VVV Survey - ESO Phase 3 - Data Release 2

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Data Collection	VVV
Release Number	2
Data Provider	Dante Minniti
Date	29.04.2013

Abstract

The VVV Survey data delivered to ESO in this Phase 3 Data Release 2 (DR2) includes the VISTA paw-print and tile images that were processed by the Cambridge Astronomical Survey Unit (CASU). These data files were successfully ingested by the ESO Archive before April 30, 2013. The data are from ESO programme 179.B-2002, with the VIRCAM instrument, using ZYJHKs filters, including multiple epochs in the Ks band, with total sky coverage of 540 sqdeg.

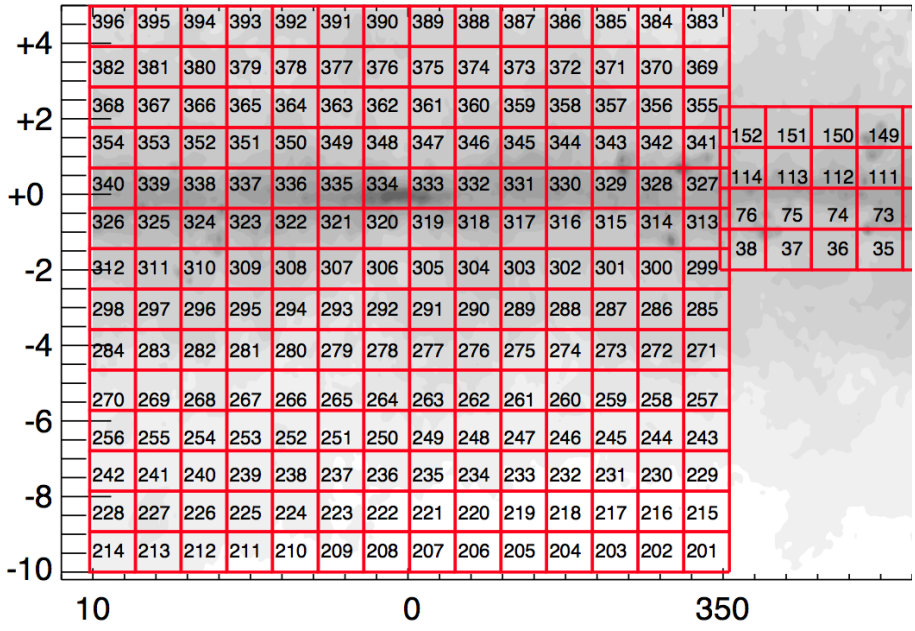
Overview of Observations

This Phase 3 release contains observations up to 31 October 2012 with all the approved data from CASU v1.2 pipeline reduction, including images and merged source catalogs. The list for this Phase 3 DR2 has 5327 tile images. If we count these plus associated confidence maps and catalogs they are approximately 22 TB of data.

DR2 includes the multi-wavelength data, i.e. images and cataloges in the 5 broad band filters. Table 1 and 2 contain the number of observations in each of those 5 filters. We note, that although Y,Z,J and H-band were only scheduled to be observed once several of the observations were obtained, due to degrading observing conditions during the execution of a given concatenation of several tiles. This leads to the repetition of the complete concatenation and hence to multiple observations for individual tiles. For further reference we note also that this policy has been changed by ESO to avoid the unnecessary repetition of tiles. On the other hand the quality control by the VVV survey team has rejected numerous data sets, i.e. The DR2 is missing observations in each of the filters, although their observational status was set to 'Completed' after the execution of the observation. This is in particular true for the Y and Z-band observations, with lower seeing limits and stricter constraints for the angular moon distance. In addition and corresponding to the Survey Management Plan P87 added 13 Ks-band observations to the bulge tiles and 8 Ks-band observations to the disk. P89 focused on the bulge only with up to 55 epochs in the Ks band (total maximum including P85, P87, P89 is 68 epochs). The total number of Ks- epochs included in DR2, independent on whether they were scheduled for P85, P87,or P89 are also given in the Table 1 and 2 (see below). This includes the one additional epoch for each tile from the multi-color observations. Due to the time required to process the data with the CASU data pipeline and the QC the data available in DR2 varies strongly from the number of observations completed by ESO, e.g. Only 10 Ks-band epochs are available for tiles b293 and b294, although those were observed 61 times by the end of P89. We caution that this is the second data release, and even though we checked

the data quality, the large data volume implies that the quality control is continuing, and that there would be images that need to be reprocessed or reacquired.

The VVV photometric data set is divided into different disk and bulge tiles. The tile nomenclature goes from d001 to d152 in the disk, and from b201 to b396 in the bulge. The coordinates of the tile centers are listed in Tables 1 and 2 below, for the bulge and disk, respectively. These Tables contain the tile ID, Equatorial coordinates RA and DEC (J2000), and Galactic coordinates l and b in degrees, as well as the number of observations in each of the 5 filters available in DR2. The map with the field IDs is shown in Figures 1a and 1b, overlapped on the extinction map of the inner Milky Way from Schlegel et al. 1997.



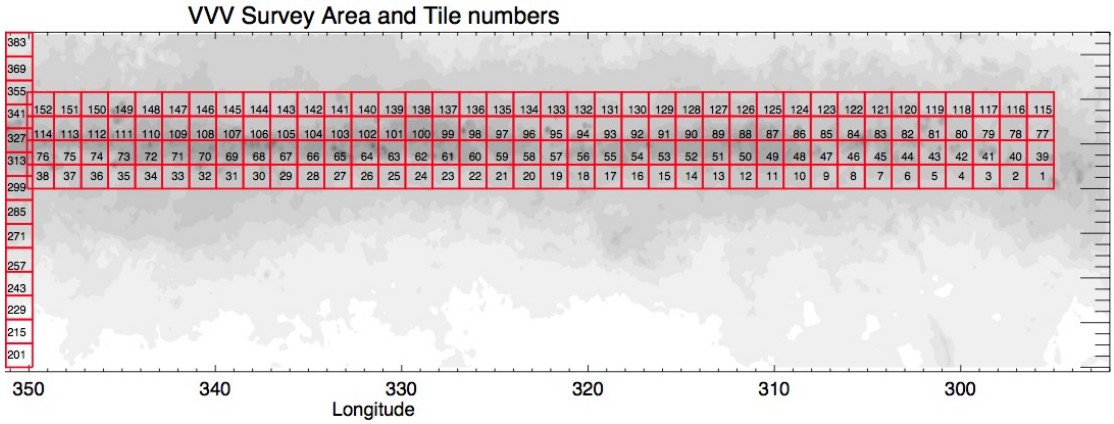


Figure 1. Maps showing the VVV tile numbers for: (a) bulge; and (b) disk.

TABLE 1: Bulge Tiles

ID	RA(J2000.0)	DEC(J2000.0)	Longitude	Latitude	Y	Z	J	H	Ks
b201	18 04 24.384	-41 44 53.520	350.74816	-9.68974	1	1	1	1	11
b202	18 08 00.144	-40 27 29.880	352.22619	-9.68971	1	1	1	1	8
b203	18 11 29.496	-39 09 52.920	353.70409	-9.68973	1	1	1	1	10
b204	18 14 52.992	-37 52 03.360	355.18207	-9.68974	1	1	1	1	7
b205	18 18 11.136	-36 34 02.640	356.66012	-9.68976	2	1	1	1	6
b206	18 21 24.360	-35 15 52.200	358.13813	-9.68975	1	1	1	1	8
b207	18 24 33.096	-33 57 33.480	359.61607	-9.68977	1	1	1	1	8
b208	18 27 37.728	-32 39 07.200	1.09399	-9.68974	0	1	1	1	8
b209	18 30 38.640	-31 20 34.080	2.57200	-9.68971	0	1	1	1	9
b210	18 33 36.168	-30 01 55.560	4.04998	-9.68973	1	1	1	1	10
b211	18 36 30.624	-28 43 12.360	5.52796	-9.68978	0	0	1	1	7
b212	18 39 22.272	-27 24 25.200	7.00593	-9.68975	4	4	0	1	9
b213	18 42 11.424	-26 05 34.800	8.48396	-9.68974	4	3	1	1	13
b214	18 44 58.320	-24 46 42.240	9.96193	-9.68974	1	1	2	3	17
b215	17 59 15.960	-41 13 55.920	350.74595	-8.59756	1	1	1	1	11
b216	18 02 55.992	-39 57 07.920	352.21956	-8.59753	1	1	1	1	8
b217	18 06 29.472	-38 40 04.080	353.69327	-8.59756	1	1	1	1	10
b218	18 09 56.880	-37 22 46.560	355.16684	-8.59757	2	1	1	1	7
b219	18 13 18.768	-36 05 16.079	356.64051	-8.59760	2	2	1	1	7
b220	18 16 35.568	-34 47 34.080	358.11423	-8.59759	1	1	1	1	10
b221	18 19 47.688	-33 29 42.360	359.58781	-8.59757	1	1	1	1	8
b222	18 22 55.560	-32 11 41.280	1.06151	-8.59755	1	0	1	1	8
b223	18 25 59.544	-30 53 32.280	2.53522	-8.59757	1	1	1	1	10
b224	18 28 59.952	-29 35 16.800	4.00880	-8.59759	1	1	1	1	10
b225	18 31 57.120	-28 16 54.840	5.48250	-8.59755	1	2	1	1	6
b226	18 34 51.360	-26 58 27.840	6.95620	-8.59757	0	0	1	1	10
b227	18 37 42.912	-25 39 56.880	8.42977	-8.59756	4	3	1	1	14
b228	18 40 32.088	-24 21 21.960	9.90350	-8.59757	1	1	2	2	17
b229	17 54 12.456	-40 42 07.560	350.74383	-7.50542	0	0	1	1	8
b230	17 57 56.496	-39 25 54.480	352.21380	-7.50537	0	0	1	1	8
b231	18 01 33.792	-38 09 24.480	353.68363	-7.50537	3	3	1	1	8
b232	18 05 04.920	-36 52 38.280	355.15359	-7.50541	2	2	1	1	7
b233	18 08 30.312	-35 35 38.040	356.62342	-7.50539	1	1	1	1	7
b234	18 11 50.472	-34 18 24.480	358.09337	-7.50535	1	1	2	3	6
b235	18 15 05.832	-33 00 59.760	359.56322	-7.50542	1	1	2	2	6
b236	18 18 16.752	-31 43 24.240	1.03312	-7.50538	1	1	1	1	6
b237	18 21 23.640	-30 25 39.360	2.50307	-7.50541	1	1	1	1	8
b238	18 24 26.808	-29 07 46.200	3.97300	-7.50540	1	0	2	2	8
b239	18 27 26.568	-27 49 45.840	5.44287	-7.50536	0	0	1	1	7
b240	18 30 23.256	-26 31 39.360	6.91271	-7.50540	2	1	1	1	9
b241	18 33 17.136	-25 13 27.120	8.38261	-7.50541	1	1	1	1	7
b242	18 36 08.472	-23 55 10.200	9.85251	-7.50542	1	1	1	1	8
b243	17 49 13.848	-40 09 29.160	350.74206	-6.41324	0	0	1	1	8
b244	17 53 01.608	-38 53 51.720	352.20875	-6.41323	4	1	1	1	8
b245	17 56 42.504	-37 37 54.840	353.67546	-6.41323	2	2	1	1	8
b246	18 00 17.064	-36 21 40.320	355.14219	-6.41321	2	1	1	1	7
b247	18 03 45.792	-35 05 09.960	356.60888	-6.41323	1	1	1	1	7

b248	18 07 09.120	-33 48 25.200	358.07550	-6.41322	1	1	1	1	5
b249	18 10 27.504	-32 31 27.120	359.54218	-6.41323	1	1	2	2	6
b250	18 13 41.328	-31 14 17.160	1.00886	-6.41325	1	1	1	1	7
b251	18 16 50.952	-29 56 56.040	2.47562	-6.41319	1	1	2	2	9
b252	18 19 56.736	-28 39 25.920	3.94224	-6.41326	1	1	2	2	8
b253	18 22 58.968	-27 21 46.800	5.40892	-6.41319	2	2	1	1	7
b254	18 25 58.008	-26 04 00.120	6.87563	-6.41325	0	0	1	1	9
b255	18 28 54.072	-24 46 06.600	8.34231	-6.41319	1	1	0	1	7
b256	18 31 47.496	-23 28 07.320	9.80903	-6.41325	1	0	1	1	8
b257	17 44 20.112	-39 36 02.160	350.74076	-5.32104	1	1	1	1	7
b258	17 48 11.328	-38 20 59.640	352.20485	-5.32102	1	1	3	3	10
b259	17 51 55.560	-37 05 36.240	353.66885	-5.32101	1	1	1	2	7
b260	17 55 33.360	-35 49 53.400	355.13291	-5.32104	2	2	3	2	9
b261	17 59 05.184	-34 33 52.920	356.59692	-5.32103	1	1	2	2	9
b262	18 02 31.512	-33 17 36.240	358.06096	-5.32105	1	1	1	1	8
b263	18 05 52.752	-32 01 04.800	359.52500	-5.32104	1	1	1	1	7
b264	18 09 09.288	-30 44 20.040	0.98899	-5.32099	1	1	1	1	7
b265	18 12 21.528	-29 27 23.400	2.45295	-5.32106	1	1	1	1	7
b266	18 15 29.784	-28 10 15.240	3.91703	-5.32105	1	1	1	1	7
b267	18 18 34.368	-26 52 57.360	5.38103	-5.32101	1	1	2	2	8
b268	18 21 35.616	-25 35 30.480	6.84507	-5.32101	1	1	2	2	7
b269	18 24 33.792	-24 17 55.680	8.30909	-5.32100	1	1	3	3	7
b270	18 27 29.184	-23 00 14.040	9.77309	-5.32107	1	1	1	1	6
b271	17 39 31.128	-39 01 49.440	350.73953	-4.22883	1	1	1	1	8
b272	17 43 25.536	-37 47 22.200	352.20141	-4.22884	1	1	1	1	8
b273	17 47 12.888	-36 32 31.920	353.66332	-4.22886	1	1	1	1	8
b274	17 50 53.688	-35 17 20.760	355.12516	-4.22890	1	1	1	1	8
b275	17 54 28.416	-34 01 49.800	356.58709	-4.22886	1	1	1	1	5
b276	17 57 57.528	-32 46 01.200	358.04898	-4.22882	1	1	5	5	10
b277	18 01 21.456	-31 29 56.400	359.51088	-4.22881	1	1	6	7	11
b278	18 04 40.584	-30 13 36.840	0.97275	-4.22884	1	1	1	1	8
b279	18 07 55.272	-28 57 03.600	2.43463	-4.22884	1	1	1	1	7
b280	18 11 05.880	-27 40 17.760	3.89659	-4.22886	2	2	1	1	7
b281	18 14 12.696	-26 23 20.760	5.35849	-4.22883	1	1	1	1	6
b282	18 17 16.056	-25 06 13.680	6.82039	-4.22886	2	1	1	1	6
b283	18 20 16.224	-23 48 57.600	8.28222	-4.22888	1	1	1	1	5
b284	18 23 13.488	-22 31 32.880	9.74416	-4.22889	1	1	1	1	6
b285	17 34 46.896	-38 26 51.720	350.73871	-3.13666	1	1	2	2	9
b286	17 38 44.256	-37 12 59.400	352.19896	-3.13670	1	1	1	1	8
b287	17 42 34.488	-35 58 41.880	353.65931	-3.13670	2	1	1	1	4
b288	17 46 18.096	-34 44 01.680	355.11962	-3.13673	1	1	2	2	6
b289	17 49 55.536	-33 29 00.240	356.57994	-3.13668	1	1	1	1	5
b290	17 53 27.288	-32 13 39.720	358.04023	-3.13673	2	1	2	1	5
b291	17 56 53.736	-30 58 01.200	359.50054	-3.13672	2	2	1	2	8
b292	18 00 15.264	-29 42 06.120	0.96088	-3.13663	1	1	1	2	7
b293	18 03 32.280	-28 25 56.280	2.42120	-3.13666	1	1	1	1	10
b294	18 06 45.096	-27 09 32.759	3.88150	-3.13671	0	1	1	1	10
b295	18 09 54.024	-25 52 56.640	5.34179	-3.13672	1	0	1	1	10
b296	18 12 59.352	-24 36 09.000	6.80204	-3.13666	2	1	2	2	11
b297	18 16 01.416	-23 19 10.920	8.26235	-3.13668	1	1	1	1	6

b298	18 19 00.456	-22 02 03.120	9.72271	-3.13666	1	2	1	1	6
b299	17 30 07.272	-37 51 11.880	350.73789	-2.04453	1	1	2	2	9
b300	17 34 07.344	-36 37 53.760	352.19711	-2.04451	2	1	1	1	8
b301	17 38 00.240	-35 24 09.000	353.65635	-2.04453	1	1	2	2	6
b302	17 41 46.440	-34 09 59.400	355.11565	-2.04449	1	1	1	2	5
b303	17 45 26.424	-32 55 27.480	356.57487	-2.04453	0	0	1	1	5
b304	17 49 00.600	-31 40 34.320	358.03411	-2.04446	1	1	1	1	5
b305	17 52 29.424	-30 25 22.080	359.49334	-2.04452	2	2	1	0	9
b306	17 55 53.256	-29 09 51.840	0.95261	-2.04456	1	1	1	1	8
b307	17 59 12.432	-27 54 05.040	2.41186	-2.04451	1	0	1	1	10
b308	18 02 27.312	-26 38 03.120	3.87111	-2.04447	1	0	1	1	10
b309	18 05 38.232	-25 21 47.520	5.33034	-2.04451	1	1	1	1	10
b310	18 08 45.480	-24 05 18.960	6.78962	-2.04454	1	1	1	1	11
b311	18 11 49.320	-22 48 38.520	8.24891	-2.04449	1	1	2	1	7
b312	18 14 50.040	-21 31 47.640	9.70816	-2.04447	4	2	1	1	6
b313	17 25 32.232	-37 14 49.920	350.73753	-0.95236	1	1	1	1	8
b314	17 29 34.800	-36 02 05.640	352.19625	-0.95230	1	1	1	1	8
b315	17 33 30.168	-34 48 52.920	353.65504	-0.95232	1	1	1	1	8
b316	17 37 18.768	-33 35 14.280	355.11368	-0.95231	1	1	1	1	8
b317	17 41 01.104	-32 21 10.800	356.57248	-0.95229	1	1	1	1	5
b318	17 44 37.584	-31 06 45.000	358.03121	-0.95230	1	1	1	1	5
b319	17 48 08.616	-29 51 58.320	359.48996	-0.95233	1	1	5	4	10
b320	17 51 34.560	-28 36 52.560	0.94861	-0.95235	1	1	1	1	6
b321	17 54 55.800	-27 21 28.440	2.40742	-0.95234	2	1	1	1	7
b322	17 58 12.648	-26 05 48.120	3.86612	-0.95234	2	2	1	1	6
b323	18 01 25.416	-24 49 52.680	5.32477	-0.95232	1	1	1	1	6
b324	18 04 34.440	-23 33 42.840	6.78355	-0.95232	1	1	1	1	6
b325	18 07 39.984	-22 17 20.400	8.24226	-0.95238	2	3	1	1	7
b326	18 10 42.288	-21 00 45.720	9.70101	-0.95231	2	1	1	1	8
b327	17 21 01.656	-36 37 48.000	350.73744	0.13984	1	1	1	1	8
b328	17 25 06.528	-35 25 37.200	352.19621	0.13989	1	1	0	3	10
b329	17 29 04.152	-34 12 56.520	353.65492	0.13987	2	2	0	3	8
b330	17 32 55.008	-32 59 47.760	355.11368	0.13984	2	1	1	3	9
b331	17 36 39.504	-31 46 13.080	356.57236	0.13988	1	1	2	2	9
b332	17 40 18.120	-30 32 14.280	358.03110	0.13982	1	1	0	2	9
b333	17 43 51.192	-29 17 52.800	359.48985	0.13988	1	1	1	1	6
b334	17 47 19.128	-28 03 10.800	0.94855	0.13988	1	1	0	1	6
b335	17 50 42.288	-26 48 09.360	2.40731	0.13985	1	1	1	1	7
b336	17 54 00.984	-25 32 49.920	3.86610	0.13985	1	1	0	1	7
b337	17 57 15.528	-24 17 14.280	5.32478	0.13981	1	1	2	3	8
b338	18 00 26.208	-23 01 23.160	6.78348	0.13983	1	1	2	3	8
b339	18 03 33.336	-21 45 17.640	8.24226	0.13983	1	1	2	2	7
b340	18 06 37.152	-20 28 59.160	9.70099	0.13985	0	0	0	1	6
b341	17 16 35.472	-36 00 07.560	350.73765	1.23203	0	0	1	1	11
b342	17 20 42.432	-34 48 30.240	352.19686	1.23205	1	1	1	1	11
b343	17 24 42.144	-33 36 20.880	353.65613	1.23203	1	1	1	1	9
b344	17 28 35.040	-32 23 41.640	355.11542	1.23207	1	1	1	1	9
b345	17 32 21.576	-31 10 35.040	356.57468	1.23205	1	1	1	1	7
b346	17 36 02.160	-29 57 02.520	358.03399	1.23203	1	1	1	1	7
b347	17 39 37.152	-28 43 06.240	359.49322	1.23206	1	1	1	1	8

b348	17 43 06.960	-27 28 47.640	0.95251	1.23203	1	1	1	1	8
b349	17 46 31.896	-26 14 08.520	2.41172	1.23201	1	1	3	3	10
b350	17 49 52.296	-24 59 09.960	3.87096	1.23204	1	1	2	2	9
b351	17 53 08.496	-23 43 53.400	5.33027	1.23202	1	1	1	1	10
b352	17 56 20.760	-22 28 20.280	6.78955	1.23201	1	1	1	1	9
b353	17 59 29.376	-21 12 31.680	8.24885	1.23202	1	1	1	1	7
b354	18 02 34.608	-19 56 29.040	9.70808	1.23199	2	2	1	1	7
b355	17 12 13.584	-35 21 49.680	350.73827	2.32427	1	1	4	6	13
b356	17 16 22.488	-34 10 45.120	352.19857	2.32417	1	1	2	2	11
b357	17 20 24.096	-32 59 06.360	353.65894	2.32423	1	1	1	1	10
b358	17 24 18.888	-31 46 56.640	355.11924	2.32422	1	1	1	1	10
b359	17 28 07.296	-30 34 17.400	356.57962	2.32420	1	0	2	1	13
b360	17 31 49.680	-29 21 11.160	358.03989	2.32423	1	1	1	1	11
b361	17 35 26.472	-28 07 39.360	359.50024	2.32421	1	1	1	1	8
b362	17 38 58.008	-26 53 43.800	0.96059	2.32418	2	0	1	1	8
b363	17 42 24.624	-25 39 25.920	2.42098	2.32420	1	2	1	1	8
b364	17 45 46.632	-24 24 47.880	3.88124	2.32419	2	2	1	1	8
b365	17 49 04.368	-23 09 50.400	5.34158	2.32416	2	1	1	1	5
b366	17 52 18.096	-21 54 34.920	6.80192	2.32418	2	2	2	1	5
b367	17 55 28.104	-20 39 02.880	8.26224	2.32419	2	2	2	2	6
b368	17 58 34.656	-19 23 15.000	9.72265	2.32423	1	2	1	2	7
b369	17 07 55.872	-34 42 57.240	350.73892	3.41637	1	1	4	5	12
b370	17 12 06.480	-33 32 24.360	352.20083	3.41644	1	1	2	2	11
b371	17 16 09.864	-32 21 16.200	353.66280	3.41638	1	0	1	2	10
b372	17 20 06.384	-31 09 35.280	355.12466	3.41637	1	1	1	1	10
b373	17 23 56.496	-29 57 23.040	356.58663	3.41642	1	1	1	1	12
b374	17 27 40.584	-28 44 42.360	358.04853	3.41640	1	1	1	2	13
b375	17 31 19.032	-27 31 34.680	359.51046	3.41635	1	1	1	1	8
b376	17 34 52.152	-26 18 01.440	0.97243	3.41644	1	1	1	1	8
b377	17 38 20.328	-25 04 05.160	2.43434	3.41638	2	0	1	1	8
b378	17 41 43.848	-23 49 46.560	3.89631	3.41638	1	1	1	1	9
b379	17 45 03.024	-22 35 07.440	5.35828	3.41637	1	1	1	1	5
b380	17 48 18.120	-21 20 09.240	6.82020	3.41640	1	1	1	1	5
b381	17 51 29.424	-20 04 53.400	8.28204	3.41640	2	2	2	2	8
b382	17 54 37.224	-18 49 20.640	9.74399	3.41636	2	2	2	2	8
b383	17 03 42.216	-34 03 30.600	350.73979	4.50856	1	0	1	2	12
b384	17 07 54.408	-32 53 29.400	352.20380	4.50857	1	1	1	1	11
b385	17 11 59.352	-31 42 51.120	353.66783	4.50858	1	1	1	1	9
b386	17 15 57.480	-30 31 37.920	355.13195	4.50860	1	1	1	1	9
b387	17 19 49.176	-29 19 52.680	356.59597	4.50856	1	1	1	1	7
b388	17 23 34.824	-28 07 36.840	358.06004	4.50857	1	1	0	1	7
b389	17 27 14.784	-26 54 52.560	359.52411	4.50859	1	1	1	1	8
b390	17 30 45.384	-25 43 05.520	0.96034	4.50854	1	1	1	1	8
b391	17 34 15.096	-24 29 30.120	2.42444	4.50852	1	1	1	1	8
b392	17 37 40.080	-23 15 31.320	3.88850	4.50858	1	1	3	3	10
b393	17 41 00.672	-22 01 10.920	5.35253	4.50853	1	1	1	1	9
b394	17 44 17.136	-20 46 29.640	6.81666	4.50854	1	1	1	1	9
b395	17 47 29.736	-19 31 29.280	8.28074	4.50857	1	0	1	1	7
b396	17 50 38.736	-18 16 11.280	9.74476	4.50855	1	2	1	1	7

TABLE 2: Disk Tiles

ID	RA(J2000.0)	DEC(2000.0)	Longitude	Latitude	Y	Z	J	H	Ks
d001	11 43 24.936	-63 31 38.640	295.43770	-1.6497	1	1	1	1	16
d002	11 56 12.576	-63 52 21.000	296.89672	-1.6497	1	1	1	1	15
d003	12 09 17.184	-64 08 46.680	298.35572	-1.6497	1	1	1	1	13
d004	12 22 35.184	-64 20 48.120	299.81470	-1.6497	1	1	1	1	13
d005	12 36 02.640	-64 28 18.840	301.27373	-1.6497	1	2	1	1	13
d006	12 49 35.184	-64 31 14.880	302.73271	-1.6497	1	1	1	1	13
d007	13 03 08.352	-64 29 34.440	304.19170	-1.6497	1	1	1	1	11
d008	13 16 37.632	-64 23 18.240	305.65072	-1.6497	1	1	1	1	11
d009	13 29 58.632	-64 12 30.240	307.10972	-1.6497	6	6	1	1	12
d010	13 43 07.272	-63 57 15.840	308.56873	-1.6497	1	1	1	1	12
d011	13 55 59.856	-63 37 42.600	310.02772	-1.6497	1	1	1	1	12
d012	14 08 33.240	-63 14 00.240	311.48673	-1.6497	1	1	1	1	12
d013	14 20 44.808	-62 46 19.920	312.94573	-1.6497	1	1	3	3	15
d014	14 32 32.496	-62 14 52.800	314.40472	-1.6497	1	1	2	3	15
d015	14 43 42.144	-61 40 33.960	315.83598	-1.6497	1	1	3	3	16
d016	14 54 38.784	-61 02 16.440	317.29497	-1.6497	1	1	2	4	15
d017	15 05 08.712	-60 20 51.000	318.75395	-1.6497	1	1	2	2	15
d018	15 15 11.880	-59 36 30.600	320.21293	-1.6497	3	1	1	1	13
d019	15 24 48.600	-58 49 27.840	321.67194	-1.6497	1	1	7	7	22
d020	15 33 59.400	-57 59 54.600	323.13095	-1.6497	1	2	7	7	22
d021	15 42 45.072	-57 08 02.400	324.58996	-1.6497	1	1	1	1	19
d022	15 51 06.576	-56 14 02.400	326.04898	-1.6497	1	1	2	2	19
d023	15 59 04.920	-55 18 04.320	327.50799	-1.6497	1	1	1	1	14
d024	16 06 41.208	-54 20 17.880	328.96694	-1.6497	1	1	2	2	12
d025	16 13 56.640	-53 20 51.360	330.42599	-1.6497	1	1	1	1	11
d026	16 20 52.320	-52 19 53.400	331.88495	-1.6497	1	1	1	1	11
d027	16 27 29.400	-51 17 30.840	333.34393	-1.6497	2	2	3	2	10
d028	16 33 49.032	-50 13 50.520	334.80299	-1.6497	1	1	1	1	10
d029	16 39 52.248	-49 08 58.920	336.26199	-1.6497	1	1	1	1	14
d030	16 45 40.128	-48 03 01.800	337.72099	-1.6497	1	1	2	2	15
d031	16 51 13.632	-46 56 04.200	339.17999	-1.6497	1	1	1	1	99
d032	16 56 33.720	-45 48 11.160	340.63896	-1.6497	1	1	1	1	9
d033	17 01 41.256	-44 39 26.640	342.09795	-1.6497	1	1	1	1	11
d034	17 06 37.104	-43 29 54.960	343.55695	-1.6497	2	2	1	1	10
d035	17 11 22.032	-42 19 39.720	345.01595	-1.6497	3	3	1	1	11
d036	17 15 56.760	-41 08 44.160	346.47495	-1.6497	1	1	1	1	10
d037	17 20 21.984	-39 57 11.160	347.93400	-1.6497	1	1	1	1	8
d038	17 24 38.352	-38 45 04.320	349.39294	-1.6497	1	1	1	1	6
d039	11 45 52.488	-62 28 17.400	295.43747	-0.5575	1	1	3	3	17
d040	11 58 14.160	-62 48 15.120	296.89617	-0.5575	1	1	1	1	13
d041	12 10 50.928	-63 04 04.800	298.35479	-0.5575	1	1	1	1	13
d042	12 23 39.672	-63 15 39.600	299.81350	-0.5575	1	1	1	1	13
d043	12 36 36.744	-63 22 53.400	301.27213	-0.5575	0	1	1	1	13
d044	12 49 38.376	-63 25 42.960	302.73081	-0.5575	1	1	1	1	11
d045	13 02 40.560	-63 24 06.840	304.18948	-0.5576	1	1	1	1	11
d046	13 15 39.288	-63 18 05.400	305.64814	-0.5575	1	1	1	1	11
d047	13 28 30.696	-63 07 42.240	307.10682	-0.5575	4	4	1	1	12

d048	13 41 11.112	-62 53 02.040	308.56549	-0.5575	4	3	1	1	12
d049	13 53 37.224	-62 34 12.000	310.02413	-0.5576	1	1	1	1	12
d050	14 05 46.176	-62 11 20.040	311.48283	-0.5575	1	1	1	1	12
d051	14 17 35.520	-61 44 36.600	312.94152	-0.5575	1	1	1	1	13
d052	14 29 03.312	-61 14 12.480	314.40014	-0.5576	1	1	1	1	13
d053	14 40 08.135	-60 40 18.480	315.85883	-0.5575	1	1	2	2	17
d054	14 50 49.032	-60 03 07.560	317.31750	-0.5575	1	1	2	2	16
d055	15 01 05.424	-59 22 51.240	318.77616	-0.5576	1	1	1	2	15
d056	15 10 57.120	-58 39 41.400	320.23482	-0.5575	2	2	1	1	13
d057	15 20 24.264	-57 53 49.920	321.69349	-0.5575	1	1	1	1	17
d058	15 29 27.264	-57 05 28.320	323.15217	-0.5575	1	1	6	6	21
d059	15 38 06.720	-56 14 47.400	324.61087	-0.5575	1	1	1	1	19
d060	15 46 23.352	-55 21 57.600	326.06950	-0.5575	1	1	1	1	19
d061	15 54 18.096	-54 27 08.640	327.52817	-0.5576	1	1	1	1	12
d062	16 01 51.840	-53 30 29.160	328.98684	-0.5575	1	1	2	2	11
d063	16 09 05.616	-52 32 08.160	330.44549	-0.5575	1	1	2	1	12
d064	16 16 00.456	-51 32 13.200	331.90419	-0.5575	1	1	1	1	11
d065	16 22 37.368	-50 30 51.840	333.36286	-0.5575	2	1	2	2	11
d066	16 28 57.360	-49 28 10.560	334.82153	-0.5575	1	1	2	2	11
d067	16 35 01.416	-48 24 15.840	336.28015	-0.5575	1	1	1	1	14
d068	16 40 50.520	-47 19 13.080	337.73882	-0.5576	1	1	2	2	14
d069	16 46 25.560	-46 13 07.320	339.19753	-0.5575	1	1	2	2	10
d070	16 51 47.400	-45 06 03.960	340.65613	-0.5575	0	1	0	1	8
d071	16 56 56.928	-43 58 06.960	342.11483	-0.5576	1	1	1	1	9
d072	17 01 54.864	-42 49 20.280	343.57351	-0.5575	1	0	1	1	9
d073	17 06 42.000	-41 39 48.240	345.03215	-0.5575	2	1	1	1	11
d074	17 11 19.032	-40 29 33.720	346.49083	-0.5575	1	1	1	1	10
d075	17 15 46.608	-39 18 39.960	347.94953	-0.5575	1	1	1	1	6
d076	17 20 05.328	-38 07 09.840	349.40822	-0.5575	1	1	1	1	6
d077	11 48 10.080	-61 24 47.160	295.43749	0.53461	1	1	1	1	15
d078	12 00 07.584	-61 44 03.840	296.89636	0.53458	1	1	1	1	15
d079	12 12 18.648	-61 59 20.400	298.35521	0.53456	1	1	1	1	15
d080	12 24 40.392	-62 10 30.000	299.81408	0.53461	1	1	1	1	14
d081	12 37 09.600	-62 17 27.960	301.27295	0.53465	1	1	2	2	11
d082	12 49 42.840	-62 20 11.400	302.73182	0.53458	1	1	1	1	10
d083	13 02 16.560	-62 18 38.160	304.19066	0.53466	1	1	2	2	24
d084	13 14 47.232	-62 12 50.040	305.64955	0.53458	1	1	1	1	14
d085	13 27 11.328	-62 02 48.840	307.10837	0.53460	1	1	1	1	20
d086	13 39 25.632	-61 48 39.240	308.56725	0.53465	1	1	1	1	19
d087	13 51 27.144	-61 30 28.080	310.02613	0.53456	1	1	1	1	15
d088	14 03 13.176	-61 08 22.200	311.48497	0.53458	4	4	1	2	14
d089	14 14 41.544	-60 42 30.600	312.94386	0.53465	1	1	1	1	17
d090	14 25 50.400	-60 13 03.720	314.40272	0.53463	1	1	1	1	16
d091	14 36 38.352	-59 40 11.640	315.86159	0.53462	1	0	1	1	13
d092	14 47 04.392	-59 04 05.520	317.32043	0.53461	1	1	1	0	12
d093	14 57 07.920	-58 24 56.160	318.77932	0.53465	1	1	1	1	15
d094	15 06 48.648	-57 42 55.440	320.23818	0.53459	1	1	1	1	14
d095	15 16 06.552	-56 58 13.800	321.69700	0.53459	1	1	1	1	14
d096	15 25 01.920	-56 11 02.040	323.15588	0.53461	1	1	1	1	14
d097	15 33 35.208	-55 21 30.600	324.61479	0.53459	1	1	1	1	17

d098	15 41 46.968	-54 29 49.200	326.07365	0.53465	1	1	1	1	17
d099	15 49 37.968	-53 36 07.560	327.53250	0.53463	1	1	1	1	13
d100	15 57 09.024	-52 40 34.320	328.99135	0.53458	2	2	2	1	14
d101	16 04 20.976	-51 43 17.400	330.45023	0.53459	1	0	1	1	9
d102	16 11 14.736	-50 44 24.720	331.90911	0.53460	1	1	1	1	10
d103	16 17 51.216	-49 44 03.480	333.36798	0.53460	4	4	1	1	11
d104	16 24 11.328	-48 42 20.160	334.82687	0.53461	1	1	1	1	11
d105	16 30 15.960	-47 39 21.240	336.28568	0.53460	1	1	1	1	11
d106	16 36 06.000	-46 35 12.120	337.74450	0.53460	1	1	1	1	11
d107	16 41 42.312	-45 29 57.840	339.20338	0.53460	2	2	2	2	15
d108	16 47 05.712	-44 23 43.440	340.66229	0.53457	2	2	2	2	14
d109	16 52 16.944	-43 16 33.240	342.12118	0.53461	1	1	2	2	12
d110	16 57 16.776	-42 08 31.560	343.58005	0.53462	0	0	0	1	10
d111	17 02 05.904	-40 59 42.360	345.03883	0.53459	1	1	1	1	9
d112	17 06 45.024	-39 50 08.520	346.49771	0.53457	1	1	4	4	11
d113	17 11 14.736	-38 39 53.280	347.95664	0.53461	1	1	1	1	8
d114	17 15 35.640	-37 29 00.240	349.41546	0.53460	1	1	1	1	8
d115	11 50 18.720	-60 21 09.000	295.43768	1.62680	1	1	1	1	15
d116	12 01 53.760	-60 39 47.520	296.89732	1.62677	1	1	1	1	15
d117	12 13 40.992	-60 54 32.759	298.35689	1.62684	1	1	1	1	13
d118	12 25 37.800	-61 05 19.680	299.81648	1.62674	1	1	1	1	13
d119	12 37 41.304	-61 12 02.520	301.27608	1.62684	1	1	3	3	12
d120	12 49 48.408	-61 14 39.480	302.73567	1.62683	1	1	1	1	10
d121	13 01 55.944	-61 13 09.120	304.19526	1.62680	1	1	1	1	16
d122	13 14 00.720	-61 07 32.159	305.65484	1.62675	1	1	1	0	13
d123	13 25 59.640	-60 57 50.400	307.11447	1.62681	1	1	1	1	20
d124	13 37 49.704	-60 44 08.880	308.57402	1.62675	1	1	1	1	17
d125	13 49 28.248	-60 26 32.280	310.03361	1.62680	1	1	1	1	12
d126	14 00 52.872	-60 05 08.160	311.49324	1.62678	4	3	0	2	12
d127	14 12 01.440	-59 40 04.440	312.95280	1.62677	3	2	1	1	17
d128	14 22 52.272	-59 11 29.760	314.41240	1.62684	1	1	1	1	16
d129	14 33 24.024	-58 39 34.560	315.87197	1.62678	1	1	1	1	14
d130	14 43 35.688	-58 04 28.200	317.33156	1.62679	1	1	1	1	12
d131	14 53 26.616	-57 26 21.480	318.79117	1.62676	1	1	1	1	15
d132	15 02 56.424	-56 45 24.480	320.25077	1.62679	1	1	1	1	14
d133	15 12 05.040	-56 01 48.000	321.71037	1.62674	1	1	1	1	13
d134	15 20 52.560	-55 15 41.760	323.16993	1.62676	1	0	1	1	13
d135	15 29 19.344	-54 27 15.480	324.62955	1.62682	1	1	1	1	20
d136	15 37 25.872	-53 36 39.240	326.08912	1.62676	1	1	1	1	18
d137	15 45 12.720	-52 44 01.320	327.54872	1.62676	1	1	1	1	13
d138	15 52 40.584	-51 49 30.360	329.00835	1.62678	2	2	2	1	13
d139	15 59 50.184	-50 53 14.640	330.46790	1.62680	2	2	2	2	11
d140	16 06 42.360	-49 55 21.360	331.92752	1.62681	1	0	0	1	9
d141	16 13 17.904	-48 55 57.720	333.38714	1.62678	4	4	1	1	11
d142	16 19 37.608	-47 55 10.200	334.84670	1.62678	2	3	1	1	10
d143	16 25 42.312	-46 53 04.920	336.30624	1.62678	1	1	1	1	11
d144	16 31 32.832	-45 49 46.920	337.76590	1.62684	1	1	1	1	11
d145	16 37 09.936	-44 45 22.320	339.22547	1.62682	1	1	1	1	13
d146	16 42 34.392	-43 39 55.440	340.68506	1.62681	1	1	2	2	14
d147	16 47 46.920	-42 33 30.960	342.14462	1.62677	1	1	2	3	10

d148	16 52 48.216	-41 26 12.480	343.60424	1.62683	1	1	1	1	10
d149	16 57 38.976	-40 18 04.320	345.06387	1.62680	1	1	1	1	9
d150	17 02 19.800	-39 09 10.080	346.52343	1.62677	1	1	3	4	12
d151	17 06 51.312	-37 59 32.640	347.98303	1.62675	1	1	4	4	11
d152	17 11 14.064	-36 49 15.240	349.44260	1.62674	1	1	1	1	8

Release Content

The VVV Survey observations planned for Year 1 (March - October 2010) comprised JHKs maps as first priority, ZY maps as second priority, and 5 epochs in the Ks-band to test for variability, for the entire bulge and disk fields (all 348 tiles covering >540 deg^2). The VVV Survey Year 1 data is now complete in all filters. This means that the multi-color map of the VVV survey region is now available (see references). The Year 2 (March – October 2011, P87) and 3 (March-October 2012, P89) observations follow the same pattern, but were acquired only in the Ks-band. The number of epochs observed varies from tile to tile due to the different observational constraints, visibility and of course the results of the final QC.

The files for this VVV Survey DR2 include images and their respective photometric catalogs that have passed the Quality Control (QC), i.e. only higher quality data are being included in this DR2. For the Phase 3 DR2 we defined the list of data files that pass all the quality and calibration checks in order to be released, and at the same time defined a list of deprecated images, or re-reduced/re-calibrated some acceptable files.

These Ks observations were intended to test the variability search techniques, and to provide a long term baseline for stellar variability (e.g. microlensing, long term variable sources), as well as for proper motions. At time of writing this report there are still observations pending from Year 2 (15%) and 3 (50%).

With respect to the observing schedule (Obs submitted including P85, P87 and P89) the various observation have the following completeness:

Bulge:

JHKs: 196 out of 196 fields completed = 100% (in all three filters)
YZ: 196 out of 196 = 100% (in both filters)
VAR: 2413 out of 18*196 (3540) = 68.1% OBs completed

Disk:

JHKs: 152 out of 152 fields completed = 100% (in all three filters)
YZ : 152 out of 152 = 100% (in both filters)
VAR: 760 out of 5x 152 (760) = 100% OBs completed

The total number of epochs observed for each individual tile and available in DR2 is shown in the above tables as well as in Figure 2.

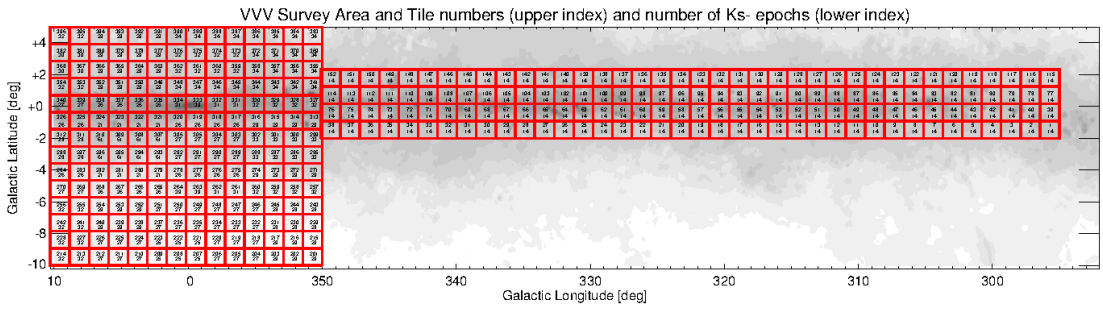


Figure 2: Number of epochs (in Ks) as completed by October 31, 2012. Those observations , combined with the now completed Y,Z,J and H-band data are part of DR2.

Data Quality

The Quality Control is similar to the one described in the previous DR1 document, but is now based on the data reduced with the new CASU pipeline v1.2. The same words of caution as before apply: this intense QC activity is continuing, and even though we checked the images for defects, we are still identifying images that need to be reprocessed or reacquired. We note that DR2 is the last data release based on the CASU pipeline v1.2. The new v1.3 was released in 2013 and will be used in the next data release (details can be found at http://apm49.ast.cam.ac.uk/surveys-projects/vista/data-processing/version-log.

The Quality Control for the Phase 3 data was performed with involvement of ESO and of most of the scientists from the VVV Survey Science Team. We checked image defects, telescope problems, seeing, zero points, magnitude limits, ellipticities, airmass, etc. Algorithmic quality control cuts to remove images with low zero points (after correcting for the seasonal trend), seeing that was significantly outside specification, or high average ellipticity were also applied. There are a number of well known image defects intrinsic to VISTA, many of which are illustrated with pictures in the CASU and VVV web pages (document vvv_defects.pdf).

The limiting magnitudes are similar to the ones for DR1 since we cover the same fields. Maps of limiting magnitudes are given in Saito et al. (2012). In addition, the calibration of the VVV Survey photometry was investigated as function of crowding in the bulge and disk fields, using the overlap regions between some consecutive tiles as described in the DR1 document release.

The VVV saturation limit ranges between Ks=10- 12. mag, with Year 1 disk observations featuring a fainter saturation limit due to the slightly longer exposure time, e.g. DIT_{Ks}=10s in multi-color observations, as compared for DIT_{Ks}=4s in variability study. The large spread in saturation limit for the bulge tiles is due to variations in crowding (e.g. in high density fields like the Galactic center (tile b333) the saturation limit is Ks=11 mag) and dust extinction. For brighter magnitudes the 2MASS photometry should be preferred. The photometric limit is typically Ks=17.5mag, but in high density fields like the in the Galactic center region it can be Ks<16 mag (see photometric completeness in Saito et al. 2012).

The photometric source lists contain calibrated aperture photometry, and the limiting magnitudes correspond to the aperture photometry. For some specific scientific purposes it would be more convenient to obtain psf- photometry, or differential image photometry on the

processed paw-print images, which can give better and deeper photometry in the most crowded regions.

Known Issues

It is important to repeat the warnings: we are finding differences of up to 0.1 mag in some of the photometric calibrations of the disk and bulge fields with respect to 2MASS, which are not surprising. We note that eventually in these regions the VVV would be better calibrated and more homogeneous than 2MASS, because “The 2MASS Survey has no Level 1 Specifications in the Galactic Plane with regard to completeness, reliability, and photometric accuracy”.

We would like to issue proper warnings about these DR2 data. For example, the data of this release are well calibrated nightly and agree with 2MASS (in the cases that it does not we suspect that 2MASS is the problem). Looking at the ZPs, we include the J, H and Ks tiles in the release that are within 0.1 mag of the average (after correcting for the seasonal trend with time). However, the Z and Y calibrations are still imperfect, with their ZPs showing more scatter and in some cases 0.1 mag below the trends. The full global quality checks must wait for the future releases where we can use the overlap regions for every tile, and use sql searches to pick the regions with strange color-magnitude diagrams.

Note that even though the photometric and astrometric calibration is all done relative to 2MASS, with greater uncertainty in the Z and Y bands, these calibrations are field dependent. For example, the limiting magnitude achieved is different depending on the fields and photometric technique used.

Data format

File Types

The types of files are similar to the previous DR1 from he VVV Survey. They are described in the DR1 document and in the paper by Saito et al. 2012.

Source List Columns

The source lists are similar to the previous DR1 from he VVV Survey. They are described in the DR1 document and in the paper by Saito et al. 2012.

Acknowledgments

Please use the following statement in your articles when using these data:
Based on data products from VVV Survey observations made with the VISTA telescope at the ESO Paranal Observatory under programme ID 179.B-2002.

Further details

More detailed information can be found at:

- the CASU webpages

http://casu.ast.cam.ac.uk/surveys-projects/vista/

- in particular

http://casu.ast.cam.ac.uk/surveys-projects/vista/data-processing/version-log

(to follow-up on the changes between the CASU pipeline v1.2 used in DR2, and v1.3 which will be used henceforth)

- by contacting the VVV Science Team Members listed at the VVV Survey webpage

http://vvvsurvey.org

- the VVV Science Team papers:

D. Minniti, P. W. Lucas, J. P. Emerson, R. K. Saito, M. Hempel, P. Pietrukowicz, A. V. Ahumada, M. V. Alonso, J. Alonso-García, J. I. Arias, R. M. Bandyopadhyay, R. H. Barbá, L. R. Bedin, E. Bica, J. Borissova, L. Bronfman, M. Catelan, J. J. Clariá, N. Cross, R. de Grijs, I. Dékány, J. E. Drew, C. Fariña, C. Feinstein, E. Fernández Lajús, R. C. Gamen, D. Geisler, W. Gieren, B. Goldman, O. González, G. Gunthardt, S. Gurovich, N. C. Hambly, M. J. Irwin, V. D. Ivanov, A. Jordán, E. Kerins, K. Kinemuchi, R. Kurtev, M. López-Corredoira, T. Maccarone, N. Masetti, D. Merlo, M. Messineo, I. F. Mirabel, L. Monaco, L. Morelli, N. Padilla, M. C. Parisi, G. Pignata, M. Rejkuba, A. Roman-Lopes, S. E. Sale, M. R. Schreiber, A. C. Schröder, M. Smith, L. Sodré Jr., M. Soto, M. Tamura, C. Tappert, M. A. Thompson, I. Toledo, M. Zoccali, “VISTA Variables in the Via Lactea (VVV): The public ESO near-IR variability survey of the Milky Way”, 2010, New Astronomy, 15, 433 (arXiv:0912.1056)

R. Saito, M. Hempel, J. Alonso-García, I. Toledo, J. Borissova, O. González, J. C. Beamin, D. Minniti, P. Lucas, J. Emerson, A. Ahumada, S. Aigrain, M. V. Alonso, E. de Amôres, R. Angeloni, J. Arias, R. Bandyopadhyay, R. Barbá, B. Barbuy, G. Baume, L. Bedin, E. Bica, L. Bronfman, G. Carraro, M. Catelan, J. J. Clariá, C. Contreras, N. Cross, C. Davis, R. de Grijs, I. Dékány, J. Drew, C. Fariña, C. Feinstein, E. Fernández Lajús, S. Folkes, R. Gamen, D. Geisler, W. Gieren, B. Goldman, A. Gosling, G. Gunthardt, S. Gurovich, N. Hambly, M. Hanson, M. Hoare, M. Irwin, V. Ivanov, A. Jordán, E. Kerins, K. Kinemuchi, R. Kurtev, A. Longmore, M. López-Corredoira, T. Maccarone, E. Martín, N. Masetti, R. Mennickent, D. Merlo, M. Messineo, F. Mirabel, L. Monaco, C. Moni Bidin, L. Morelli, N. Padilla, T. Palma, M. C. Parisi, Q. Parker, D. Pavani, P. Pietrukowicz, G. Pietrzynski, G. Pignata, M. Rejkuba, A. Rojas, A. Roman-Lopes, M. T. Ruiz, S. Sale, I. Saviane, M. Schreiber, A. Schröder, S. Sharma, M. Smith, L. Sodré Jr., M. Soto, A. Stephens, M. Tamura, C. Tappert, M. Thompson, E. Valenti, L. Vanzi, W. Weidmann, M. Zoccali; “VISTA Variables in the Via Lactea: current status and first results”, 2010, The Messenger, 141, 24

M. Catelan, D. Minniti, P. W. Lucas, J. Alonso-García, R. Angeloni, J. C. Beamín, C. Bonatto, J. Borissova, C. Contreras, N. Cross, I. Dekany, J. P. Emerson, S. Eyheramendi, D. Geisler, E. Gonzalez-Solares, K. Helminiak, M. Hempel, M. J. Irwin, V. D. Ivanov, A. Jordan, R. Kerins, R. Kurtev, F. Mauro, C. Moni-Bidin, C. Navarrete, P. Perez, K. Pichara, M. Read, M. Rejkuba, R. K. Saito, S. E. Sale, I. Toledo, "The Vista Variables in the Via Lactea (VVV) ESO Public Survey: Current Status and First Results", 2011, in Carnegie Observatories Astrophysics Series (ed. Andrew McWilliam), Volume 5, 145

R. K. Saito, M. Hempel, D. Minniti, P. W. Lucas, M. Rejkuba, I. Toledo, O. A. Gonzalez, J. Alonso-Garcia, M. J. Irwin, E. Gonzalez-Solares, S. T. Hodgkin, J. R. Lewis, N. Cross, V. D. Ivanov, E. Kerins, J. P. Emerson, M. Soto, E. B. Amores, S. Gurovich, I. Dékány, R. Angeloni, J. C. Beamin, M. Catelan, N. Padilla, M. Zoccali, P. Pietrukowicz, C. Moni-Bidin, F. Mauro, D. Geisler, S. L. Folkes, S. E. Sale, J. Borissova, R. Kurtev, A. V. Ahumada, M. V. Alonso, A. Adamson, J. I. Arias, R. M. Bandyopadhyay, R. H. Barbá, B. Barbuy, G. L. Baume, L. R. Bedin, R. Benjamin, E. Bica, C. Bonatto, L. Bronfman, G. Carraro, A. N. Chene, J. J. Clariá, J. R. A. Clarke, C. Contreras, A. Corvillon, R. de Grijs, B. Dias, J. E. Drew, C. Fariña, C. Feinstein, E. Fernández Lajús, R. C. Gamen, W. Gieren, B. Goldman, C. Gonzalez-Fernandez, R. J. J. Grand, G. Gunthardt, N. C. Hambly, M. M. Hanson, K. Helminiak, M. G. Hoare, L. Huckvale, A. Jordán, K. Kinemuchi, M. López-Corredoira, T. Maccarone, D. Majaess, E. Martin, N. Masetti, R. E. Mennickent, I. F. Mirabel, L. Monaco, L. Morelli, V. Motta, T. Palma, M. C. Parisi, Q. Parker, F. Peñaloza, G. Pietrzynski, G. Pignata, B. Popesku, M. A. Read, A. Roman-Lopes, M. T. Ruiz, I. Saviane, M. R. Schreiber, A. C. Schröder, S. Sharma, M. D. Smith, L. Sodre Jr., J. Stead, A. W. Stephens, M. Tamura, C. Tappert, M. A. Thompson, E. Valenti, L. Vanzi, N. A. Walton, W. Weidmann, and A. Zijlstra, "VVV DR1: The First Data Release of the Milky Way Bulge and Southern Plane from the Near-Infrared ESO Public Survey VISTA Variables in the Vıa Lactea", 2012, Astronomy & Astrophysics, 537, A107

Since its start in 2010 the VVV survey has resulted in a large number of publications by individual research groups in peer-reviewed journals (31), as well as numerous presentations in international conferences.

The complete list of refereed publication can be found below.

1 2012, ApJL, 761, 29
Mauro, F.; Moni Bidin, C.; Cohen, R.; Geisler, D.; Minniti, D.; Catelan, M.; Chené, A.; Villanova, S.
Double Horizontal Branches in NGC 6440 and NGC 6569 Unveiled by the VVV Survey

2 2012, AJ, 144, 127
Amôres, E. B.; Sodré, L.; Minniti, D.; Alonso, M. V.; Padilla, N.; Gurovich, S.; Arsenijevic, V.; Tollerud, E. J.; Rodríguez-Ardila, A.; Díaz Tello, J.; Lucas, P. W.
Galaxies behind the Galactic Plane: First Results and Perspectives from the VVV Survey

3 2012, A&A, 546,107
González-Fernández, C.; López-Corredoira, M.; Amôres, E. B.; Minniti, D.; Lucas, P.; Toledo, I.
The long bar as seen by the VVV survey. I. Colour-magnitude diagrams

4 2012, A&A, 545, 54
Chené, A.-N.; Borissova, J.; Clarke, J. R. A.; Bonatto, C.; Majaess, D. J.; Moni Bidin,

C.; Sale, S. E.; Mauro, F.; Kurtev, R.; Baume, G.; and 8 coauthors
Massive open star clusters using the VVV survey. I. Presentation of the data and description of the approach
5 2012A&A...544A.147
Saito, R. K.; Minniti, D.; Dias, B.; Hempel, M.; Rejkuba, M.; Alonso-García, J.; Barbuy, B.; Catelan, M.; Emerson, J. P.; Gonzalez, O. A.; and 2 coauthors
Milky Way demographics with the VVV survey. I. The 84-million star colour-magnitude diagram of the Galactic bulge
6 2012, A&A, 543, 13
Gonzalez, O. A.; Rejkuba, M.; Zoccali, M.; Valenti, E.; Minniti, D.; Schultheis, M.; Tobar, R.; Chen, B.
Reddening and metallicity maps of the Milky Way bulge from VVV and 2MASS. II. The complete high resolution extinction map and implications for Galactic bulge studies
7 2012, ApJ, 750, 169
Pietrukowicz, P.; Udalski, A.; Soszyński, I.; Nataf, D. M.; Wyrzykowski, Ł.; Poleski, R.; Kozłowski, S.; Szymański, M. K.; Kubiak, M.; Pietrzyński, G.; Ulaczyk, K.
The Optical Gravitational Lensing Experiment: Analysis of the Bulge RR Lyrae Population from the OGLE-III Data
8 2012, ApJL, 744, 8
Gerhard, O.; Martinez-Valpuesta, I.
The Inner Galactic Bulge: Evidence for a Nuclear Bar?
9 2012, A&A, 537L, 4
Majaess, D.; Turner, D.; Moni Bidin, C.; Geisler, D.; Borissova, J.; Minniti, D.; Bonatto, C.; Gieren, W.; Carraro, G.; Kurtev, R.; and 7 coauthors
Strengthening the open cluster distance scale via VVV photometry
10 2012, A&A, 537, 116
Pietrukowicz, P.; Minniti, D.; Alonso-García, J.; Hempel, M.
Variability and stellar populations with deep optical-IR images of the Milky Way disc: matching VVV with VLT/VIMOS data
11 2012, A&A, 537, 107
Saito, R. K.; Hempel, M.; Minniti, D.; Lucas, P. W.; Rejkuba, M.; Toledo, I.; Gonzalez, O. A.; Alonso-García, J.; Irwin, M. J.; Gonzalez-Solares, E.; and 100 coauthors
VVV DR1: The first data release of the Milky Way bulge and southern plane from the near-infrared ESO public survey VISTA variables in the Vía Láctea
12 2011, ApJL, 741, 36
Majaess, D.; Turner, D.; Gieren, W.
Concerning the Classical Cepheid VI C Wesenheit Function's Strong Metallicity Dependence
13 2011, ApJL; 741, 27
Majaess, D.; Turner, D.; Moni Bidin, Ch.; Mauro, F.; Geisler, D.; Gieren, W.; Minniti, D.; Chené, A.; Lucas, P.; Borissova, J.; and 3 coauthors
New Evidence Supporting Membership for TW Nor in Lyngå 6 and the Centaurus Spiral Arm
14 2011, A&A, 535, 33
Moni Bidin, C.; Mauro, F.; Geisler, D.; Minniti, D.; Catelan, M.; Hempel, M.; Valenti, E.; Valcarce, A. A. R.; Alonso-García, J.; Borissova, J.; and 5 coauthors
Three Galactic globular cluster candidates
15 2011, A&A, 534, 14
Gonzalez, O. A.; Rejkuba, M.; Minniti, D.; Zoccali, M.; Valenti, E.; Saito, R. K.
The inner Galactic bar traced by the VVV survey

16 2011, A&A, 534, 3
Gonzalez, O. A.; Rejkuba, M.; Zoccali, M.; Valenti, E.; Minniti, D.
Reddening and metallicity maps of the Milky Way bulge from VVV and 2MASS. I. The method and minor axis maps
17 2011, A&A, 532, 131
Borissova, J.; Bonatto, C.; Kurtev, R.; Clarke, J. R. A.; Peñaloza, F.; Sale, S. E.; Minniti, D.; Alonso-García, J.; Artigau, E.; Barbá, R.; and 20 coauthors
New Galactic star clusters discovered in the VVV survey
18 2011, A&A, 531, 73
Baume, G.; Carraro, G.; Comeron, F.; de Elía, G. C.
The Ara OB1a association. Stellar population and star formation history
19 2011, ApJL, 733, 43
Minniti, D.; Saito, R. K.; Alonso-García, J.; Lucas, P. W.; Hempel, M.
The Edge of the Milky Way Stellar Disk Revealed Using Clump Giant Stars as Distance Indicators
20 2011, A&A, 527, 81
Minniti, D.; Hempel, M.; Toledo, I.; Ivanov, V. D.; Alonso-García, J.; Saito, R. K.; Catelan, M.; Geisler, D.; Jordán, A.; Borissova, J.; and 8 coauthors
Discovery of VVV CL001. A low-mass globular cluster next to UKS 1 in the direction of the Galactic bulge
21 2011, BAAA, 54, 293
Barbá, R.; Soto, M.; Gunthardt, G.; Minniti, D.; Rejkuba, M.; Lucas, P. W.; Irwin, M. J.
Advances in the VVV-2MASS photometric transformations from Galactic disk CASU catalogues: Milky Way demographics with the VVV survey
22 2011, BAAA, 54, 285
Saito, R. K.; Minniti, D.
The VVV color-magnitude diagram of the Galactic bulge
23 2011, BAAA, 54,281
Santucho, V.; Gurovich, S.; Dominguez, M.; Minniti, D.; Soto, M.; Amôres, E. B.
Caracterización del sistema fotométrico del VVV para el estudio de la subestructura en nuestra galaxia
24 2011, BAAA, 54, 277
Borissova, J.; Clarke, J. R. A.; Bonatto, C.; Chené, A.-N.; Bica, E.; Kurtev, R.; Barbá, R.; Minniti, D.; Peñaloza, F.; Catelan, M.; and 7 coauthors
New Galactic star cluster candidates discovered in the VVV Survey within 10 degrees around the Galactic center
25 2011, BAAA, 54, 265
Minniti, D.; Clariá, J. J.; Saito, R. K.; Hempel, M.; Lucas, P. W.; Rejkuba, M.; Toledo, I.; Gonzalez, O. A.; Alonso-García, J.; Irwin, M. J.; and 92 coauthors
The VVV Survey of the Milky Way: first year results
26 2011, BAAA, 54, 215
Chené, A.-N.; Clarke, J. R. A.; Borissova, J.; Moni Bidin, C.; Mauro, F.; Bonatto, C.; Kurtev, R.; Baume, G.; Feinstein, C.; Minniti, D.; and 3 coauthors
Investigando cúmulos estelares masivos con el VVV
27 2011, BAAA, 54, 143
Mauro, F.; Moni Bidin, C.; Geisler, D.
Photometric study of Galactic star clusters in the VVV survey
28 2011, BAAA, 54, 89
Baravalle, L.; Alonso, M. V.; Nilo Castellón, J. L.
Búsqueda de objetos extensos en el Relevamiento VVV (Vista Variables in the Vía

Láctea)
29 2011, BAAA, 54, 85
Barbá, R.; Morrell, N. I.; Gunthardt, G.; Torres Robledo, S.; Jaque, M.; Soto, M.; Ferrero, G.; Arias, J. I.; Roman-Lopes, A.; Gamen, R. C.; Astudillo Hormazabal, J.
Southern near-infrared photometric monitoring of Galactic young star clusters (NIP of Stars)
30 2010NewA, 15, 433
Minniti, D.; Lucas, P. W.; Emerson, J. P.; Saito, R. K.; Hempel, M.; Pietrukowicz, P.; Ahumada, A. V.; Alonso, M. V.; Alonso-Garcia, J.; Arias, J. I.; and 57 coauthors
VISTA Variables in the Via Lactea (VVV): The public ESO near-IR variability survey of the Milky Way
31 2010, BAAA, 53, 169
Baume, G.; Fernández Lajús, E.; Feinstein, C.; Gamen, R.; Fariña, C.
Participación científica del Nodo La Plata en el Proyecto VVV