ZTF-I -> ZTF-II, “Pasadena”
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ZTF-I performance in a nutshell

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(Thanks to Frank Masci, Andrew Drake, Eric Bellm)

Overview: March 17, 2018 – Sept 30, 2020

- 929 nights – data taken on 734
- Exposures:

	g	r	i	Total
All	179,523	271,899	28,042	479,464
MSIP	95,030	98,516	115	193,661
Galactic Plane	20,753	46,738	3,752	71,243
Good (DR3)	94.5%	92.8%	95.6%	93.7%

- 300 million alerts, 6.5 million associated with known SSOs
- 3 Data Releases: 5.6B sources (gri)
- > 90 publications – 1800 citations, 5200 reads

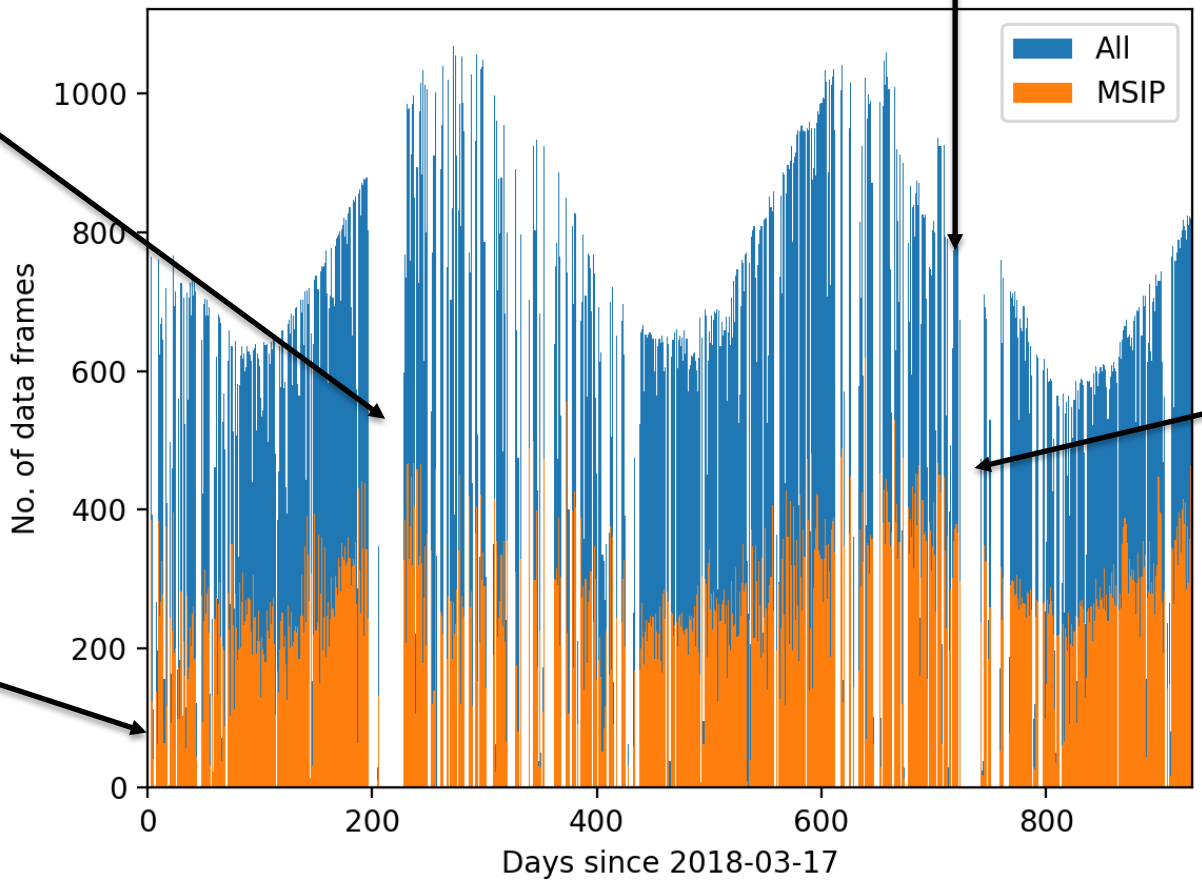
Observing nights

Cryocooler leak

Rained first 2 nights

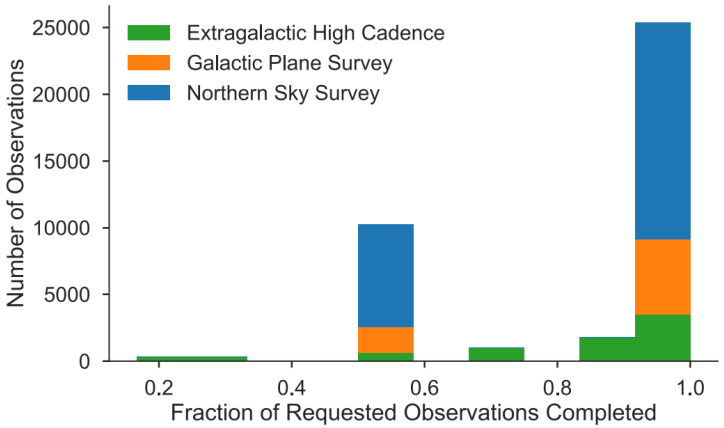
Driest February on record

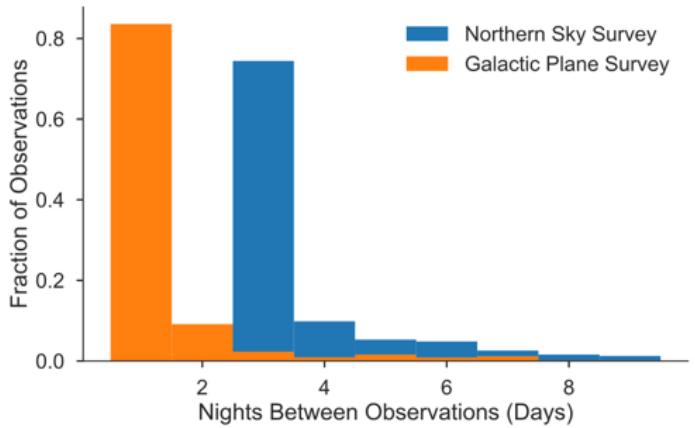
Wettest March in 25 years



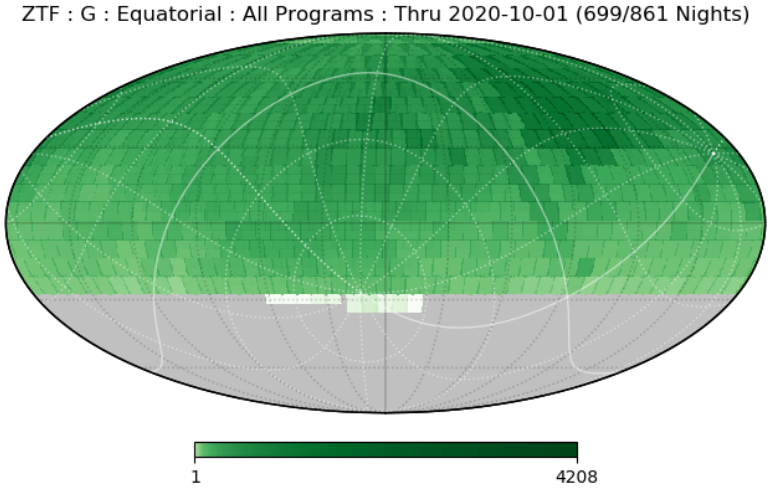
Scheduling

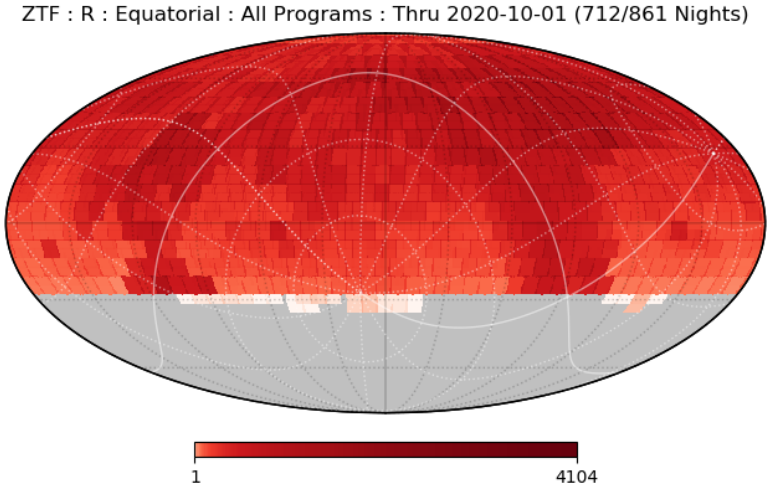
- The most complex time-domain survey ever scheduled
- 40% MSIP, 40% partnership, 20% Caltech:
  - Cadenced surveys, time constrained, deep drilling, …
  - 88+ survey configurations over Phase I
  - >3 changes / month
  - 4137 filter exchanges
  - 3121 ToOs

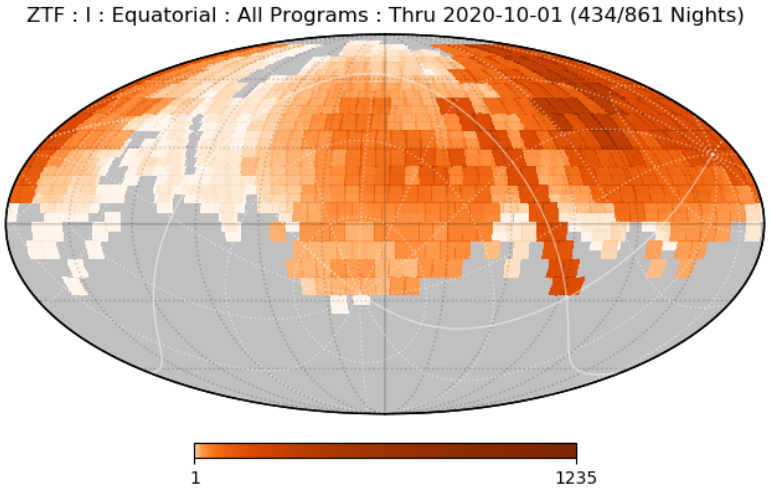




Sky coverage: all data

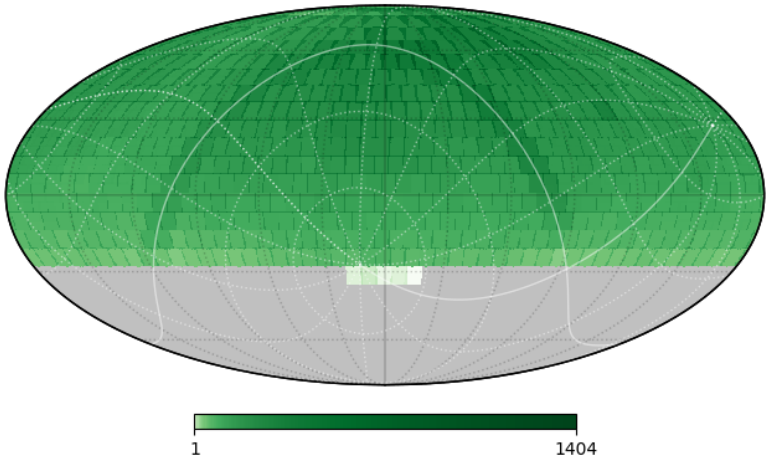




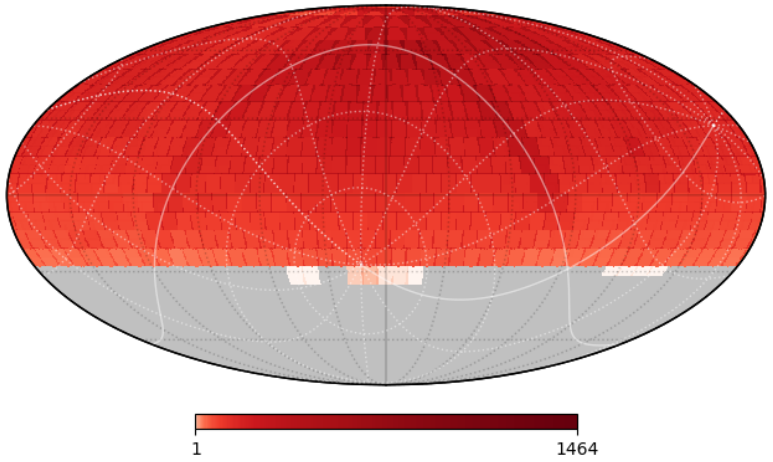


Sky coverage: MSIP survey

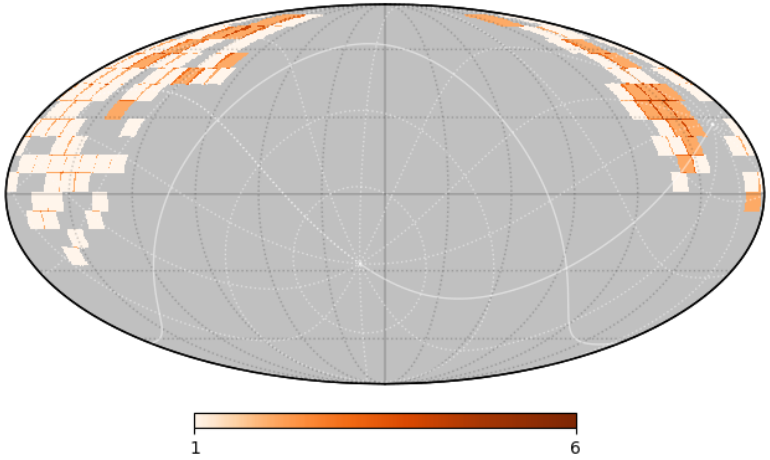
ZTF : G : Equatorial : Public Survey : Thru 2020-10-01 (695/861 Nights)



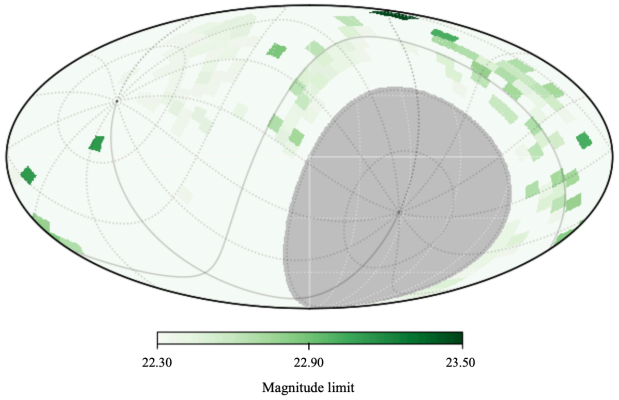
ZTF : R : Equatorial : Public Survey : Thru 2020-10-01 (708/861 Nights)

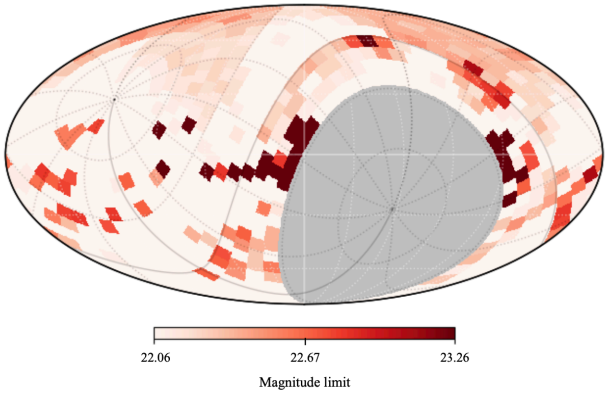


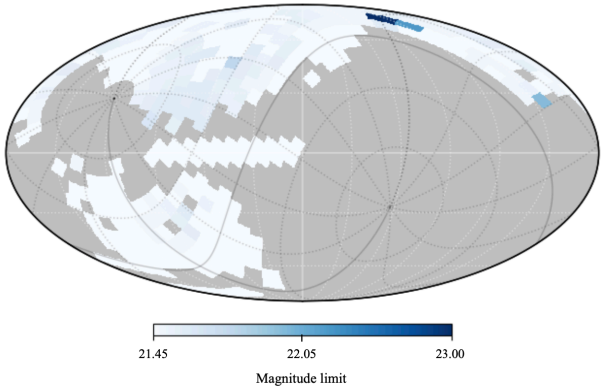
ZTF : I : Equatorial : Public Survey : Thru 2020-10-01 (2/861 Nights)

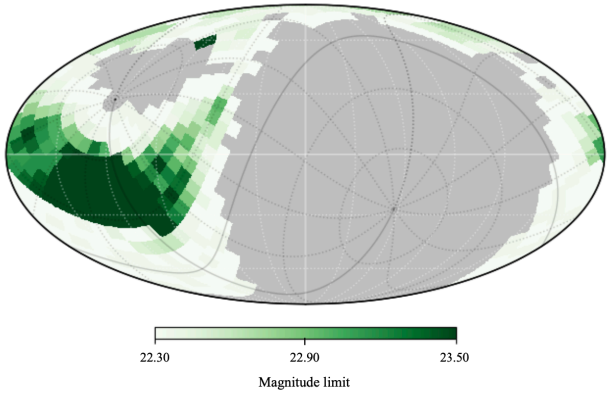


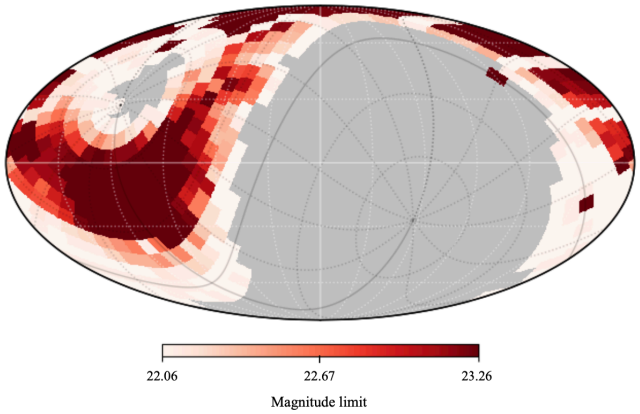
Sky depth - references

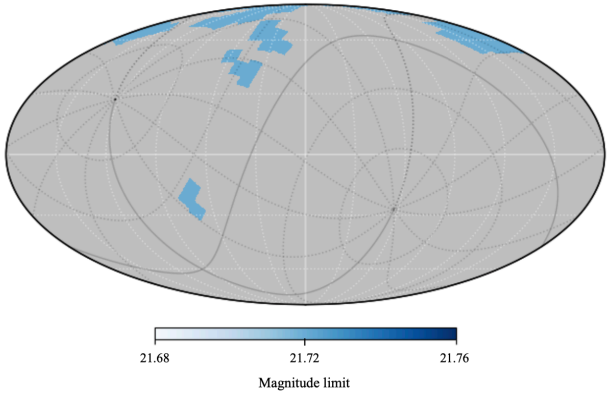




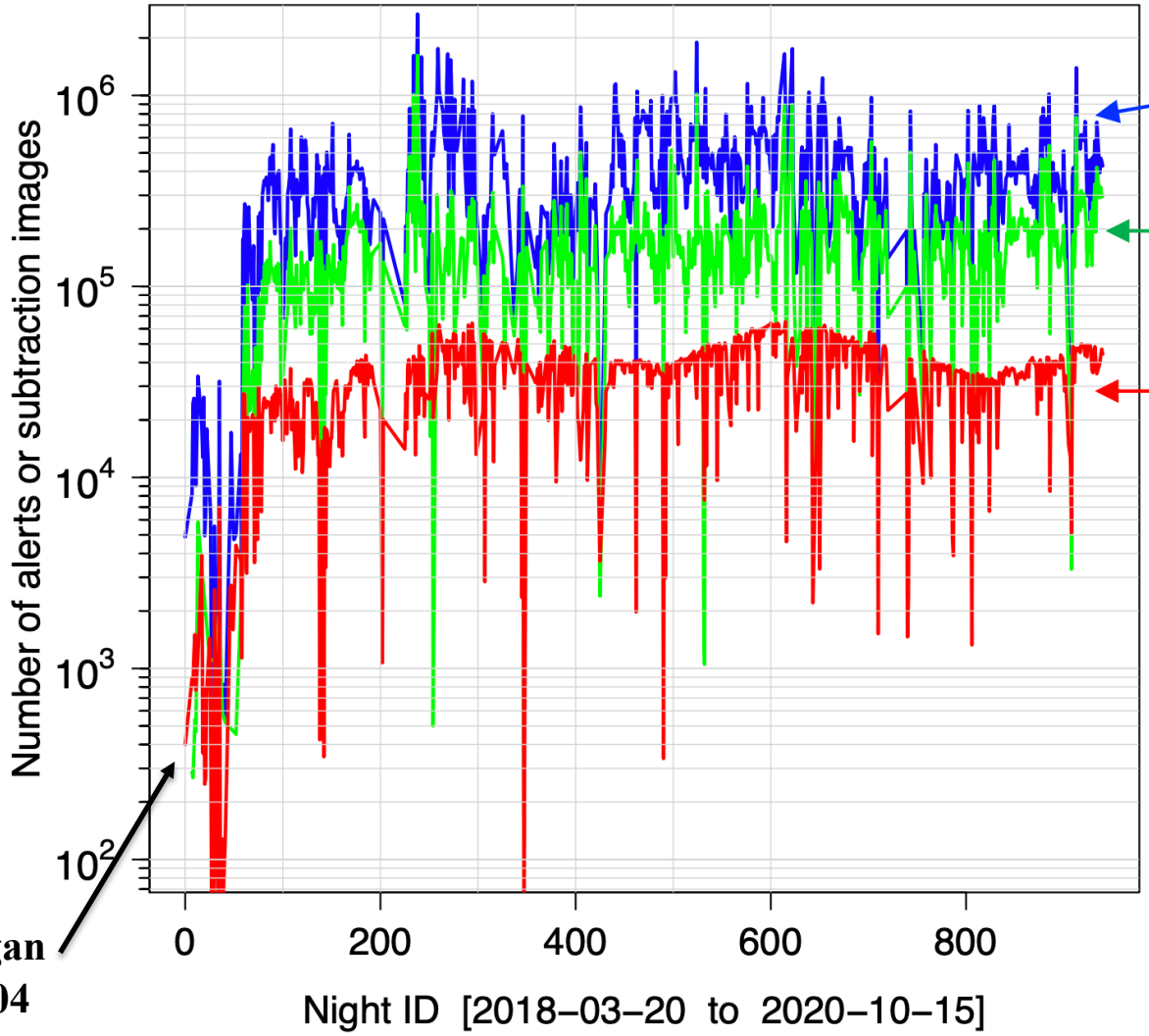








Alerts



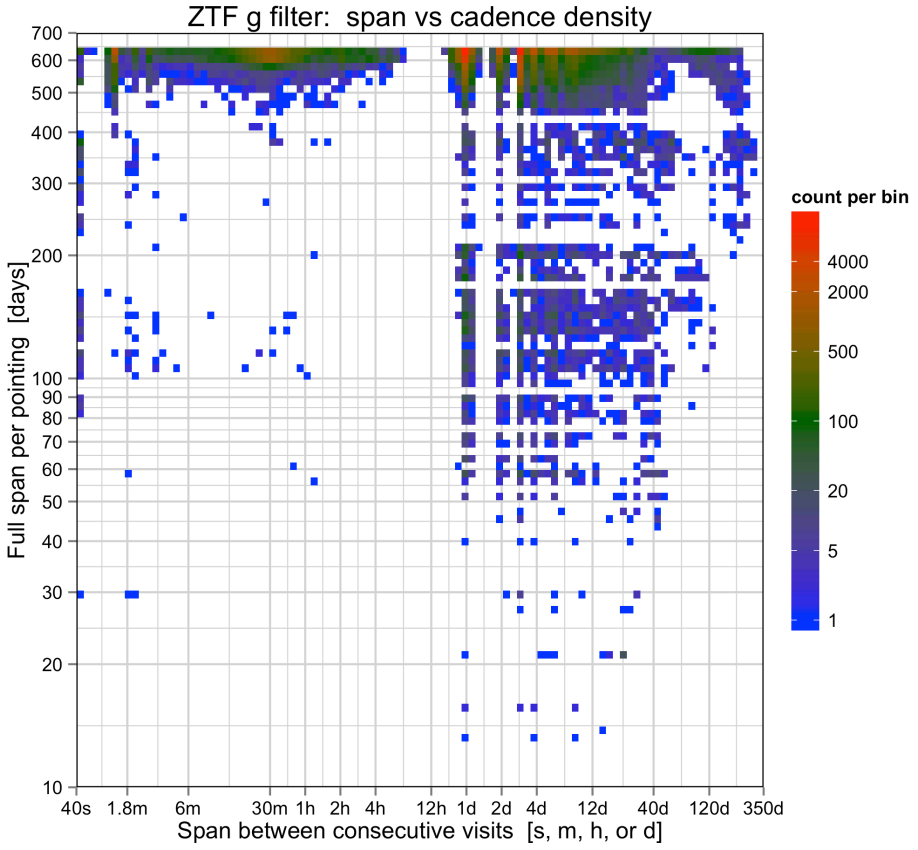
=> ~ 16 alerts/sq.deg
~ 750 / exposure

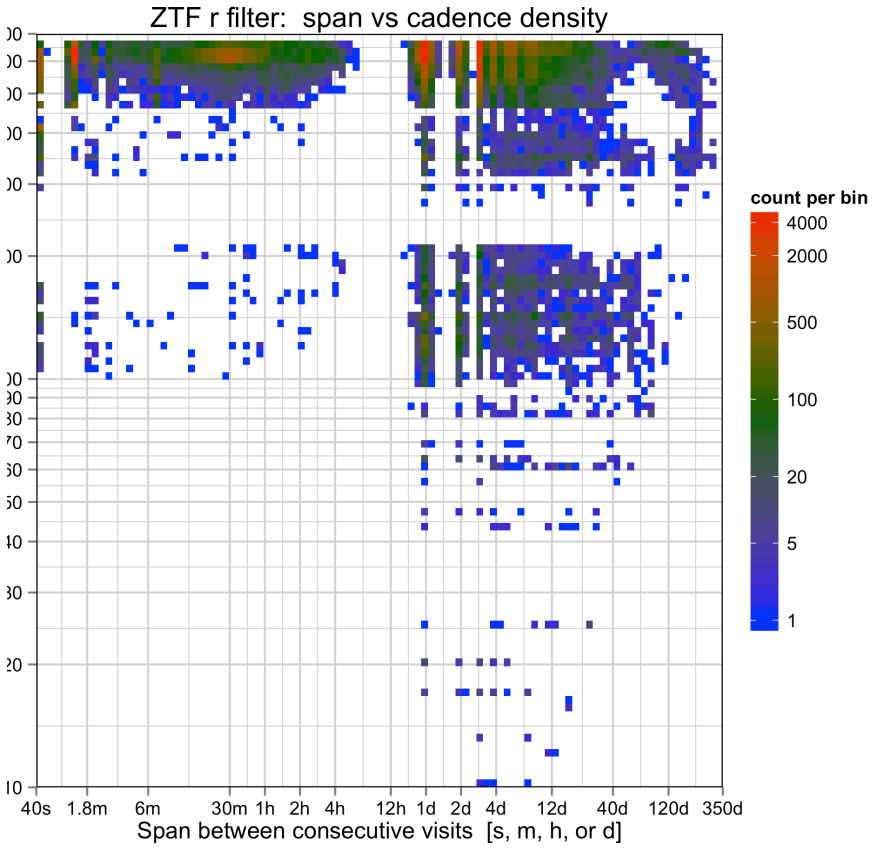
Light curves

	g	r	i	Total
All *ref* sources	4.6B	6.4B	1.6B	12.6B
All *sci* sources	109B	361B	43B	513B
DR3 *ref* sources	2.1B	3.0B	560M	5.6B
DR3 *sci* sources	60B	171B	3B	234B
DR3 $N_{obs} \geq 10$	612M	1.1B	74M	1.8B
DR3 $N_{obs} \geq 20$	456M	907M	34M	1.4B

DR3: All MSIP data to 2019-12-31 and all proprietary data to 2018-12-31

Light curve cadence





Current photometric accuracy

- Current scheme: $m_{cal} = m_{inst} + ZP_f + c_f\left(m_1^{PS1} - m_2^{PS1}\right)$
- ZTF g, r-band photometric error limits:
  - Individual observations raw RMS ~2-5%
  - Calibrated individual obs. vs PS1: RMS ~ 1.2-1.8%
  - Calibrated median object mags vs PS1: RMS ~0.7% (mag < 18.5)
- <2% systematics with:
  - Source color, magnitude, location, airmass, reddening, sky level, number of calibrator stars, and time

Archive usage (IRSA)

~ 660,000 queries (median is ~5000 per week)