



LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)

# Characterization Metric Report: Science Pipelines Version 11.0 (Summer 2015)

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DMTR-11

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## Abstract

Starting from Summer 2015, administrative (“cycle”) releases are accompanied by a measurements report characterising the current performance. Metrics included in these reports are expected to increase in number and sophistication at subsequent releases. This brief report describe measurements of interest that were carried out.



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## 1 Summary of Photometric Repeatability Measurements

*Submitted by Jim Bosch*

This dataset is a selection of *i*-band HyperSuprime-Cam engineering data taken in the SDSS Stripe 82 region. This dataset consists of 30 s exposures, so it is somewhat similar to projected LSST data in depth. Our current calibration approach has many limitations relative to what we ultimately plan to implement for LSST:

- There's currently no relative calibration being run at all.
- We have only limited correction for chromatic effects.
- There's currently no allowance for zeropoint variations smaller than the scale of a CCD.
- We also use a much simpler sample selection than that proposed by the [SRD](#).

Annotated code to compute the metrics can be found at <https://github.com/lstt/afw/blob/tickets/DM-3896/examples/repeatability.ipynb>.

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Metric Characterised	Metric Ref	Target	Measured Value	Measurement Method
Photometric repeatability (procCalRep)	DLP-307	$\leq 13$ mmag	10.6 mmag	DM-3338 (using <i>i</i> -band data)
Photometric repeatability (PA1gri)	DLP-315	$\leq 13$ mmag	10.6 mmag	DM-3338
Photometric repeatability (PA1uzy)	DLP-316	$\leq 13$ mmag	10.6 mmag	DM-3338 (using <i>i</i> -band data)

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## 2 Summary of Algorithmic Performance Measurements

*Submitted by John Swinbank*

The *i*-band HSC engineering data (described above) was used where possible and the same caveats apply. Consult the tickets in the Measurement Method column for more details.

<b>Metric Characterised</b>	<b>Metric Ref</b>	<b>Target</b>	<b>Measured Value</b>	<b>Measurement Method</b>
Residual PSF Ellipticity Correlations (TE1)	DLP-290	$\leq 5e-3$	6e-5	DM-3040
Residual PSF Ellipticity Correlations (TE2)	DLP-290	$\leq 5e-3$	2e-5	DM-3047
Relative Astrometry (AM1)	DLP-310	< 60 mas	12.49 mas	DM-3057
Relative Astrometry (AM2)	DLP-311	< 60 mas	12.19 mas	DM-3064

### 3 Summary of Computational Performance Measurements

*Submitted by John Swinbank and Simon Krughoff*

At this point of Construction, the computational performance measurements are a combination of precursor data processing and extrapolation from R&D assumptions.

DECam/HITS data was used for the OTT1 estimate and for the diffim and single-frame measurement of the Alert Production Computational Budget in combination with data from the 3rd Data Challenge [Document-26217].

For the Data Release Production of the computational budget, we used DECam/HITS data for estimating diffim performance, HSC-I for assembling and measuring coadds and for forced measurement, estimates from FDR for multifit, and data from the 3rd Data Challenge for SDQA. Calculations for the DRP computational budget used this iPython notebook

<b>Metric Characterised</b>	<b>Metric Ref</b>	<b>Target</b>	<b>Measured Value</b>	<b>Measurement Method</b>
OTT1	DLP-328	$\leq 240$ sec	200-250 sec	DM-3724
AP Computational Budget	DLP-329	$\leq 231$ TFLOPS	34-39 TFLOPS	DM-3267
DRP Computational Budget	DLP-314	$\leq 645$ TFLOPS	318 TFLOPS	DM-3083

## References

- [1] **[LPM-17]**, Ivezić, Ž., The LSST Science Collaboration, 2011, *LSST Science Requirements Document*, LPM-17, URL <https://ls.st/LPM-17>
- [2] **[Document-26217]**, Kantor, J., 2010, *Data Challenge 3b Performance Test 1.1*, Document-26217, URL <https://ls.st/Document-26217>