

APPENDIX A: TABLES OF ANOMALIES

Listed below are the anomalous objects that were selected from the study in [Debosscher et al. \(2007\)](#), as well as sample sets of anomalies selected with our method.

Table A1. *Bona-fide* anomalies from [Debosscher et al. \(2007\)](#)

KIC ID	Class 1	Class 2	Class 3	Score
12601939	CLCEP	MISC	ECL	0.008 786
12406908	CLCEP	ELL	ROT	0.008 274
3561372	CLCEP	MISC	SR	0.012 829
8481420	CLCEP	ROT	MISC	0.006 202
5095098	CLCEP	MISC	ROT	0.005 816
8259835	CLCEP	ELL	ROT	0.005 276
1573138	CLCEP	ELL	ROT	0.007 246
5217688	CLCEP	ROT	MISC	0.008 604
7957881	CLCEP	ROT	ELL	0.006 563
4357272	CLCEP	MISC	GDOR	0.005 871
6423857	CLCEP	ELL	ROT	0.006 206
9413885	ELL	CLCEP	ROT	0.006 567
7800087	ELL	BCEP	ECL	0.009 391
3240305	ELL	BCEP	RRC	0.008 397
11246163	ELL	BCEP	RVTAU	0.009 316
5460828	ELL	MISC	ROT	0.005 374
9117123	ELL	BCEP	CLCEP	0.006 927
8396230	ELL	MISC	GDOR	0.005 703
10815379	ELL	ECL	RRD	0.005 149
4175618	ELL	BCEP	RRC	0.005 983
5301955	ELL	MISC	BCEP	0.015 353
3859213	ELL	CLCEP	MISC	0.005 018
11091336	ELL	ROT	ECL	0.005 229
2159783	ELL	BCEP	RRC	0.016 287
9606106	ELL	ROT	ECL	0.008 558
11666309	ELL	MISC	GDOR	0.006 769
2285420	ELL	ROT	ECL	0.005 544
9450669	ELL	ROT	CLCEP	0.008 379
6035535	ELL	BCEP	ECL	0.007 001
7433177	ELL	ECL	ROT	0.005 067
6719893	ELL	CLCEP	BCEP	0.008 012
3848042	ELL	BCEP	ECL	0.005 773
3222369	ELL	ROT	CLCEP	0.005 142
5474812	ELL	ROT	ECL	0.007 564
7036755	ELL	ECL	RRD	0.007 399
1570924	ELL	ROT	ECL	0.012 890
5181824	ELL	ECL	RRD	0.006 514
9306085	ELL	BCEP	MISC	0.007 915
10646009	ELL	CLCEP	ROT	0.010 896
5956051	ELL	BCEP	RRC	0.007 217
3528198	ELL	ROT	MISC	0.005 085
10275197	ELL	ECL	BCEP	0.005 110
10618253	ELL	BCEP	RRC	0.012 478
9761113	ELL	ROT	ECL	0.005 797
5446821	ELL	MISC	ECL	0.005 349
11717798	ELL	BCEP	RRC	0.006 314
11862915	ELL	CLCEP	ECL	0.006 677
8682921	ELL	BCEP	ECL	0.006 592
5646176	ELL	MISC	ROT	0.008 414
4059007	ELL	ROT	CLCEP	0.010 037
8012943	ELL	ROT	BCEP	0.006 293
10515986	ELL	ROT	ECL	0.006 091
11087095	ELL	ECL	RRD	0.005 589
12365015	ELL	ECL	RRD	0.007 136
6675318	ELL	BCEP	CLCEP	0.006 399

Table A1 – *continued*

KIC ID	Class 1	Class 2	Class 3	Score
10320278	ELL	MISC	ECL	0.007444
9812607	ELL	ROT	ECL	0.006179
6129451	ELL	ROT	CLCEP	0.005499
4819564	ELL	BCEP	RRC	0.006216
10711646	GDOR	MISC	ECL	0.011303
6779613	GDOR	ROT	MISC	0.005053
4932691	GDOR	MISC	ROT	0.007420
6953103	GDOR	SPB	MISC	0.008369
3759394	GDOR	MISC	ROT	0.005154
10292465	GDOR	MISC	ECL	0.007451
8097825	GDOR	MISC	ECL	0.010753
8590527	GDOR	MISC	ECL	0.008554
9210828	GDOR	MISC	ECL	0.006667
7671594	GDOR	MISC	ECL	0.012776
3847822	GDOR	MISC	SPB	0.006331
4752731	GDOR	BCEP	RRC	0.007465
7798259	GDOR	MISC	ECL	0.011330
6025466	GDOR	MISC	SPB	0.006922
4077442	GDOR	MISC	ECL	0.008474
7286410	GDOR	MISC	DMCEP	0.005183
5166136	GDOR	BCEP	MISC	0.005202
11922782	GDOR	MISC	ECL	0.008168
6836589	GDOR	MISC	DSCUT	0.007383
7672492	GDOR	SPB	ROT	0.005770
6863840	GDOR	MISC	ECL	0.010896
4358206	GDOR	MISC	ECL	0.009987
11455795	GDOR	MISC	ECL	0.009661
9945280	GDOR	MISC	ROT	0.006897
12258225	GDOR	SPB	ROT	0.005385
10490282	GDOR	MISC	SPB	0.005621
12350399	GDOR	MISC	SPB	0.005130
5510843	GDOR	MISC	ECL	0.008098
3455094	GDOR	SPB	MISC	0.011192
7021689	GDOR	BCEP	ELL	0.006029
11134079	GDOR	MISC	ECL	0.010049
6870327	GDOR	MISC	ECL	0.005929
5822633	GDOR	MISC	SPB	0.007497
8288719	GDOR	MISC	ECL	0.007163
7021124	RRAB	RVTAU	ECL	0.037103
6619830	RRAB	CLCEP	RVTAU	0.014750
6936115	RRAB	RVTAU	ECL	0.030800
5559631	RRAB	RVTAU	CLCEP	0.023171
4473355	RRC	BCEP	ROT	0.005773
5520878	RRC	BCEP	ELL	0.014310
8265951	RRC	BCEP	ELL	0.006168
4064484	RRC	BCEP	ELL	0.015817
7698650	RRC	BCEP	ELL	0.015414
10229723	RRC	BCEP	ELL	0.005765
9453114	RRC	BCEP	ELL	0.015157
9350889	RRC	BCEP	ELL	0.006121
3104113	RRC	BCEP	ELL	0.009540
1572802	RRC	ROT	ECL	0.007025
2985366	RRC	BCEP	ECL	0.008409
10063343	RRC	BCEP	ECL	0.006657
11097678	RRC	ELL	BCEP	0.006830
12055014	RRC	BCEP	ELL	0.009629
5950759	RVTAU	MISC	BCEP	0.034695
6044064	RVTAU	MISC	GDOR	0.020491
9848000	SPB	MISC	GDOR	0.005501
8247608	SPB	GDOR	ROT	0.006217
4248763	SPB	GDOR	ROT	0.008199
3443221	SPB	GDOR	ECL	0.009317

Table A1 – continued

KIC ID	Class 1	Class 2	Class 3	Score
3654076	SPB	MISC	ROT	0.011 238
3001695	SPB	GDOR	MISC	0.005 913
6425437	SPB	GDOR	ECL	0.006 307
7339348	SPB	ROT	ELL	0.006 906
8719419	SPB	GDOR	MISC	0.005 727
3326917	SPB	ROT	MISC	0.006 382
4932663	SPB	GDOR	ECL	0.005 664
8041249	SPB	MISC	ROT	0.006 619
3748748	SPB	GDOR	ECL	0.005 785
6681516	SPB	GDOR	MISC	0.005 094
2141387	SPB	GDOR	MISC	0.007 015
7039421	SPB	GDOR	MISC	0.006 928
5288646	SPB	GDOR	MISC	0.005 199
6449081	SPB	GDOR	ECL	0.005 312
8332664	SPB	GDOR	MISC	0.005 079
6939772	SPB	GDOR	MISC	0.005 217
7581697	SPB	MISC	GDOR	0.006 368
8127495	SPB	GDOR	ROT	0.005 188
9007322	SPB	GDOR	MISC	0.005 837
4175707	SPB	DSCUT	GDOR	0.008 219
7449844	SPB	ACT	ECL	0.006 529
7448050	SPB	GDOR	MISC	0.005 404
8113425	SPB	MISC	ROT	0.008 591
5450166	SPB	GDOR	MISC	0.008 491
3331147	SPB	ECL	RRD	0.005 493
8355134	SPB	GDOR	MISC	0.018 311
8264617	SPB	GDOR	MISC	0.005 602
8180361	SPB	GDOR	ECL	0.005 658
5021374	SPB	GDOR	MISC	0.005 310
10669516	SPB	GDOR	MISC	0.005 521
5000454	SPB	GDOR	MISC	0.005 090
9267997	SPB	MISC	ROT	0.008 132
6367159	SPB	MISC	ROT	0.008 734
8712174	SPB	GDOR	ECL	0.007 186

Note: The KIC number corresponds to the Kepler ID. Class 1, Class 2, and Class 3 correspond to the most probable classes according to [Debosscher et al. \(2007\)](#). CLCEP: Classical Cepheid; ECL: Eclipsing Binary; ROT: Rotating variable; SR: Semi-regular star; ELL: Ellipsoidal binary; BCEP: β -Cephei star; RRAB: RR-Lyrae star RRab; RRC: RR-Lyrae star RRC; RRD: RR-Lyrae star RRd; RVTAU: RV-Tauri star; SPB: Slowly-pulsating B stars; GDOR: γ -Doradus type variables; DMCEP: Double-mode Cepheid; DSCUT: δ -Scuti star; MISC: Miscellaneous. The last column is the anomaly score assigned in [Giles & Walkowicz \(2019\)](#).

Table A2. Sample of unclassified anomalies similar to δ -Scuti stars

KIC	<i>G</i> mag	$G_{BP}-G_{RP}$	t-SNE f1	t-SNE f2	UMAP f1	UMAP f2	URF score
100003119			-6.247	-18.123	-1.654	11.323	1.000
100003307			-6.742	-17.711	-1.439	11.610	0.998
100003116			-6.203	-18.156	-1.710	11.328	0.998
8093353			-5.770	-18.456	-1.846	11.076	0.998
100003338			-5.307	-18.781	-1.884	10.773	0.996
10678547	0.776	0.341	-3.247	-19.316	-1.991	9.824	0.996
10612592			-6.116	-18.222	-1.652	11.294	0.995
2695999	4.145	0.994	-0.532	-18.305	-1.642	8.727	0.995
5450881	0.860	0.046	-0.669	-18.538	-1.707	8.741	0.995
10203328			-6.723	-17.734	-1.494	11.628	0.995
12603159	1.807	0.257	-4.512	-19.094	-2.071	10.403	0.994
100003285			-5.818	-18.417	-1.802	11.044	0.994
8640132	2.492	0.548	-5.998	-18.306	-1.829	11.231	0.994
11657371	2.914	0.522	-3.388	-19.384	-2.046	9.852	0.994
7467547	3.773	0.827	-2.966	-19.303	-1.966	9.713	0.994
9410674	6.803	1.383	-6.272	-18.086	-1.542	11.323	0.993
10975463			-6.054	-18.263	-1.697	11.230	0.993
100003367			-3.332	-19.340	-2.061	9.847	0.993
9897683			-5.782	-18.436	-1.767	10.998	0.993
6311520	2.722	0.807	-1.522	-19.019	-1.900	9.110	0.993

Note: The KIC number corresponds to the Kepler ID. The *G* magnitude and colors have been obtained from the *Gaia* archive.

Table A3. Sample of unclassified anomalies similar to oscillating binary stars.

KIC	<i>G</i> mag	$G_{BP}-G_{RP}$	t-SNE f1	t-SNE f2	UMAP f1	UMAP f2	URF score
9594654			-7.582	10.908	5.213	17.082	0.999
9776888			-7.629	10.846	5.149	17.092	0.999
100003189			-7.667	10.798	5.091	17.053	0.997
9594468			-7.649	10.820	5.104	17.094	0.997
9956596			-7.705	10.748	4.984	16.999	0.993
100004178			-7.581	10.905	5.239	17.096	0.992
9471705			-7.698	10.757	5.028	16.999	0.992
4049858			-7.611	10.868	5.196	17.095	0.989
100004179			-7.636	10.838	5.125	17.077	0.985
9836795	11.232	2.449	-7.719	10.730	5.061	17.073	0.985
8719524	8.991	1.969	-7.606	10.876	5.223	17.093	0.985
7025613	13.028	3.764	-7.593	10.893	5.198	17.080	0.984
9716337			-7.758	10.674	4.907	16.936	0.983
9541127	2.840	0.594	-7.641	10.888	5.024	17.040	0.980
9722737	2.187	0.707	-7.717	10.721	4.960	17.000	0.972
10284901	2.987	0.459	-7.684	10.779	5.039	17.039	0.966
8087649	2.528	0.555	-7.711	10.722	5.019	16.985	0.961
10350225	8.473		-7.694	10.737	4.968	16.916	0.959
8963394	3.674	0.827	-7.673	10.826	4.928	16.953	0.958
10454962	6.719	1.467	-7.740	10.872	4.968	17.029	0.957

Note: The KIC number corresponds to the Kepler ID. The *G* magnitude and colors have been obtained from the *Gaia* archive.

Table A4. Sample of unclassified anomalies similar to eruptive RGB stars

KIC	G mag	$G_{BP}-G_{rp}$	t-SNE f1	t-SNE f2	UMAP f1	UMAP f2	URF score
5014753	5.441		-4.154	-16.684	-0.903	10.464	0.986
8195444	3.473	1.687	-4.507	-14.705	-0.102	11.566	0.980
8649496	0.358	2.009	-1.839	-17.647	-0.982	9.116	0.975
8450468	3.916	0.783	-2.562	-17.238	-1.230	9.658	0.975
7200934	-0.375	1.600	-2.407	-17.495	-0.930	9.427	0.973
10416390			-4.119	-15.529	-0.191	10.818	0.972
8836489	-0.861	1.801	-3.178	-17.401	-0.974	9.807	0.970
5219663	-1.139	1.770	-2.830	-17.494	-1.010	9.605	0.968
1865744	6.551		-3.613	-17.096	-0.925	10.136	0.968
7984243	0.079	1.796	-3.227	-17.062	-0.769	9.880	0.966
8145759	-0.065	1.474	-1.822	-17.744	-1.054	9.124	0.965
4587051	-0.069	1.703	-1.940	-17.529	-0.851	9.155	0.964
10991892	-0.085	1.530	-2.453	-17.553	-0.965	9.401	0.963
6849861	-0.866	1.669	-4.125	-16.036	-0.507	10.685	0.963
9301126	0.484	1.965	-3.414	-17.166	-0.948	10.009	0.962
6025983	-0.401	1.588	-3.542	-16.890	-0.757	10.127	0.961
10447681	0.008	1.569	-3.086	-17.456	-1.024	9.715	0.961
7336419	-0.140	1.504	-3.196	-16.873	-0.430	9.743	0.961
7779434	0.594	1.978	-3.456	-17.093	-0.836	10.057	0.960
6020718	0.078	1.487	-2.775	-17.514	-0.952	9.567	0.960

Note: The KIC number corresponds to the Kepler ID. The G magnitude and colors have been obtained from the *Gaia* archive.

Table A5. Sample of unclassified anomalies similar to Long Period Variable stars

KIC	G mag	$G_{BP}-G_{rp}$	t-SNE f1	t-SNE f2	UMAP f1	UMAP f2	URF score
11082175	4.482		-9.066	0.093	4.844	14.527	0.912
11554998	1.394	1.415	-9.076	0.162	4.859	14.580	0.908
10483262	-0.907	3.141	-8.948	-0.193	4.790	14.154	0.905
4677837	0.025	1.568	-9.091	0.153	4.678	14.576	0.899
10157826	-1.709	2.390	-9.011	-0.030	4.806	14.335	0.898
7909956	1.326	1.520	-9.025	0.003	4.690	14.395	0.896
8376357	-1.945	3.278	-9.051	0.230	4.946	14.603	0.893
11122913	-5.435	1.729	-9.005	-0.046	4.869	14.345	0.892
12072767	-1.326	3.220	-9.068	0.255	4.793	14.666	0.892
5733729	-2.055	2.574	-9.075	0.322	5.001	14.735	0.892
11033884	-2.470	2.379	-8.947	-0.166	4.862	14.168	0.891
6020264	-1.178	4.010	-9.033	0.004	4.691	14.427	0.891
7739645	-2.122	2.060	-9.042	0.076	4.876	14.503	0.889
100004284			-9.133	0.332	4.619	14.780	0.888
5640488	-1.360	3.255	-9.111	0.321	4.775	14.762	0.888
9820825	-2.267	2.667	-9.112	0.290	4.684	14.687	0.887
5219922	-2.209	2.738	-9.084	0.154	4.684	14.578	0.887
4551712	-1.890	2.276	-8.941	-0.195	4.920	14.170	0.884
4919121	-1.423	3.215	-9.045	0.027	4.774	14.416	0.880
6605787	-1.644	3.006	-9.055	0.148	4.923	14.553	0.880

Note: The KIC number corresponds to the Kepler ID. The G magnitude and colors have been obtained from the *Gaia* archive.

Table A6. Sample of manifold anomalies selected with the Euclidean score.

KIC	<i>G</i> mag	$G_{BP}-G_{RP}$	t-SNE f1	t-SNE f2	UMAP f1	UMAP f2	Euclidean score
5168334	5.024	1.080	3.258	4.430	9.337	-2.559	38.828
5774442	2.880	0.632	4.845	-2.389	12.411	-1.525	34.779
9395222	2.861	0.498	4.830	-2.373	2.044	-4.773	33.520
6129761	3.420	0.937	-10.421	-3.447	13.182	3.452	28.460
6205481	6.054	1.095	0.158	-13.372	0.560	10.386	27.023
9896606	2.712	0.611	8.723	-14.658	-3.345	4.770	24.044
8984949	3.826	0.816	1.045	14.843	2.367	-4.065	20.270
5943622	4.736	0.827	-14.951	2.678	9.336	6.330	19.137
9900027	5.091	0.901	1.782	2.507	1.336	-4.290	18.315
4755287	3.405	0.636	0.065	15.622	5.068	-5.823	17.808
5385792	3.829	0.746	3.401	-10.216	0.727	7.244	17.578
7886329	4.113	0.775	10.269	9.163	9.726	-3.314	17.494
5192090	2.854	0.613	-2.985	-5.562	14.047	-0.529	17.279
8038609	1.611	0.444	-8.258	-8.029	2.219	14.651	17.009
6706543	3.533	0.746	4.219	8.535	3.302	-3.207	16.656
9162503	2.991	0.612	0.940	15.112	7.607	-4.653	16.609
8191672	3.449	0.872	-17.432	-2.711	10.703	8.468	16.571
8313059	3.624	0.736	1.514	14.066	4.741	-5.021	15.538
8197220	2.595	0.541	16.445	3.658	10.613	-6.064	15.445
6707691	0.529	1.043	16.342	9.632	8.304	-6.536	15.170

Note: The KIC number corresponds to the Kepler ID. The *G* magnitude and colors have been obtained from the *Gaia* archive.