Large Synoptic Survey Telescope (LSST)

LSST Crowded Fields photometry: appendix

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LSST-2017

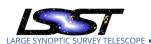**Latest Revision: 2018-03-20**

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1   Table 1 : LSST processing of DECAPS visits

Visit	N_{raw}	(N_f)	$-N_r$	$= N_c$	N_c/deg^2	N_{MAF}/deg^2	ρ_{MAF}	N_{loSN}	$N_{parents}$	$N_{blended}$	$N_{deblended}$
568172	29809	9148	12434	17375	6241	72072	21.3	12986	153919	77723	289200
527319	120862	13744	39638	81224	29175	79632	19.9	34282	112848	28212	86196
530012	160406	15210	61337	99069	35585	203040	10.6	51669	20425	2143	7241
525846	167582	15247	63295	104287	37459	203040	10.6	51949	96932	31724	113865
525900	171337	15037	58219	113118	40631	79632	19.9	46796	70011	9731	41120
529989	182933	15910	61808	121125	43508	79632	19.9	49120	114760	54746	198511
529974	228849	16842	67339	161510	58014	76572	20.5	44712	104406	26981	103920
525814	235307	16811	72214	163093	58582	76572	20.5	50998	98063	28128	102658
527096	227256	16100	59686	167570	60191	55908	25.0	36748	85483	16136	69718
644125	242521	16387	72363	170158	60101	72072	21.3	40731	89237	17861	75835
611980	273032	18816	76043	196989	70758	116856	15.6	41383	78662	42516	151854
527247	264383	15283	66539	197844	71065	116676	15.6	38391	138758	59728	200438
567283	280305	16981	68379	211926	76123	612648	4.0	30908	230049	64593	195501
527555	313294	1173	81585	231709	83229	783324	3.0	39458	127709	49579	170745
612757	317270	4014	84877	232393	82084	292788	7.9	42468	128543	50645	176673
527246	319929	18136	86268	233661	83930	114588	15.7	47233	128325	58651	206903
640891	355861	24520	107462	248399	87737	121536	15.1	60163	127665	45693	146571
611970	377917	26716	120640	257277	92413	178992	11.5	80884	133384	53522	184423
645251	348033	18786	89669	258364	91257	128016	14.7	41210	129397	34130	100856
527296	361951	21167	101452	260499	93571	588096	4.2	63149	144777	50631	182509
611969	387056	25752	118639	268417	96415	292788	7.9	74291	162439	70305	262885
526413	368017	22267	98745	269272	96722	78480	20.1	52626	151602	82678	295547
525838	371329	19984	100644	270685	97229	116676	15.6	54839	71782	16117	79683
525837	393879	22350	107414	286465	102898	114588	15.7	56743	74171	14580	71655
611529	398924	22625	105677	293247	105334	116856	15.6	54741	113152	86539	376291
527552	395446	1716	99214	296232	106406	591336	4.2	44093	95415	72727	318061

525920	415231	22439	111423	303808	109127	588096	4.2	59375	133660	55280	198116
527300	436689	24839	120330	316359	113635	594324	4.2	70470	170980	82687	317507
644035	435830	2170	106363	329467	116371	205308	10.5	46535	93985	48307	174978
525904	479294	26679	135534	343760	123478	594324	4.2	77080	112960	67743	255127
527453	495629	28732	139172	356457	128039	242316	9.3	80487	208259	137811	565651
609754	490143	26233	121738	368405	132330	116856	15.6	62319	199832	151565	653749
530032	486203	23112	115217	370986	133257	198432	10.7	51002	176645	113085	441312
526152	520842	28739	143336	377506	135599	55404	25.1	77724	142876	100061	400366
567795	508405	26663	129592	378813	136069	721728	3.4	63447	62120	42489	175696
641497	529827	28546	137626	392201	138530	205308	10.5	59868	184493	139641	592661
640995	571174	2973	155705	415469	146748	242316	9.3	85262	171899	67666	239729
527064	558264	26197	132299	425965	153006	591336	4.2	56098	184352	59068	193269
566793	560376	1088	134186	426190	158458	1292976	1.7	59842	132416	60622	222193
644205	571378	4663	142463	428915	151498	721728	3.4	65955	165636	45858	150457
525879	575982	28502	139102	436880	156927	198432	10.7	63181	119515	85247	353502
644144	597726	30439	152632	445094	168442	1292976	1.7	77506	115951	62116	217379
644082	614401	29828	152226	462175	163246	783324	3.0	65428	166750	94046	356549
645255	617345	2342	148062	469283	165756	612648	4.0	62971	187074	140722	589579
644011	643303	5962	151827	491476	173595	355896	6.7	58686	129561	76106	302738
641500	731042	2925	178763	552279	195071	305280	7.7	78451	171114	92824	350463
526028	911721	38810	234490	677231	243260	305280	7.7	113255	166673	85331	319374
644074	916795	41973	219530	697265	246282	481788	5.1	89471	102816	48459	162019
644070	917375	3993	214363	703012	248312	481788	5.1	87108	122274	89793	385659
641548	1005146	44347	238787	766359	270687	355896	6.7	96812	117637	85174	357565

Table 1: A summary of all LSST-processed DECAPS visits. The column 'visit' corresponds to the DECAPS visit number. The following four columns ('N raw', 'N f', '-N r', '=N c') contain the source counts per visit area (≈ 2.74 deg^2). 'N raw' is the input number of sources per visit , summing over all CCD source catalogs. '(N f)' is the number of sources removed due to bad flags. '-N r' is the total number of removed sources (due to flags, low S/N, or sources that in the LSST deblending process are neither isolated parents, nor deblended children). '=N c' is the final number of clean sources per visit ('N raw' - 'N r'= 'N c'). 'N c/deg^2' is '=N c' converted to count per deg^2. N MAF/deg^2 is the predicted number of sources per deg^2 at that location based on Galfast simulation. ρ_{MAF} is the MAF density; eg. 21.3 is the top 21.3% stellar density of the simulated sky.

2   Table 2 : DECAPS single-epoch source catalogs

Visit	N_{raw}	(N_f)	$-N_r$	$= N_c$	N_c/deg^2	N_{MAF}/deg^2	ρ_{MAF}
568172	16824	138	150	16674	5989	72072	21.3
527319	92326	2819	3039	89287	32071	79632	19.9
530012	121313	3293	3982	117331	42145	203040	10.6
525846	125245	3135	3457	121788	43746	203040	10.6
525900	127722	2557	2786	124936	44876	79632	19.9
529989	140043	2527	2803	137240	49296	79632	19.9
527096	194837	2126	2290	192547	69162	55908	25.0
525814	200562	4481	4938	195624	70268	76572	20.5
529974	224231	3992	4413	219818	78958	76572	20.5
644125	228088	5570	6182	221906	78380	72072	21.3
527247	237656	4858	5144	232512	83518	116676	15.6
527246	301083	5469	5907	295176	106027	114588	15.7
611980	315722	6779	7397	308325	110750	116856	15.6
527296	330295	7176	7726	322569	115866	588096	4.2
611970	340528	9668	10513	330015	118541	178992	11.5
612757	342629	8541	9473	333156	117674	292788	7.9
645251	343358	5546	6253	337105	119069	128016	14.7
640891	361837	9423	10389	351448	124135	121536	15.1
525838	360793	6057	6515	354278	127256	116676	15.6
611969	376588	10280	11243	365345	131231	292788	7.9
527300	409385	8974	9654	399731	143583	594324	4.2
611529	428299	9981	11167	417132	149833	116856	15.6
527555	421706	3848	4285	417421	149937	783324	3.0
525837	425261	6791	7437	417824	150082	114588	15.7
526413	428035	8417	9137	418898	150467	78480	20.1
525920	449868	6675	7430	442438	158923	588096	4.2
609754	474355	10034	11677	462678	166193	116856	15.6
525904	490306	8413	9118	481188	172842	594324	4.2
567283	575760	5549	6426	569334	204504	612648	4.0
644035	583432	9457	10948	572484	202208	205308	10.5
526152	599164	12579	14023	585141	210182	55404	25.1
641497	611424	10156	11324	600100	211962	205308	10.5
530032	638179	9776	10964	627215	225295	198432	10.7

527453	682113	14654	16569	665544	239062	242316	9.3
527552	714305	6031	6893	707412	254101	591336	4.2
525879	772457	11625	13117	759340	272754	198432	10.7
640995	783011	17946	20850	762161	269204	242316	9.3
567795	791019	9439	11056	779963	280162	721728	3.4
644205	800175	13601	15899	784276	277016	721728	3.4
645255	852539	9620	11135	841404	297194	612648	4.0
641500	935661	14131	16133	919528	324788	305280	7.7
644082	1007998	12826	15633	992365	350515	783324	3.0
526028	1035808	17929	20772	1015036	364600	305280	7.7
527064	1085375	10200	12399	1072976	385412	591336	4.2
644011	1181972	11059	13806	1168166	412611	355896	6.7
566793	1350724	12414	22431	1328293	493863	1292976	1.7
641548	1404895	14336	17562	1387333	490023	355896	6.7
644144	1444897	16255	28641	1416256	535971	1292976	1.7
644074	1692430	16941	23670	1668760	589427	481788	5.1
644070	1698554	16404	22559	1675995	591982	481788	5.1

Table 2: A summary of all single-epoch DECAPS source catalogs, with columns as in Table 1.

3 Table 3: Pairs of DECAPS visits at the same location.

4 Tables 4-6: Astrometry tests

TABLE 3: Pairs of visits at two different epochs, arranged by the mean DECAPS source density $\langle N_{1,2} \rangle$ (last column). The RA and DEC are in degrees, and mean DECAPS source density in sources per sq. deg.

visit1	ra1	dec1	visit2	ra2	dec2	$\langle N_{1,2} \rangle$
525846	133.55	-44.27	530012	133.55	-44.27	42945
525900	140.62	-48.15	529989	140.62	-48.15	47086
525814	126.43	-43.07	529974	126.42	-43.07	74613
525838	132.59	-50.3	527247	132.59	-50.31	105387
611969	115.53	-24.08	612757	115.79	-24.11	124452
525837	131.56	-48.6	527246	131.56	-48.6	128054
525920	143.23	-51.45	527296	143.23	-51.45	137394
525904	140.55	-51.25	527300	140.55	-51.25	158212
641497	166.47	-53.71	644035	166.73	-53.8	207085
525879	137.64	-54.08	530032	137.64	-54.09	249024
644082	190.31	-61.09	527555	190.32	-61.09	250226
567283	247.04	-47.27	645255	247.03	-47.27	250849
527453	173.92	-62.16	640995	173.91	-62.16	254133
567795	252.15	-47.43	644205	251.81	-47.41	278589
527064	189.89	-59.43	527552	189.88	-59.43	319756
526028	168.47	-56.53	641500	168.47	-56.52	344694
641548	176.18	-66.43	644011	176.46	-66.52	451317
644144	243.08	-53.37	566793	243.08	-53.37	514917
644074	188.49	-67.28	644070	188.18	-67.23	590704

TABLE 4: The difference in RA,DEC for various visits, between LSST processing of fields at the same location, but observed at different times (see Table 3 for summary). The median and spread of astrometric offset are in miliarcseconds. The final column shows the LSST source count averaged between the two visits in counts per square degree.

visit1	visit2	med$(\Delta\alpha)$	med$(\Delta\delta)$	$\sigma_G(\Delta\alpha)$	$\sigma_G(\Delta\delta)$	$\langle N \rangle$
525846	530012	1.83	0.18	9.43	8.85	39733
525900	529989	-3.12	0.36	10.87	11.58	44577
525814	529974	-0.29	1.15	10.65	10.46	66455
525838	527247	2.52	-2.23	9.96	12.21	94766
525837	527246	1.58	-1.24	9.07	11.51	110734
525920	527296	0.88	-3.2	10.36	9.85	119371
525904	527300	0.43	-1.55	8.29	10.0	138384
641497	644035	2.26	-1.42	19.8	22.68	167267
567283	645255	-5.58	1.05	33.77	19.75	185894
644082	527555	-4.16	-5.05	29.92	26.1	186731
527453	640995	-0.33	1.7	12.95	12.25	195763
525879	530032	0.8	-0.46	10.56	13.41	197058
527064	527552	-0.13	-2.19	16.93	15.74	224731
526028	641500	-1.2	0.42	11.52	11.12	281929
641548	644011	1.2	-2.43	26.08	30.7	336729
644144	566793	1.05	-0.25	27.86	19.69	339183
644074	644070	-2.56	0.3	26.14	27.69	419000

TABLE 5: The difference in RA,DEC for various visits, between DECAPS processing of fields at the same location, but observed at different times (see Table 3 for summary). All measured quantities are in miliarcseconds. See Table 4 for the equivalent visits processed by LSST.

visit1	visit2	med$(\Delta\alpha)$	med$(\Delta\delta)$	$\sigma_G(\Delta\alpha)$	$\sigma_G(\Delta\delta)$	$\langle N \rangle$
525846	530012	5.92	-1.18	14.69	14.49	39733
525900	529989	-5.34	-4.18	21.18	20.76	44577
525814	529974	6.55	0.19	20.58	17.76	66455
525838	527247	-6.5	-0.72	17.62	16.45	94766
525837	527246	-3.55	-2.86	18.5	17.57	110734
525920	527296	-4.97	-3.26	19.72	16.88	119371
525904	527300	-5.05	-4.13	14.4	16.26	138384
641497	644035	8.91	12.57	34.18	31.02	167267
567283	645255	-53.12	-49.23	39.71	24.55	185894
644082	527555	139.33	-15.63	40.71	36.27	186731
527453	640995	-126.51	28.81	24.75	18.27	195763
525879	530032	-0.43	-5.17	22.88	23.66	197058
527064	527552	5.11	-3.74	20.95	25.13	224731
526028	641500	-134.26	28.5	26.81	19.56	281929
641548	644011	-1.69	-5.63	32.3	36.95	336729
644144	566793	94.95	68.82	32.42	23.74	339183
644074	644070	-4.92	1.61	25.15	28.14	419000

TABLE 6: The difference in RA,DEC for the same visit analyzed by LSST and DECAPS. Each row corresponds to a separate visit, which correspond to different stellar density. All measured quantities are in miliarcseconds.

visit	median($\Delta\alpha$)	median($\Delta\delta$)	$\sigma_G(\Delta\alpha)$	$\sigma_G(\Delta\delta)$
525904	155.49	-36.46	70.06	38.55
525920	130.45	-27.53	72.83	43.88
525846	105.62	-51.71	42.49	30.04
525879	131.93	-42.62	138.58	75.68
525837	96.01	-47.93	65.17	36.6
525838	124.9	-68.92	59.56	33.99
525814	39.99	-29.87	47.26	29.72
525900	127.61	-32.38	54.81	33.67
527300	146.26	-38.73	56.49	25.48
527296	120.47	-26.98	41.65	27.14
530012	111.21	-51.38	35.01	28.34
530032	126.69	-47.85	115.02	65.23
527246	88.38	-49.06	45.87	30.6
527247	110.44	-66.18	43.15	29.71
529974	49.13	-30.91	48.55	28.95
529989	126.51	-33.77	52.12	28.33