Pan-STARRS1 Data Release 1

Everything about the catalogs condensed to a single sheet of paper

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Introduction
This sheet only covers the catalogs released for Pan-STARRS1 DR1. Pixels (from the stacks) are also available, more information is available at the Pan-STARRS or STScI booths. This sheet is intended for people familiar with SQL, who want to jump in and start querying the catalogs.

Data Release 1
Data release 1 (DR1), released on December 19, 2016, is focused on the static sky. This is the 3pi survey, covering ¾ of the sky (everything north of dec = -30). This includes stacked images and catalogs in 5 filters (grizy), and mean properties for all of the detections. The catalogs are ubercalibrated and also calibrated to Gaia.

There are 10.7 billion objects detected, with 3.4 billion of those detected in the stacks. The majority of the objects detected are only detected once or twice (out of ~60 epochs) – they are included in the database, but are probably not useful or interesting (until DR2, which has pixels and catalogs for individual exposures). Stick with things detected in the stacks for now.

Future Data Releases
DR2, planned for 2017, will include pixels and catalogs related to the single epoch exposures, including forced photometry. Later data releases will include products related to difference images, and products related to the Medium Deep Survey.

DR1 papers describing the surveys, processing and database

1: “The Pan-STARRS1 Surveys”, K. C. Chambers et al, https://arxiv.org/abs/1612.05560

2: “Pan-STARRS Data Processing System”, E. A. Magnier et al, https://arxiv.org/abs/1612.05240

3: “Pan-STARRS Pixel Processing: Detrending, Warping, Stacking”, C. Z. Waters et al, https://arxiv.org/abs/1612.05245

4: “Pan-STARRS Pixel Analysis : Source Detection & Characterization”, E. A. Magnier et al, https://arxiv.org/abs/1612.05244

5: “Pan-STARRS Photometric and Astrometric Calibration”, E. A. Magnier et al, https://arxiv.org/abs/1612.05242

6: “The Pan-STARRS1 Database and Data Product”, H. A. Flewelling et al, https://arxiv.org/abs/1612.05243

*Also visit the Pan-STARRS and STScI booths, and see Huber's poster on the Pan-STARRS Medium Deep Survey

Fundamental Data Tables in DR1

ObjectThin : Contains positional and other basic information for objects.

MeanObject : Contains filter dependent mean photometric information for objects, based on single epoch data.

GaiaFrameCoordinate : Contains ra and dec of objects calibrated against Gaia astrometry.

ForcedMeanObject : Contains the mean of single epoch photometric information for sources detected in the stacked data.

ForcedMeanLensing : Contains mean lensing parameters measured from forced photometry of objects detected in stack images on individual single epoch data

StackObjectThin : Contains basic positional and photometric information for point source photometry of stack detections, with information for all filters joined in a single row.

StackObjectAttributes : Contains PSF, Kron, aperture fluxes, and point-source object shape parameters for all filters in a single row.

StackApFlx : Contains the fluxes within SDSS R5, R6, R7 for unconvolved, convolved to 6 pixels, convolved to 8 pixels stacks.

StackModelFitExp : Contains exponential fit parameters to extended sources

StackModelFitDev : Contains de Vaucouleurs fit parameters to extended sources.

StackModelFitSer : Contains the Sersic fit parameters to extended sources.

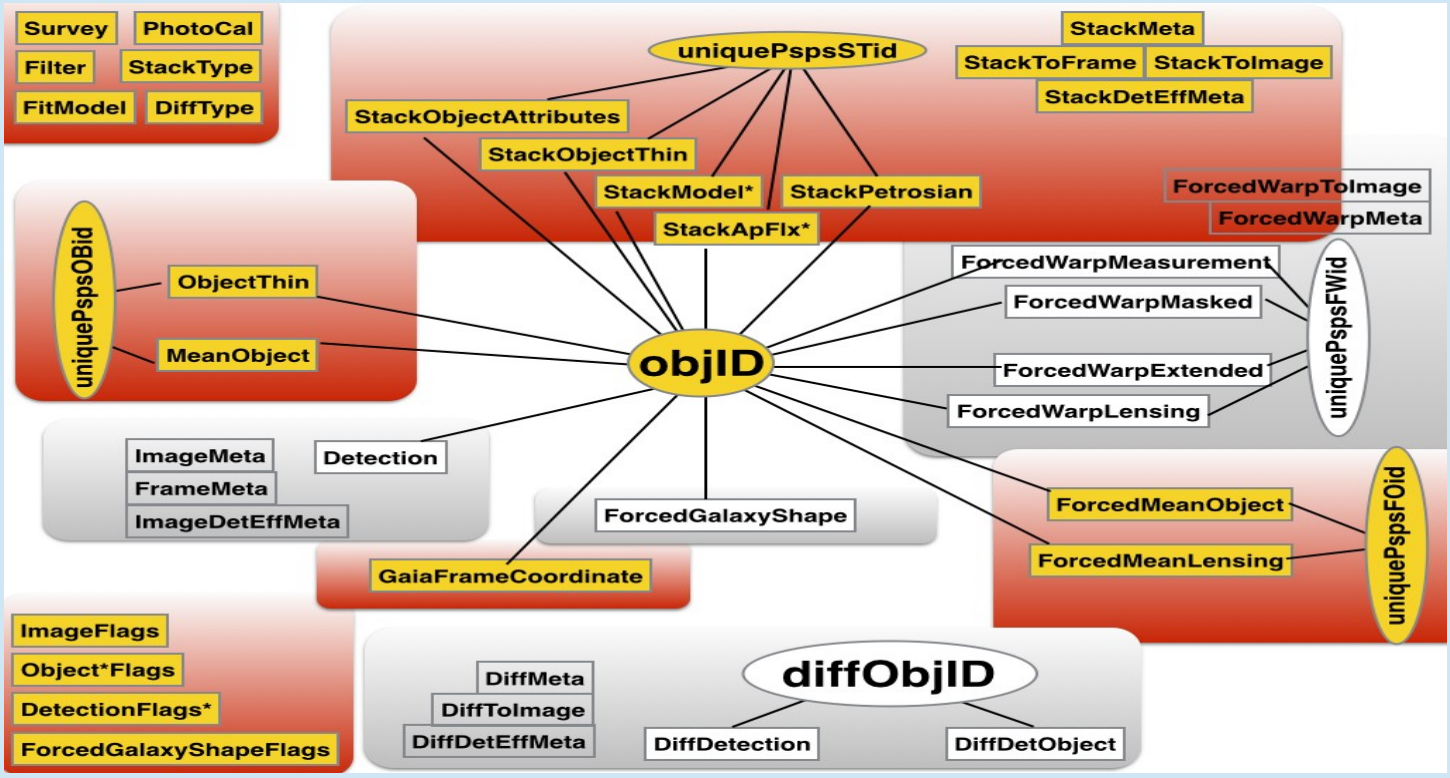
StackApFlxExGalCon6, **StackApFlxExGalCon8**, **StackApFlxExGalUnc** : These are only for the extragalactic sky (not galactic plane), for uncolvolved, convolved to 6 pixels (1.5 arcsec), convolved to 8 pixels (2.0 arcsec) stacks. Contains fluxes within SDSS R3 (1.03 arcsec), R4 (1.76) , R5 (3.00), R6 (4.63) , R7 (7.43), R8 (11.42), R9 (18.20), R10 (28.20), R11 (44.21) apertures for extended sources.

StackPetrosian : Contains the Petrosian magnitudes and radii for extended sources.

Observational Metadata in DR1

StackMeta : info on processing details for a given stack
StackToFrame : links stackimageID to frameID
StackToImage : links stackImageID to imageID
StackDetEffMeta : detection efficiency for a given stack

The Spider Plot
How to join most tables using objId or uniquePsps(XX)id. Rectangles represent table names, ovals represent column names, lines show how to join between tables using column names. The red and yellow colors are available in DR1.

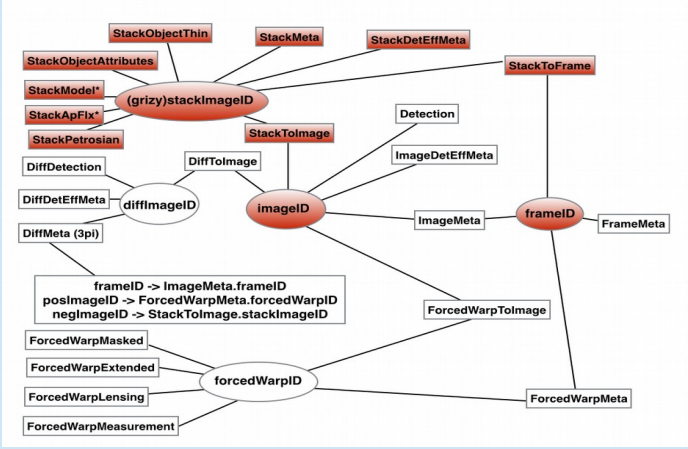


Objects and objID
Objects associate single epoch detections and stacked detections within a one arcsecond radius. Each object is assigned a unique objID. Nearby detections (ie, 2 detections from an image within a 1 arcsec radius), will be labeled as the same object. Stacks have overlaps, these will generate duplicate stack detections in the overlaps, use the bestDetection flag to get best stack detection.

Which ra /dec to use?
Use ra / dec in GaiaFrameCoordinate– this is the mean ra and dec for an object, and is calibrated against Gaia.

NULLS are -999
We use -999 instead of NULLS. This was a design choice to not use NULLS for performance reasons, with -999 chosen as it's not likely to be confused as an astrophysical value.

How to link detections to images
How to join fundamental data tables to observational metadata tables. Rectangles are table names, ovals are column names to use to join. Black links show how to connect tables. Those shaded red are available in DR1.



Types of Tables

Fundamental – attributes calculated from individual exposures or stacks

Oberservational Metadata – information about the individual exposures (eg filter or exposure time)

System Metadata – fixed information about the system and database, eg, flag information tables

Links to access the data

PS1 Archive Homepage: http://panstarrs.stsci.edu/

PS1 Object Catalog Search:
http://archive.stsci.edu/panstarrs/search.php

PS1 Image Cutout Server: http://ps1images.stsci.edu

PS1 Casjobs SQL Server:
http://mastweb.stsci.edu/ps1casjobs