



LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)
**Characterization Metric Report:
Science Pipelines Version 14.0**

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DMTR-41

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Abstract

This brief report describe measurements of interest that were carried out for release v14.0 of the Science Pipeline.

The report for the previous version can be found in DMTR-15.



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Characterization Metric Report: Science Pipelines

Version 14.0

Measured using validation_data_hsc, which consists of 8 HSC engineering images: 2 *r*-band, 4 *i'*-band, and 2 *y*-band. Measurements were made on individual, separately-processed, single-frame images: Jointcal and/or meas_mosaic were not run. For comparison, we provide the SRD required "design" value of each metric as defined in the Science Requirements Document [LPM-17], and, where available, the target for this release as defined in the Data Management Development Milestone Roadmap [LDM-240]. All values were computed using the examples/runHscTest.sh script in the validate_drp package.

Note that care must be taken to compare apples to apples. These metrics have all been computed relative to the "design" specifications. If compared to metrics computed relative to a different threshold, the values of the KPMs will be different.

1 Photometric Performance

Submitted by Michael Wood-Vasey

procCalRep corresponds to requirement OSS-REQ-0275 (defined in LSE-30). All other photometric performance metrics follow LSS-REQ-0093 (LSE-29) and LPM-17 table 14.

Metric	Unit	SRD	Release 14	Value	Comments
		Requirement- Design	Target		
procCalRep	mmag	≤ 13	—	—	Need simulations
PA1 (<i>u</i> band)	mmag	≤ 12	—	—	No data
PA1 (<i>g</i> band)	mmag	≤ 8	—	—	No data
PA1 (<i>r</i> band)	mmag	≤ 5	8.0	14.03	
PA1 (<i>i</i> band)	mmag	≤ 5	8.0	11.85	
PA1 (<i>z</i> band)	mmag	≤ 12	—	—	No data
PA1 (<i>y</i> band)	mmag	≤ 12	—	—	No data
PF1 (<i>u</i> band)	%	≤ 20	—	—	No data

Metric	Unit	SRD		Value	Comments
		Requirement- Design	Release 14 Target		
PF1 (g band)	%	≤ 20	—	—	No data
PF1 (r band)	%	≤ 10	10.0	30.10	
PF1 (i band)	%	≤ 10	10.0	25.98	
PF1 (z band)	%	≤ 20	—	—	No data
PF1 (y band)	%	≤ 20	—	—	No data
PA2 (u band)	mmag	≤ 22.5	—	—	No data
PA2 (g band)	mmag	≤ 15	—	—	No data
PA2 (r band)	mmag	≤ 15	22.5	26.55	
PA2 (i band)	mmag	≤ 15	22.5	25.30	
PA2 (z band)	mmag	≤ 22.5	—	—	No data
PA2 (y band)	mmag	≤ 22.5	—	—	No data

2 Astrometric Performance

Submitted by Michael Wood-Vasey

The following metrics are defined following LSR-REQ-0094 [LSE-29] and LPM-17 table 18.

Metric	Unit	SRD Requirement	Release 14 Target	Value
AM1 (r-band)	mas	≤ 20	30.0	6.29
AM1 (i-band)	mas	≤ 20	30.0	10.77
AF1 (r-band)	%	≤ 10	10.0	1.78
AF1 (i-band)	%	≤ 10	10.0	2.06
AD1 (r-band)	mas	≤ 20	20.0	10.38
AD1 (i-band)	mas	≤ 20	20.0	10.71
AM2 (r-band)	mas	≤ 10	40.0	6.15
AM2 (i-band)	mas	≤ 10	40.0	10.96
AF2 (r-band)	%	≤ 10	10.0	1.84
AF2 (i-band)	%	≤ 10	10.0	2.40
AD2 (r-band)	mas	≤ 20	20.0	10.21
AD2 (i-band)	mas	≤ 20	20.0	11.16

3 Ellipticity Correlations

Submitted by Michael Wood-Vasey

The following metrics are defined following LSR-REQ-0097 [LSE-29] and LPM-17 table 27.

Metric	Unit	SRD Requirement	Release 14 Target	Value
TE1 (<i>r</i> -band)	—	$\leq 3 \times 10^{-5}$	—	—
TE1 (<i>i</i> -band)	—	$\leq 3 \times 10^{-5}$	—	—
TE2 (<i>r</i> -band)	—	$\leq 3 \times 10^{-7}$	—	—
TE2 (<i>i</i> -band)	—	$\leq 3 \times 10^{-7}$	—	—

4 Computational Performance

Computational performance metrics were not re-measured for this release. We expect no significant changes relative to the report on version 12 [DMTR-14].

References

- [1] **[LSE-29]**, Claver, C.F., The LSST Systems Engineering Integrated Project Team, 2016, *LSST System Requirements*, LSE-29, URL <https://ls.st/LSE-29>
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- [3] **[LPM-17]**, Ivezić, Ž., The LSST Science Collaboration, 2011, *LSST Science Requirements Document*, LPM-17, URL <https://ls.st/LPM-17>
- [4] **[LDM-240]**, Kantor, J., Jurić, M., Lim, K.T., 2016, *Data Management Releases*, LDM-240, URL <https://ls.st/LDM-240>
- [5] **[DMTR-14]**, Swinbank, J., Bosch, J., Krughoff, S., 2016, *Characterization Metric Report: Science Pipelines Version 12.0*, DMTR-14, URL <https://ls.st/DMTR-14>



- [6] **[DMTR-15]**, Wood-Vasey, M., Swinbank, J., 2017, *Characterization Metric Report: Science Pipelines Version 13.0*, DMTR-15, URL <https://ls.st/DMTR-15>