LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)

Characterization Metric Report: Science Pipelines Version 13.0

Michael Wood-Vasey, and John Swinbank

DMTR-15

Latest Revision: 2017-03-22

Abstract

This brief report describe measurements of interest that were carried out for release v13.0 of the Science Pipeline.
The report for the previous version can be found in DMTR-14.

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Measured using validation_data_hsc, which consists of 8 HSC engineering images: 4 *r*-band, 2 *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 "minimum" 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.

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 Requirement	Release 13 Target	Value	Comments
procCalRep	mmag	≤ 13	10.0	—	Need simulations
PA1 (*g* band)	mmag	≤ 8	12.0	—	No data
PA1 (*r* band)	mmag	≤ 8	12.0	14.3	
PA1 (*i* band)	mmag	≤ 8	12.0	12.0	
PF1 (*g* band)	%	≤ 20	—	—	No data
PF1 (*r* band)	%	≤ 20	—	30.6	
PF1 (*i* band)	%	≤ 20	—	18.2	
PA2 (*g* band)	mmag	≤ 15	—	—	No data
PA2 (*r* band)	mmag	≤ 15	—	19.6	
PA2 (*i* band)	mmag	≤ 15	—	18.2	
PA1 (*u* band)	mmag	≤ 12	13.0	—	No data
PA1 (*z* band)	mmag	≤ 12	13.0	—	No data
PA1 (*y* band)	mmag	≤ 12	13.0	24.3	

Metric	Unit	SRD Requirement	Release 13 Target	Value	Comments
PF1 (*u* band)	%	≤ 20	—	—	No data
PF1 (*z* band)	%	≤ 20	—	—	No data
PF1 (*y* band)	%	≤ 20	—	36.9	
PA2 (*u* band)	mmag	≤ 22.5	—	—	No data
PA2 (*z* band)	mmag	≤ 22.5	—	—	No data
PA2 (*y* band)	mmag	≤ 22.5	—	33.6	

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 13 Target	Value
AM1 (*r*-band)	mas	≤ 20	50.0	6.5
AM1 (*i*-band)	mas	≤ 20	50.0	10.5
AF1 (*r*-band)	%	≤ 20	—	0.27
AF1 (*i*-band)	%	≤ 20	—	0.69
AD1 (*r*-band)	mas	≤ 40	—	6.5
AD1 (*i*-band)	mas	≤ 40	—	7.5
AM2 (*r*-band)	mas	≤ 20	50.0	6.5
AM2 (*i*-band)	mas	≤ 20	50.0	10.5
AF2 (*r*-band)	%	≤ 20	—	0.47
AF2 (*i*-band)	%	≤ 20	—	0.67
AD2 (*r*-band)	mas	≤ 40	—	6.6
AD2 (*i*-band)	mas	≤ 40	—	7.3

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 13 Target	Value
TE1 (*r*-band)	—	$\leq 3 \times 10^{-5}$	1×10^{-3}	7.9×10^{-7}
TE1 (*i*-band)	—	$\leq 3 \times 10^{-5}$	1×10^{-3}	1.9×10^{-6}
TE2 (*r*-band)	—	$\leq 3 \times 10^{-7}$	1×10^{-3}	1.8×10^{-6}
TE2 (*i*-band)	—	$\leq 3 \times 10^{-7}$	1×10^{-3}	3.0×10^{-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

[2] **[LSE-30]**, Claver, C.F., The LSST Systems Engineering Integrated Project Team, 2016, *LSST System Requirements*, LSE-30, URL https://ls.st/LSE-30

[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., Juric, 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