	-6
fONv: Area/benchmark fO All visits HealpixSlicer	1.003	1.003	0
Normalized Teff	0.424	0.558	32
Number of Exposures	2447931	2372700	-3
Fraction of total NVisits WFD	0.851	0.864	1
Mean NVisits Per night OneDSlicer	808.966	784.364	-3
Median NVisits WFD u band HealpixSlicer	63	62	-2
Median NVisits WFD g band HealpixSlicer	88	87	-1
Median NVisits WFD r band HealpixSlicer	201	200	0
Median NVisits WFD i band HealpixSlicer	202	199	-1
Median NVisits WFD z band HealpixSlicer	180	183	2
Median NVisits WFD y band HealpixSlicer	181	182	1
Median NVisits WFD all bands HealpixSlicer	916	912	0
Median CoaddM5 WFD u band HealpixSlicer	25.440	25.615	1
Median CoaddM5 WFD g band HealpixSlicer	27.051	27.110	0
Median CoaddM5 WFD r band HealpixSlicer	27.028	27.188	1
Median CoaddM5 WFD i band HealpixSlicer	26.432	26.613	1
Median CoaddM5 WFD z band HealpixSlicer	25.660	25.707	0
Median CoaddM5 WFD y band HealpixSlicer	24.695	24.892	1
Median Parallax @ 20.0 WFD HealpixSlicer	0.535	0.551	3
Median Parallax @ 24.0 WFD HealpixSlicer	7.038	6.320	-10
Median Proper Motion @ 20.0 WFD HealpixSlicer	0.162	0.149	-8
Median Proper Motion @ 24.0 WFD HealpixSlicer	2.138	1.713	-20
Area (sq deg) Number of revisits faster than 30.0 minutes All visits HealpixSlicer	6388.932	5834.756	-9
Area (sq deg) RapidRevisitUniformity WFD HealpixSlicer	25431.170	9597.863	-62
Median Fraction of visits in pairs (15-60 min) gri HealpixSlicer	0.909	0.895	-2
Median Median Inter-Night Gap all bands HealpixSlicer	2.950	1.973	-33
Median seeingEff WFD r band	0.912	0.853	-6
Median slewTime All visits	4.756	5.175	9
Total Filter Changes All visits	14194	10644	-25
OpenShutterFraction	0.735	0.716	-3

MAF progress

- Run-to-run/runs comparison tools





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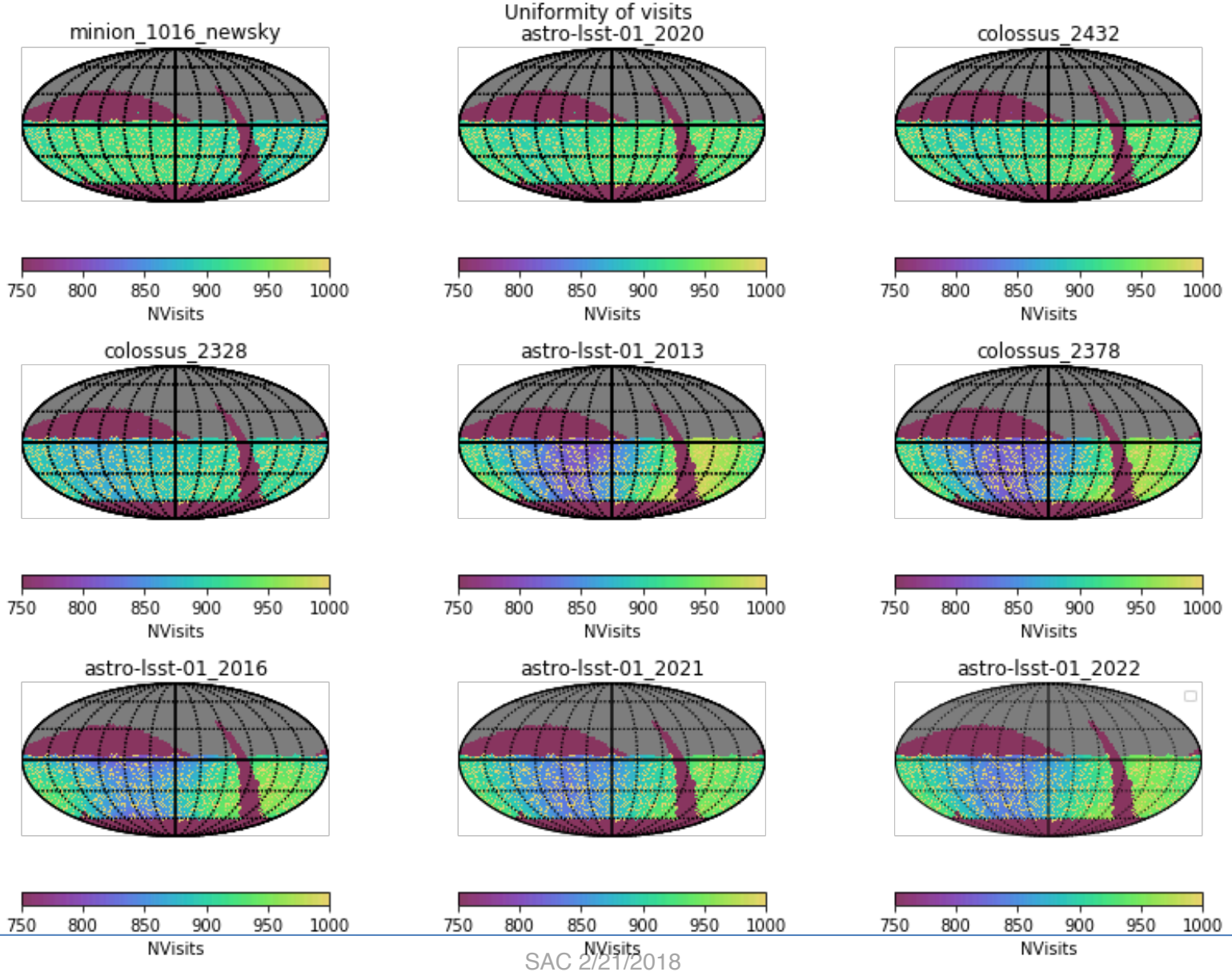

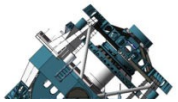

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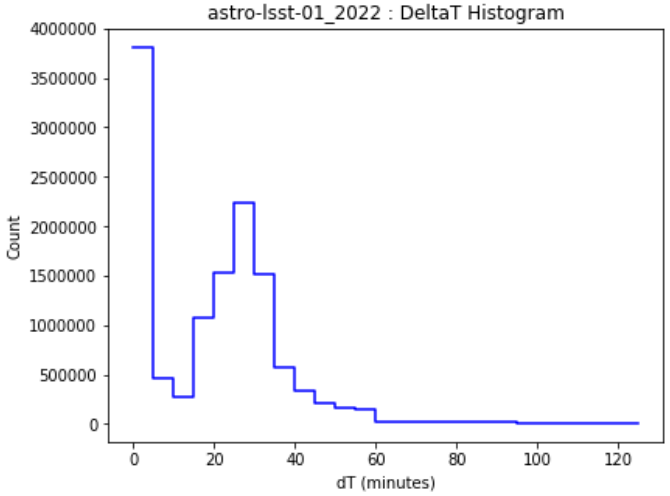
Look for changes between two surveys or across many.

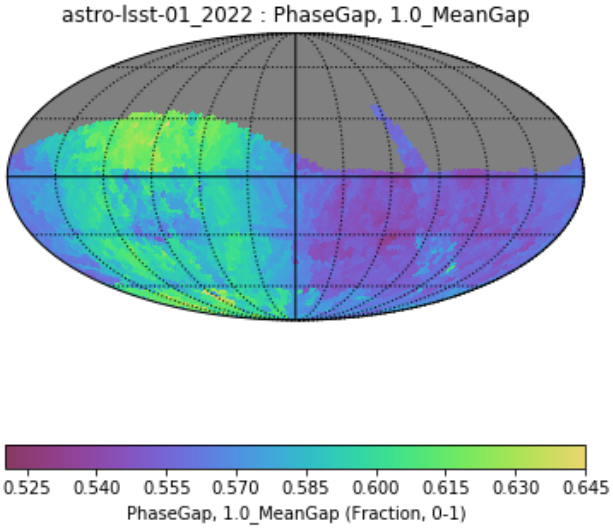
	Max Filter Changes OneDSlicer	Mean Filter Changes OneDSlicer	Median Filter Changes OneDSlicer	Filter Changes Whole Survey
minion_1016_newsky	54.0	4.287178	2.0	14194.0
astro-lsst-01_2020	69.0	3.316033	2.0	11213.0
colossus_2432	23.0	3.137521	2.0	10698.0
colossus_2328	23.0	3.026446	2.0	10347.0
astro-lsst-01_2013	23.0	3.390083	2.0	11406.0
colossus_2378	25.0	3.494876	2.0	11758.0
astro-lsst-01_2016	24.0	3.214545	2.0	10851.0
astro-lsst-01_2021	24.0	3.279008	2.0	11110.0
astro-lsst-01_2022	23.0	3.134876	2.0	10644.0

MAF progress

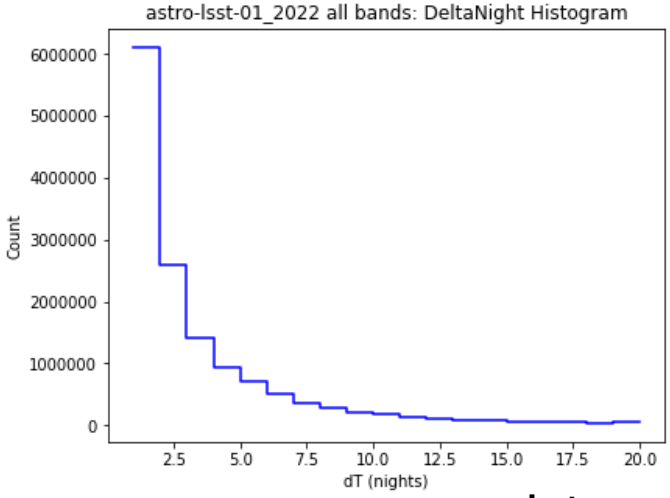
- Additional metrics for time-dependent cadence evaluation



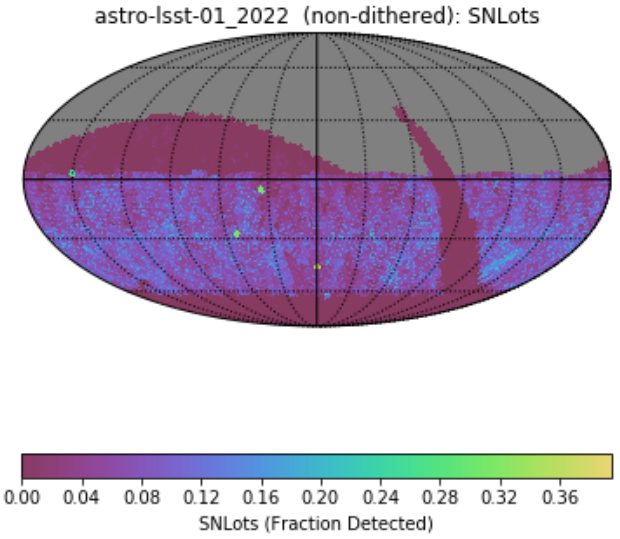
Intra-night

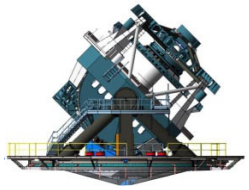


Heuristic-based science evaluation



Inter-night





MAF progress

- Documentation of MAF + metrics
  - Entry point https://sims-maf.lsst.io
    - Will add more higher-level information
  - List of all metrics https://sims-maf.lsst.io/metricList.html
  - Tutorial notebooks on MAF
    - Entry point @ https://github.com/LSST-nonproject/sims_maf_contrib/blob/master/tutorials/Index.ipynb
    - Will fold into sims-maf.lsst.io
  - Documentation of existing MAF analysis scripts
    - Need to write this and add to sims-maf.lsst.io