THE STAR CLUSTERS OF M33

(brighter than +17.2)

Map ID #[1]	Ma 2012 (v)[2]	SM2007 (v)[3]	Ma 2012 B-V[4]	SSA2010 #[5]	SM2007 #[6]	CS82 #[7]	Other Designation	Galacto-centric Distance[8]	In OB-Association[9]
01	**15.885**	**15.85**	**0.191**	**--**	**420†**		**CBF 142**	**12.4'**	**A85**
02	**15.938**	**15.95**	**0.273**	**2050**	**395**			**8.7'**	**--**
03	**15.953**	**16.14**	**0.659††**	**1672**	**261**			**2.7'**	**--**
04	**15.993**	**15.90**	**0.323**	**1361**	**154**			**2.6'**	**A55**
05	**16.094**	**16.07**	**0.195**	**1815**	**331**			**7.5'**	**A73**
06	**16.109**	**16.19**	**0.121**	**1669**	**260**		**CBF 158**	**6.0'**	**A04/IC 139**
07	**16.120**	**16.11**	**0.693**	**2261**	**438**	**C39**		**21.7'**	**--**
08	**16.144*****	**--**	**0.073*****	**--**	**--**		**[MC83] 08‡**	**30.0'**	**--**
09	**16.298**	**16.21**	**0.783**	**1458**	**178**	**U49**	**CBF 61**	**8.2'**	**--**
10	**16.342**	**16.27**	**0.140**	**--**	**320**		**CBF 141**	**3.8'**	**A96**
11	**16.376**	**16.39**	**0.910**	**1765**	**316**	**R12**	**CBF 116**	**3.8'**	**--**
12	**16.378***	**--**	**0.334***	**1256**	**--**			**5.6'**	**A52**
13	**16.384**	**16.39**	**0.021**	**--**	**197**		**CBF 127**	**1.0**	**A142**
14	**16.391**	**16.40**	**0.735**	**1717**	**281**			**4.5'**	**--**
15	**16.399**	**16.35**	**0.799**	**1704**	**273**		**CBF 28**	**2.4'**	**--**
16	16.400**	--	--	1684	--			12.9'	A36
17	**16.462**	**16.44**	**0.190**	**1357**	**152**			**8.8'**	**A12/IC 137**
18	**16.470**	**16.61**	**0.337**	**1829**	**337**			**6.5'**	**--**
19	**16.501**	**16.55**	**0.310**	**2269**	**439**	**M6**		**14.7'**	**--**
20	**16.545**	**16.52**	**0.976**	**1710**	**275**	**R14**	**CBF 98**	**2.7'**	**--**
21	**16.623**	**16.64**	**0.358**	**1601**	**222**	**M4**		**8.4'**	**--**
22	16.643*	--	0.028*	1207	--			9.4'	A31
23	**16.685**	**16.75**	**0.315**	**1946**	**368**			**10.0'**	**--**
24	**16.709**	**16.70**	**0.154**	**1659**	**255**		**CBF 32**	**6.5'**	**A68**
25	**16.724***	**--**	**0.120***	**38**	**38**		**[ZK2009] 38^**	**4.5'**	**A50**
26	**16.738**	**16.78**	**0.304**	**1953**	**370**			**9.1'**	**A79**
27	**16.740^^**	**--**	**0.400^^**	**--**	**--**		**[CM81] 05‡‡**	**4.1'**	**A62/NGC 595**
28	**16.779**	**16.76**	**0.308**	**1546**	**198**		**CBF 02**	**0.7'**	**A142**
29	16.785**	--	0.987**	1570	--			25.8'	--
30	**16.811*****	**--**	**0.307*****	**1641**	**--**			**6.6'**	**A05/IC 140**
31	**16.819**	**16.83**	**0.352**	**1720**	**284**	**M2**		**12.9'**	**A36**
32	16.880	16.84	0.335	1760	313	M1		13.2'	A37
33	**16.992***	**--**	**0.092***	**64**	**64**		**[ZK2009] 64^**	**4.2'**	**A03**
34	**17.036**	**17.20**	**0.232**	**1374**	**156**			**4.9'**	**--**
35	**17.049**	**--**	**0.030**	**1748**	**305**			**8.5'**	**A71**
36	**17.078**	**17.00**	**0.124**	**1637**	**243**		**CBF 159**	**6.3'**	**A05/IC 140**
37	17.089	17.17	0.305	1112	59			6.6'	A60
38	17.118*	--	0.291*	1106	--			7.9'	A53
39	**17.122**	**17.15**	**0.294**	**1311**	**140**	**U111**		**6.1'**	**--**
40	**17.123**	**17.16**	**0.264**	**1957**	**371**		**CBF 35**	**7.1'**	**--**
41	**17.125***	**--**	**0.192***	**1906**	**--**			**8.0'**	**A101/IC 136**
42	**17.127**	**17.19**	**0.753**	**2075**	**402**	**M9**	**CBF 70**	**8.5'**	**--**
43	**17.173**	**17.14**	**0.324**	**1639**	**245**	**H14**	**CBF 33**	**6.3'**	**A68**
44	**17.247**	**17.20**	**0.501**	**2218**	**427**	**C27**		**13.9'**	**--**
45	**17.286**	**17.17**	**0.756**	**1203**	**95**	**U77**	**CBF 90**	**5.1'**	**A61**

Bold have either been confirmed in Sarajedini & Mancone (2007) based on *HST* and high-resolution ground-based imaging, by the author's own visual inspection of *HST* images, or by various papers studied by the author. Thus any not in bold are still unconfirmed clusters.

Red are within 2' of M33's core, making them extremely difficult to see.

Orange are considered akin to our Galaxy's globular clusters.

[1] – As labeled on the **M33 Clusters & Stars Finder Chart**. Any in red, however, are not labeled.

[2] – From Ma, J. 2012, AJ, 144, 41

[3] – From Sarajedini, A. & Mancone, C. 2007, AJ, 134, 447

[4] – From Ma, J. 2012, AJ, 144, 41

[5] – From San Roman, I., Sarajedini, A. & Aparicio, A. 2010, ApJ, 720, 1674

[6] – From Sarajedini, A. & Mancone, C. 2007, AJ, 134, 447

[7] – From Christian, C. & Schommer, R. 1982, ApJS, 49, 405

[8] – Distance from M33's core in minutes of arc

[9] – As they are labeled and their boundaries drawn in Humphreys, R. & Sandage, A. 1980, ApJS, 44, 319

* – From Ma, J. 2013, AJ, 145, 88

** – From Fan, Z. & de Grijs, R. 2014, ApJS, 211, 22

*** – From Massey, P., et al. 2006, AJ, 131, 2478. However, in Massey, P., Bianchi, L., Hutchings, J. & Stecher, T. (1996, ApJ, 469, 629) it was found to be +15.99 and before that, in Ivanov et al. (1993, ApJS, 89, 85) it was found to be +16.20.

^ – From Zloczewski, K. & Kaluzny, J. 2009, AcA, 59, 47

^^ – From Wilson, C. & Matthews, B. 1995, ApJ, 455, 125

† – Herrero et al. (1994) wrote, *"[The] spectrum is peculiar in that the star has the appearance of an early B-star although metal lines appear to be absent but from the widths of the hydrogen lines it is not a supergiant. However, from its visual magnitude and provided that it is a member of M33 it cannot be a single B-star and we therefore suspect that this object is in fact a star cluster. Indeed this is confirmed by the slope of the red spectrograms which indicate contamination by late spectral types."*

†† – Park, Park, & Lee (2009) wrote, *"The* HST/WFPC2 *images of the field including this cluster and the CMD [color-magnitude diagram] of this cluster show that there are two very bright red stars. The spatial locations of these red stars in the cluster indicate that they are probably member stars, and their locations on the CMD show that they are red supergiant stars. The fluxes of these stars contribute to most of the integrated light of the star cluster. If we remove the light contribution of these two red supergiant stars, we get the integrated photometry of V = 18.625±0.015, and (B – V) = –0.004±0.019. This shows that this cluster is much younger than the age derived from the case including the two stars. We estimated the age of this star cluster to be log(t) = 7.0, which is much younger than previous estimations. This case clearly shows the power of age estimation with resolved star CMD over those based on integrated light."*

‡ – First discovered by Massey & Conti (1983) due to the two Wolf-Rayet stars it contains, it was later proven by Kehrig et al. (2011) that the brighter one is the ionizing source for MA 1, the He II nebula that they lie in. In that same paper the authors wrote, *"The properties of MC8 are…consistent with a WN star located within a compact, young star cluster such as Brey 65 in the LMC (Walborn et al. 1999), in which the He II λ4686 emission strength is severely diluted by other cluster members (mostly O, B and A stars)."*

‡‡ – First discovered by Conti & Massey (1981) due to the Wolf-Rayet star it contains, Drissen, Moffat, & Shara (1993) wrote, *"The* HST *images are most useful…in the central, crowded part of NGC 595" and that the "trapezium-like cluster is most interesting: it contains four stars of similar B magnitude (and probably more fainter, unresolved stars), one of which shows a weak but definite excess at λ4686 (WR 11)."*

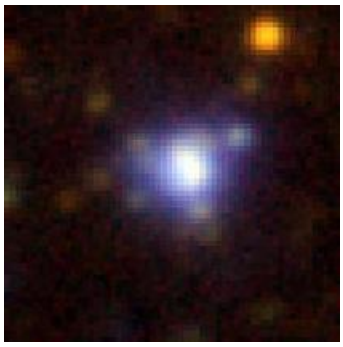
The Core of Messier 33

In Massey, P., et al. (2006, AJ, 131, 2478) the core of M33 was measured at magnitude +14.173

Between February of 2017 and February 2018, the *Hubble Space Telescope* spent more than 48 hours of exposure time taking 54 individual images with the Advanced Camera for Surveys. Stitched together, they created a massive 665 million pixel image mosaic of Messier 33 that spans roughly 12,000 by 18,000 light-years and reveals nearly 25 million individually resolved stars. It was assembled by a team of astronomers at the University of Washington and released to the public during the 233rd Meeting of the American Astronomical Society in January 2019.

Thirty-one of the following 45 images are close-ups from the half-resolution (543 MB) image mosaic of M33 taken by the Hubble Space Telescope. The other fourteen are from the Panoramic Survey Telescope and Rapid Response System (PanSTARRS) archive (in filters y, i, g). Each one is 15 arc-seconds across, which at a distance of 847 kpc is equal to 62 parsecs (200 light-years).


[SSA2010] --, [SM2007] 420


[SSA2010] 2050, [SM2007] 395


[SSA2010] 1672, [SM2007] 261


[SSA2010] 1361, [SM2007] 154


[SSA2010] 1815, [SM2007] 331


[SSA2010] 1669, [SM2007] 260


[SSA2010] 2261, [SM2007] 438

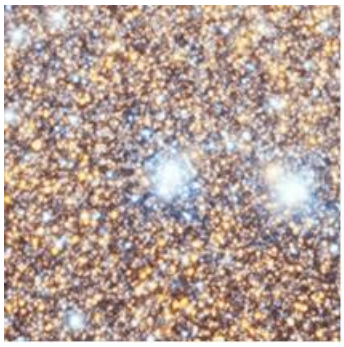

[MC83] 08


[SSA2010] 1458, [SM2007] 178

[SSA2010] --, [SM2007] 320

[SSA2010] 1765, [SM2007] 316

[SSA2010] 1256, [SM2007] --



[SSA2010] --, [SM2007] 197

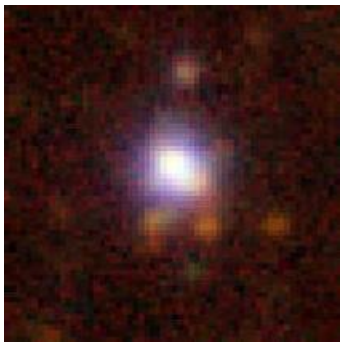
[SSA2010] 1717, [SM2007] 281

[SSA2010] 1704, [SM2007] 273

[SSA2010] 1684, [SM2007] --

[SSA2010] 1357, [SM2007] 152

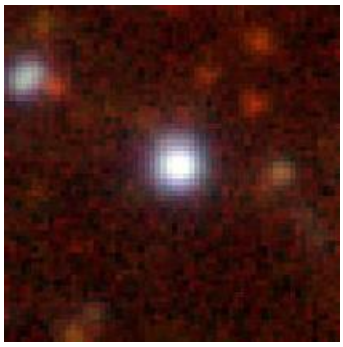
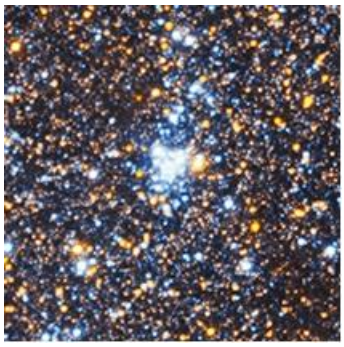
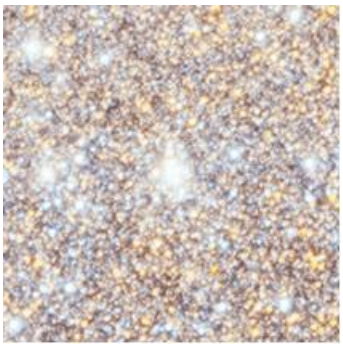
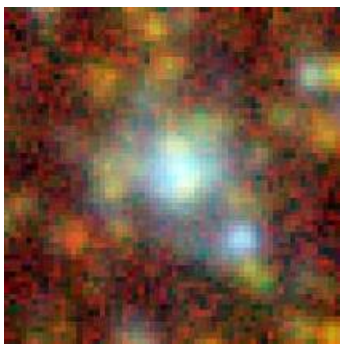
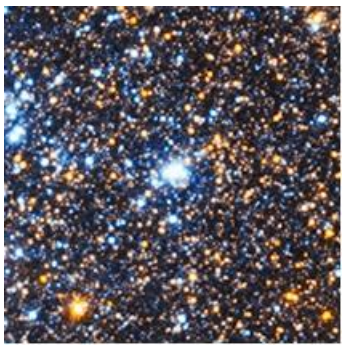
[SSA2010] 1829, [SM2007] 337

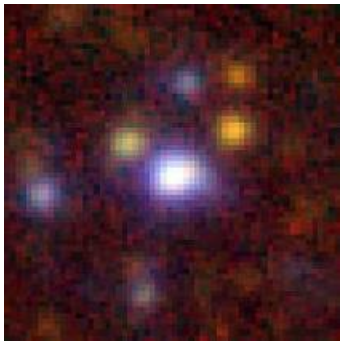


[SSA2010] 2269, [SM2007] 439

[SSA2010] 1710, [SM2007] 275

[SSA2010] 1601, [SM2007] 222

 [SSA2010] 1207, [SM2007] --	 **[SSA2010] 1946, [SM2007] 368**	 **[SSA2010] 1659, [SM2007] 255**
 **[ZK2009] 38**	 **[SSA2010] 1953, [SM2007] 370**	 **[CM81] 05**
 **[SSA2010] 1641, [SM2007] --**	 **[SSA2010] 1546, [SM2007] 198**	 [SSA2010] 1570, [SM2007] --
 **[SSA2010] 1720, [SM2007] 284**	 [SSA2010] 1760, [SM2007] 313	 **[ZK2009] 64**

 **[SSA2010] 1374, [SM2007] 156**	 **[SSA2010] 1748, [SM2007] 305**	 **[SSA2010] 1637, [SM2007] 243**
 [SSA2010] 1112, [SM2007] 59	 [SSA2010] 1106, [SM2007] --	 **[SSA2010] 1311, [SM2007] 140**
 **[SSA2010] 1957, [SM2007] 371**	 **[SSA2010] 1906, [SM2007] --**	 **[SSA2010] 2075, [SM2007] 402**
 **[SSA2010] 1639, [SM2007] 245**	 **[SSA2010] 2218, [SM2007] 427**	 **[SSA2010] 1203, [SM2007] 95**