The PTF / iPTF 2016 Fall Release

Frank Masci & the PTF / ZTF Team

IPAC, Caltech

What is the Palomar Transient Factory (PTF)

- PTF is a robotic sky-survey designed to discover and study time-domain phenomena: flux transients and variables of all types; transiting exoplanets; and moving-objects (asteroids).

- PTF uses the 48-inch on Palomar Mountain and surveys ~2500 square degrees per night, predominately in *R*-band to a depth of ~ 20.5 mag.

- Products entail images at each observation-epoch, co-added images, and source-catalogs, totaling ~ 1TB of data every four days.

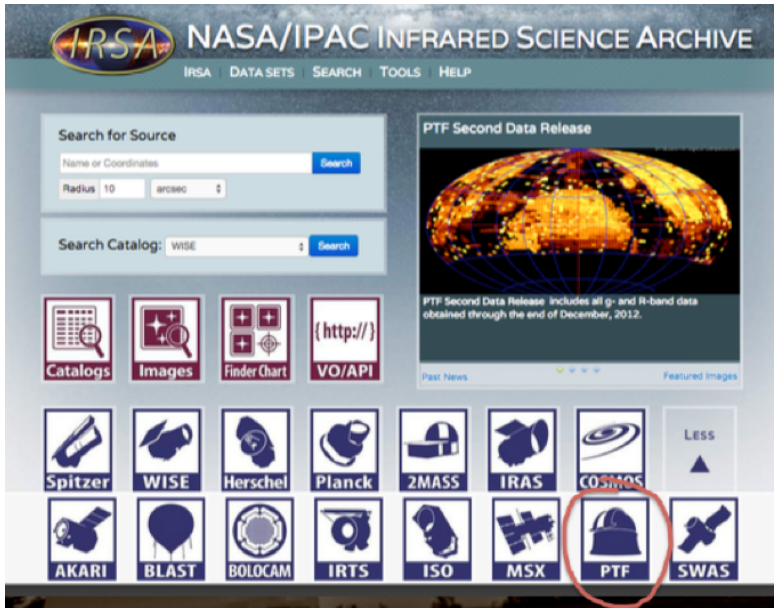
- PTF has been running for 7 years (now called "*intermediate* PTF" or iPTF). This is both privately and NSF funded. There's also some NASA contribution through a Fermi project.

- In 2017, PTF will transition to the Zwicky Transient Facility (ZTF) using a new camera with a 47 square-degree field-of-view. ZTF will scan the entire Northern visible sky every night.

- IPAC is responsible for all data processing, archiving, and user-interfaces to access: all image data, epochal catalogs and lightcurves generated therefrom.
  - ➢ expertise consists of pipeline/software developers; database administrators; system engineers

PTF lightcurve release (Fall 2016)

- A PTF lightcurve service will be available through the NASA/IPAC Infrared Science Archive (IRSA) later this year.
- User can submit queries based on sky cone-searches; individual objects of interest, as well as filter on any pre-computed lightcurve metrics.
- Lightcurves will be constructed dynamically from the single-epoch source catalogs in the PTF archive (positionally-associated beforehand).
- Image cutouts on each time-resolved measurement will also be made available in future.
- This service will support lightcurve construction for ~600 million objects across a six year span.
- The GUI will be extended for ZTF to include an on-the-fly periodogram and period calculator, with image-overlay tools to enable interactive selection/omission of time-series observations.



Fall 2016 release contents (DR3)

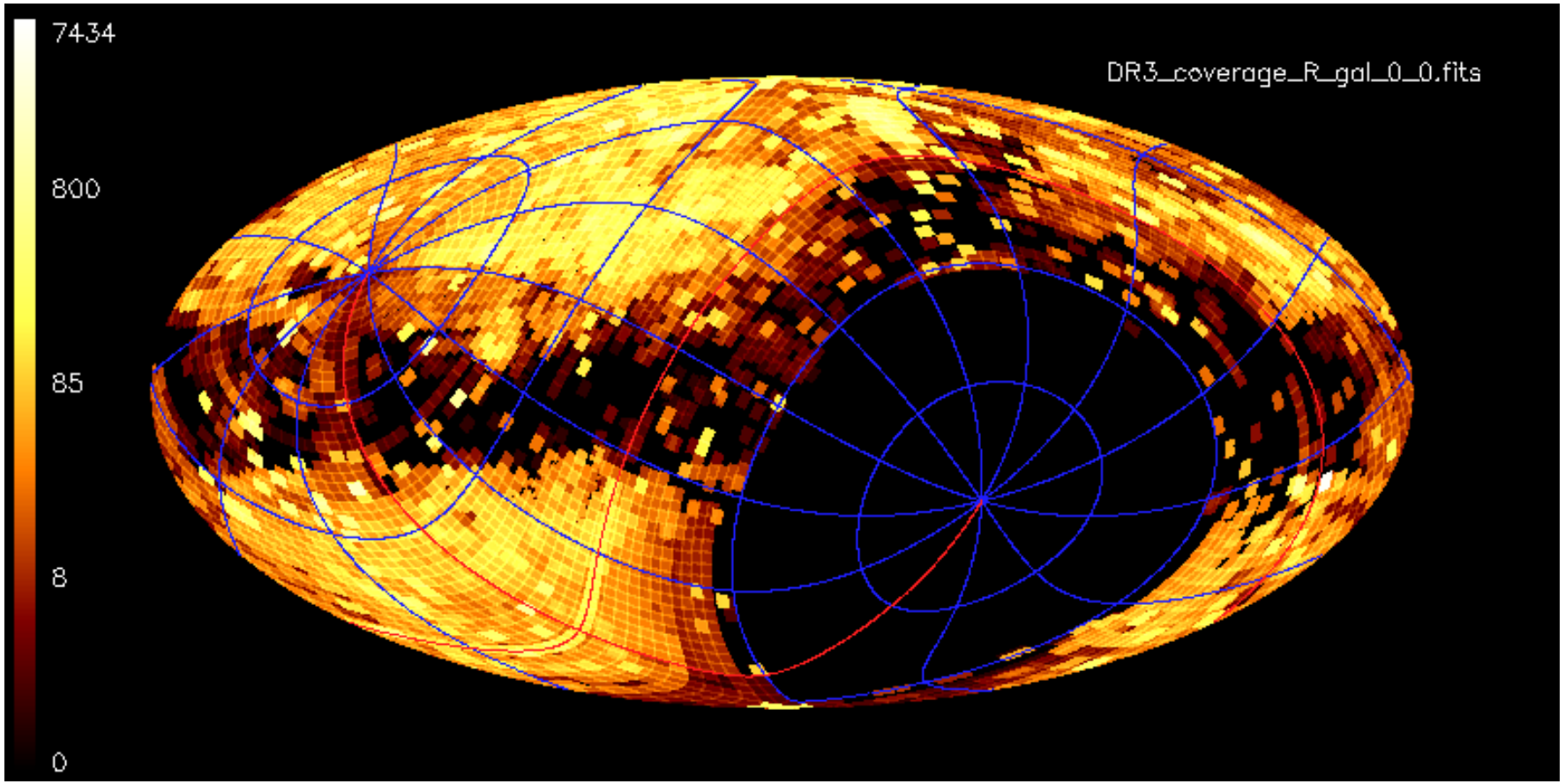
- New epochal image data and source catalog files acquired **1/1/2013 to 1/28/2015** (iPTF phase)
  - Of order 650,000 new single-epoch images with accompanying catalogs
  - Brings total number to ~ 3.47 million in *R* and ~ 0.72 million in *g* (DR2 + DR3)

- New co-add images with accompanying source catalog files
  - 9663 new co-add products generated from the epochal image data
  - Brings total number of co-adds to 56,440 (in *R* and *g*)

- A lightcurve database to enable lightcurve construction using observation epochs spanning **3/1/2009 to 1/28/2015**:
  - ~ 600 million objects linked to ~ 10 billion multi-epoch measurements.

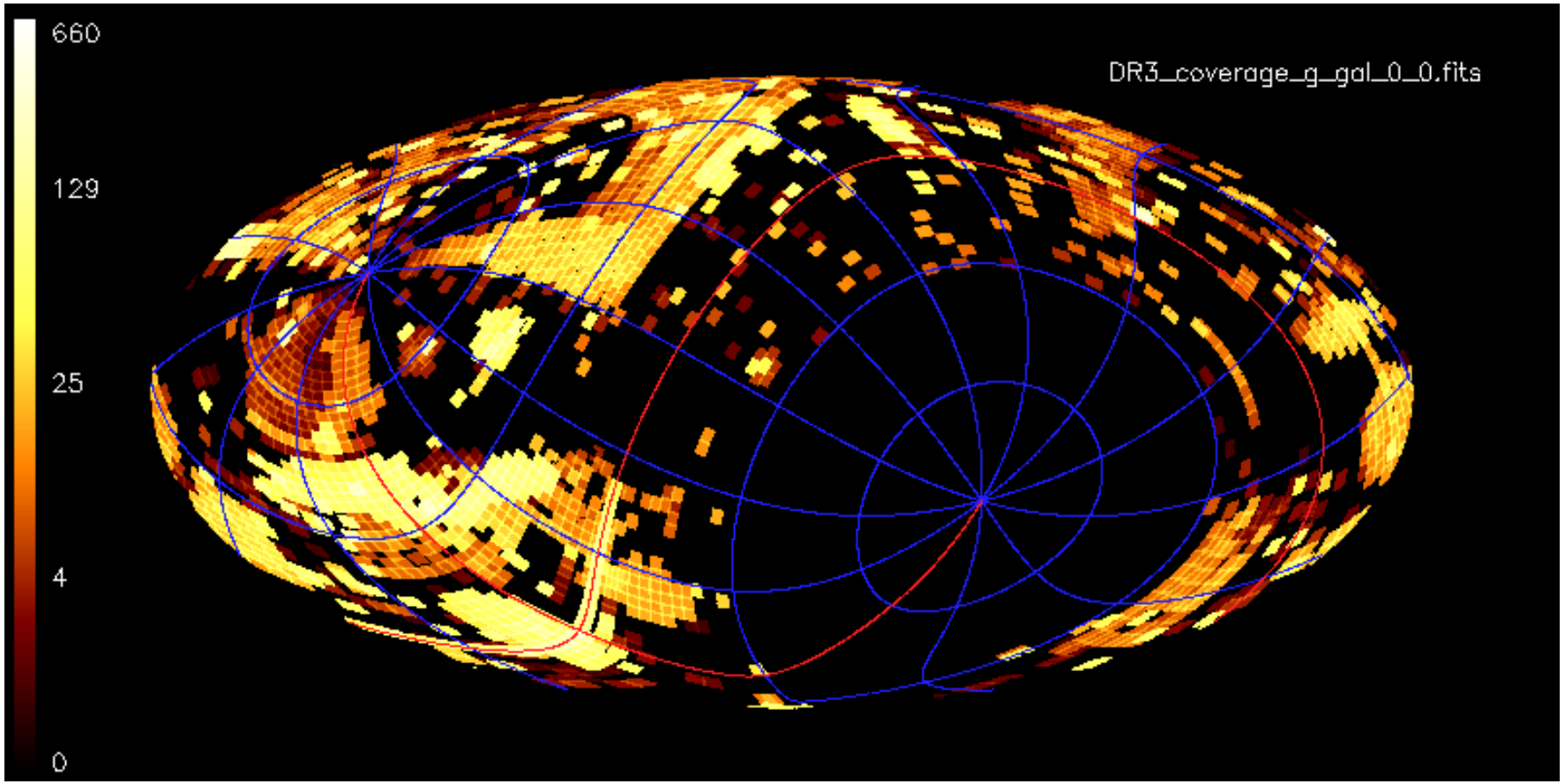
Sky depth-of-coverage for epochal image products (R-band)

All epochs from the archive that will be publically available following the Fall 2016 release:
~ 3.47 million R-band images. Projection is galactic, centered at *l, b* = 0, 0.



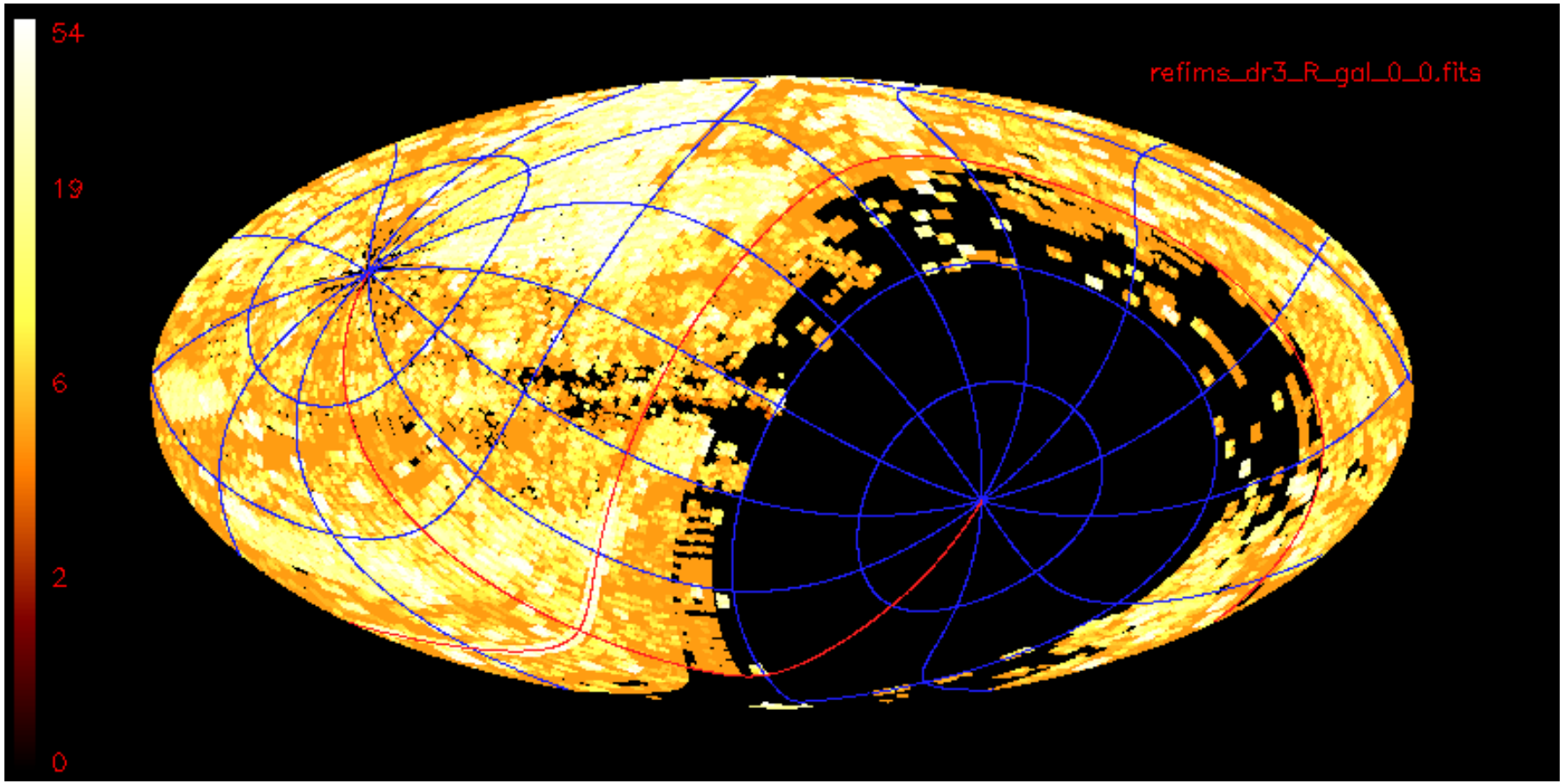
Sky depth-of-coverage for epochal image products (g-band)

All epochs from the archive that will be publically available following the Fall 2016 release:
~ 0.72 million g-band images. Projection is galactic, centered at *l, b* = 0, 0.



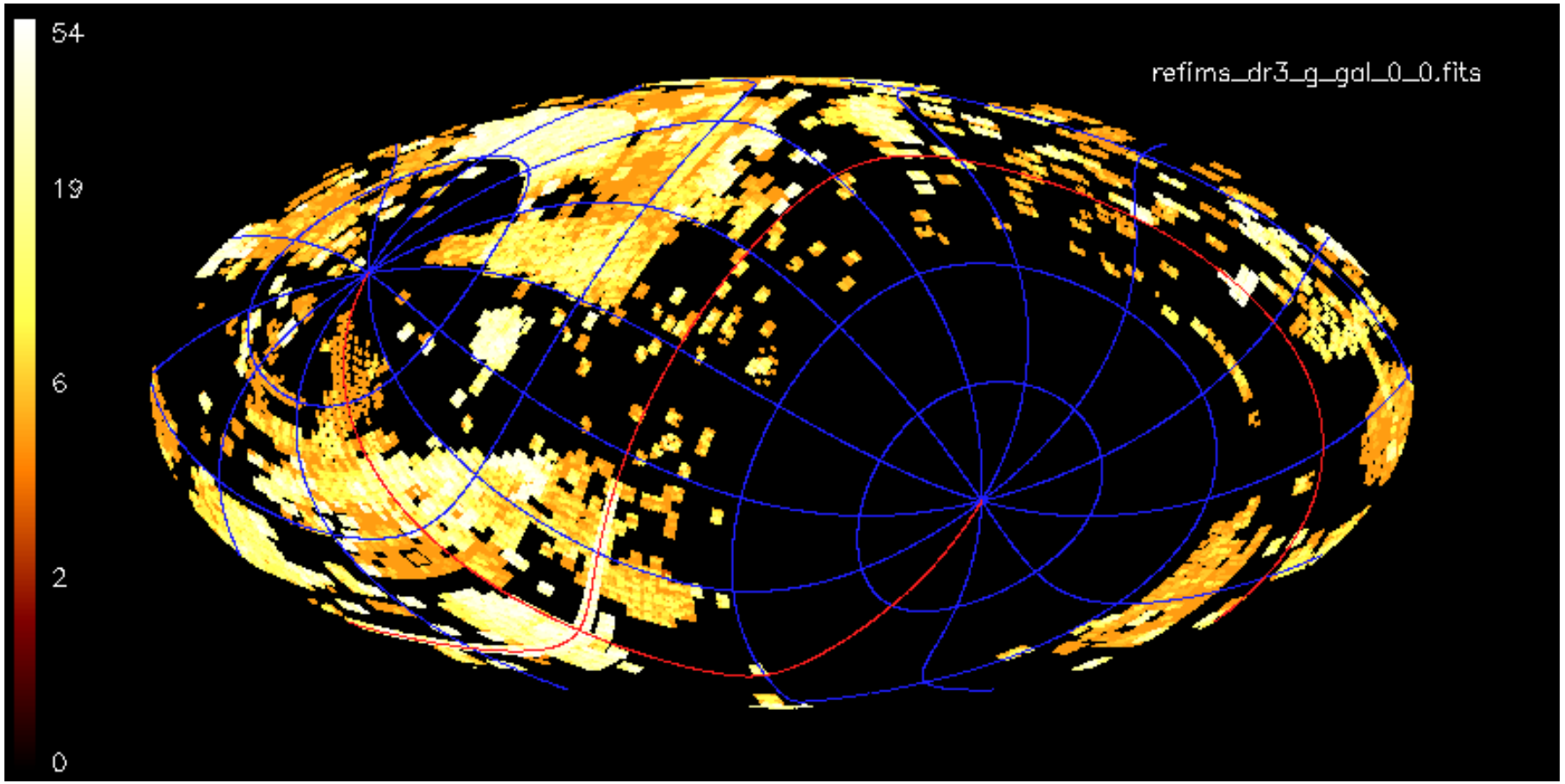
Sky depth-of-coverage for co-add products (R-band)

All co-add images from the archive that will be publically available following the Fall 2016 release: **41,200 R-band co-add images.** Projection is galactic, centered at *l, b* = 0, 0.



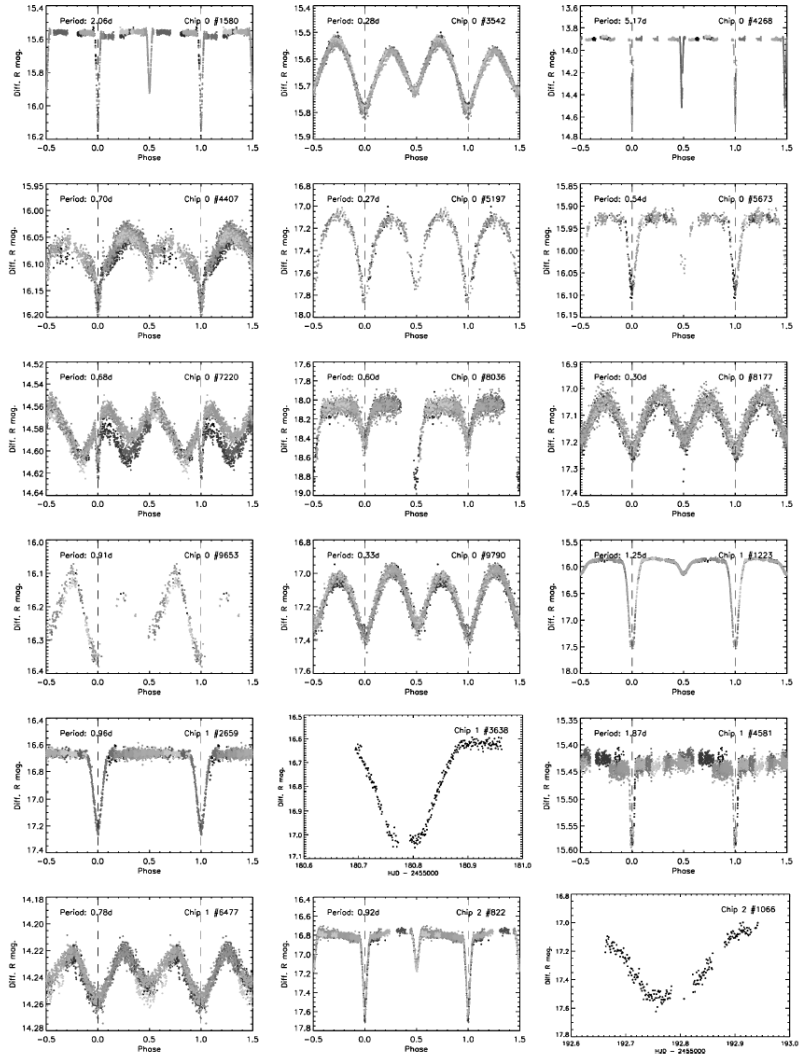
Sky depth-of-coverage for co-add products (g-band)

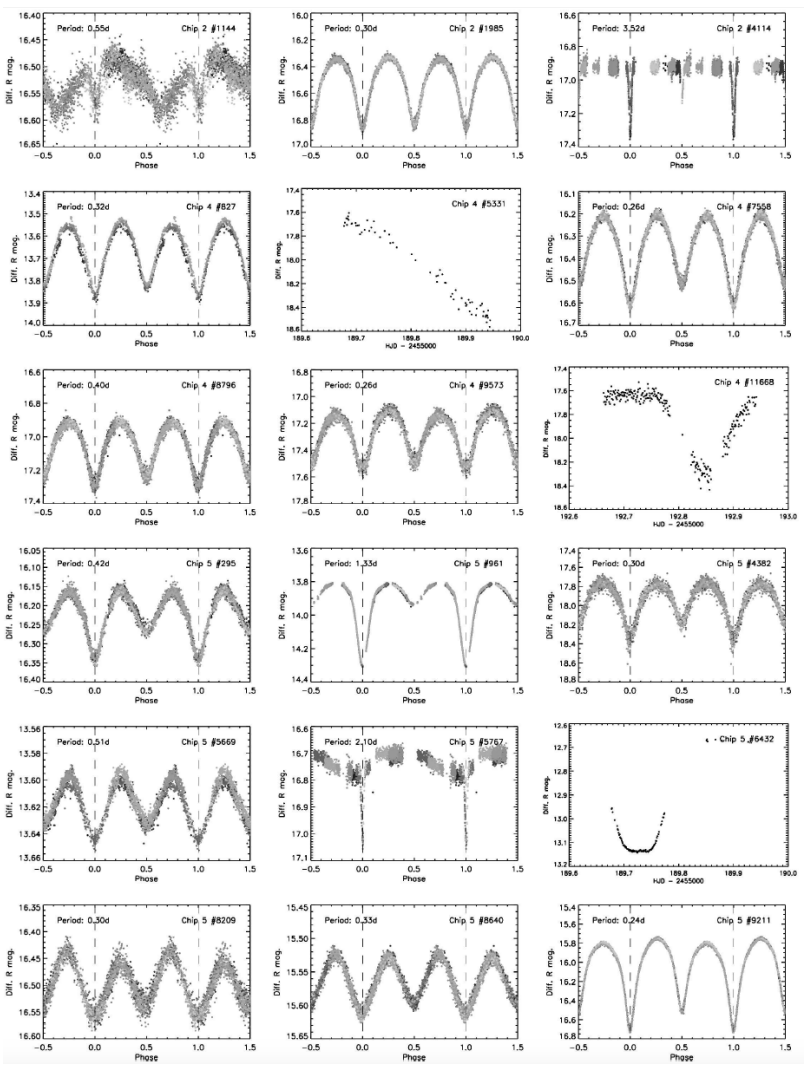
All co-add images from the archive that will be publically available following the Fall 2016 release: **15,240 g-band co-add images.** Projection is galactic, centered at *l, b* = 0, 0.



Example PTF lightcurves from the Orion project

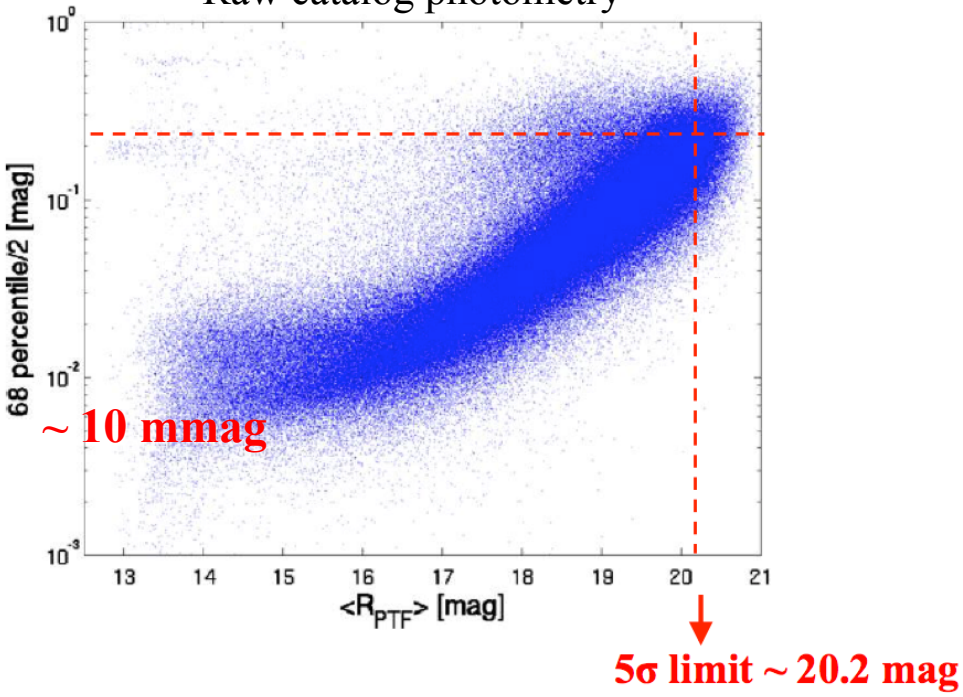
Binary star lightcurves; from Van Eyken et al. (2011)





Photometric Performance

Raw catalog photometry



Refined (relative) photometry for lightcurve DB