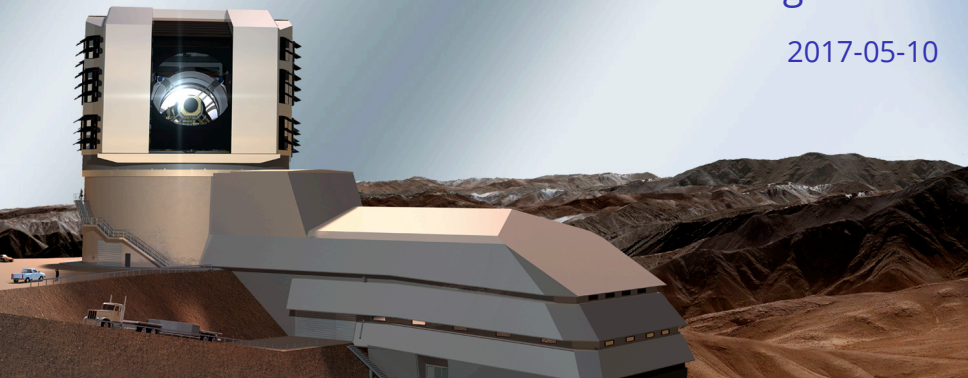




John Swinbank
Deputy DM PM & proto-SuperCamel

Data Release & Calibration Products Production Planning for F17

2017-05-10





Overview

Activities in F17

Cross-Team Dependencies

Bonus: Detailed Work Package Descriptions



- Work scheduled for 14 individuals providing 11 FTEs of effort.
- 12 “product development” work packages.
- Further effort devoted to QA and maintenance.
- No milestones exposed to PMCS scheduled for this cycle.



Overview

Activities in F17

Cross-Team Dependencies

Bonus: Detailed Work Package Descriptions



- Calibration Products Production: AuxTel pipeline, Collimated Beam Projector data reduction. [2 FTE]
 - Tested by pipeline processing of CTIO 0.9 m observations.
- Deblending. [1 FTE]
 - Deploy NMF deblender in the stack, enable science lead to make a call as to future development direction.
- Galaxy Model Fitting. [1+ FTE]
 - Deploy constrained bulge+disk fitting algorithm in the stack. Demonstrate performance comparable to CModel with fewer failures (by inspection).
- Middleware. [1+ FTE]
 - Detailed planning pending on results of SuperTask WG.
- Full focal plane PSF estimation. [1 FTE]
 - Model PSF due to telescope optics across focal plane, demonstrate we can mitigate variation of PSF size.



- "QA". [2.5 FTE]
 - Regular inspection of large-scale data processing, identify and correct problems, develop tooling to help.
- Analysis tools.
 - Global Calibration (FGCM). [0.5 FTE]
 - RedMaPPer cluster finder. [0.5 FTE]
- S/G Classification. [0.5 FTE]
 - Resurrect old code; restore our S/G classification on HSC PDR1 data to (at least) the levels with older HSC releases.
- Warped image comparison. [0.5 FTE]
 - Demonstrate that we can do better than "safe clipping" by visual inspection.



Overview

Activities in F17

Cross-Team Dependencies

Bonus: Detailed Work Package Descriptions



- Previously submitted request to NCSA for HSC data processing services during F17.
- Hope to work with SQuaRE to begin integration of QA plots developed by the DRP team into a SQuaSH-type harness.
- Need the ability to operate across the whole focal plane.
 - Current middleware is not up to the task.
 - Can work around this through F17, but will become a major bottleneck for us moving into S18.
 - Details of how to address this presumably come out of SuperTask WG.



- Note two milestones we are hoping the DAX group will reach during F17:
 - Interface afw tables to SQL database.
 - Database ingest system

We do not require those milestones for our F17 activities, but expect to need them early in S18.



Overview

Activities in F17

Cross-Team Dependencies

Bonus: Detailed Work Package Descriptions



– Auxiliary Telescope Data Processing Pipeline

- Currently have a prototype which provides image processing and feature extraction based on data taken at the CTIO 0.9 m.
- Goals for F17:
 - Convert to run within the LSST stack framework (i.e. making use of afw primitives and pipe_base TaskS).
 - Add wavelength calibration capability.
 - Demonstrate successful operation of both the above by pipelined processing of summer 2017 CTIO 0.9 m observations.

– Collimated Beam Projector

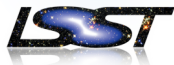
- Prototype version of flat construction algorithm running on summer 2017 CTIO 0.9 m data. Will require substantial effort developing and 'stackifying' TaskS for processing CBP data.



- Experiments in S17 have shown promising initial results from the prototype “Non-Negative Matrix Factorization” (NMF) deblender.
- Goal for F17 is to develop the prototype to the point where we can assess the extent to which it can ultimately meet LSST’s requirements. This will include:
 - Enhance (computational) performance to the level at which it can process large areas of sky (~ 10 s sq. deg.);
 - Integrate into standard DRP pipelines;
 - Switch focus from small scale ‘toy’ tests to ensure we can avoid catastrophic failure modes;
 - Evaluate performance vis-à-vis current (SDSS-derived) deblender.
- By the end of the cycle, DRP Science Lead & LSST Pipelines Scientist will have to make a call on whether we should push this approach further or explore another avenue.



- Required for QA & testing with precursor datasets; per LDM-151 we expect to use Gaia for global calibration during operations.
- Will provide a global calibration system based on Rykoff & Burke's "Forward Global Calibration Method" (FGCM) in the stack during F17.
- Will test by using FGCM in reprocessing HSC PDR1 data and demonstrate that it provides an improvement in photometric repeatability.



- Develop prototype galaxy bulge + disk model fitting code (this is an LSE-163 required deliverable).
- When working at scale (e.g. over HSC PDR1), should provide throughput comparable to the existing CModel (meas_modelfit) codebase while producing fewer obvious failures than CModel.



- (Note the scare quotes.)
- We expect that we will have to undertake some effort in support of the outcomes of the SuperTask WG and ongoing task framework / process execution middleware.
- The detailed form of this work will not be known until the outputs from the WG have been properly digested. Expect this may consist of participation in follow-up WGs, prototyping new functionality, providing input to other groups undertaking development work, porting existing code to the new system, etc.



- Build upon the S17 “donut” fitting work to model the PSF due to the telescope optics across the full focal plane.
- Demonstrate that we can substantially mitigate PSF size variationa across the focal plane using results derived from this method.
- NB we are hamstrung by the lack of suitable middleware when working across the full focal plane.

- Evaluate the results of large-scale processing of HSC PDR1.
 - Hoping for support from NCSA, per previous request.
- Identify performance regressions or anomalies; investigate the cause; where possible, resolve them directly; if not, work with pipeline developers to fix them.
- Identify areas where the overall pipeline performance is weaker than expected; suggest (& if possible, implement) algorithmic improvements to mitigate.
- Develop/prototype analysis tools to assist in the above tasks. These likely include upgrades to the existing diagnostic scripts, together with planning for and (if possible) developing “drill down” and large-area visualization techniques.
 - Hoping to work with SQuaRE to include some of this functionality in SQuaSH.



- RedMaPPer (Rykoff et al. 2014) is a red-sequence cluster finding algorithm.
- It can play an important role in QA: by assessing our success in finding clusters, we can evaluate the performance of our photometry.
- Goal for this cycle Rykoff et al. RedMaPPer algorithm within the stack framework.



- Prototype code was developed by Jose Garmilla — a PhD student on HSC — some time ago.
- Resurrect it and integrated it with the DM stack.
- Aim is to provide classification at least on a par with earlier HSC data releases when processing HSC PDR1.



- Investigate alternatives to the baseline (MultiFit) approach to galaxy shear measurement.
- Work with the Pipelines Scientist and DRP Science Lead to refine our future approach to shear measurement algorithms.
- Rather than undertaking substantial research work as part of DM construction, we hope to work with colleagues on DESC who will do the “heavy lifting” here.



- Identify and mask artefacts by spotting artefacts when building coadds.
- This involves completing work started during S17.
- Demonstrate that when run over the HSC RC dataset it does better than the “safe clipping” we currently use by visual inspection