

Robert Wood's Astronomical League Observation Record – Globular Clusters



Messier 12 in Ophiuchus

Introduction

This project was initiated in the summer of 2023 and is the first official AL observing program that I undertook. It was originally submitted on July 20th, 2023, with 52 objects. The list contains 3 of the AL Challenge Object List: NGC 4147, NGC 5053 and NGC 5466.

The Shapley Cluster Classifications are my estimates. Where my estimate differed from published values, I noted the published values in parenthesis. My estimates were correct 41% of the time. I was within +/- 1 75% of the time and +/- 2 89%. The clusters that proved most difficult were the small angular diameter clusters. My scope and camera setup just did not have enough focal length to be able to resolve these clusters to the point that I could accurately estimate their concentration classifications.

All image data collected was captured by a CMOS camera using live stacking with SharpCap 4.0. Post processing was limited to converting the color images to black and white and inverting them. This was all done through Photoshop. The final image was cropped square to fit the format of the log better. The image sizes are all the same, 3672 by 3672 pixels. This gives the benefit of maintaining the relative object sizes for an observer. The field of view of the final cropped image is 53 x 53 arcminutes, or just under 1 square degree.

The decision to convert the images to black and white and to invert them was made for two reasons, the first was practical as it reduced the overall file size of the logbook which would facilitate the submission of it. The second reason was that it made the fainter, more distributed clusters stand out more. The final effect of this decision was the production of an old school photographic plate type appearance which I very much liked.

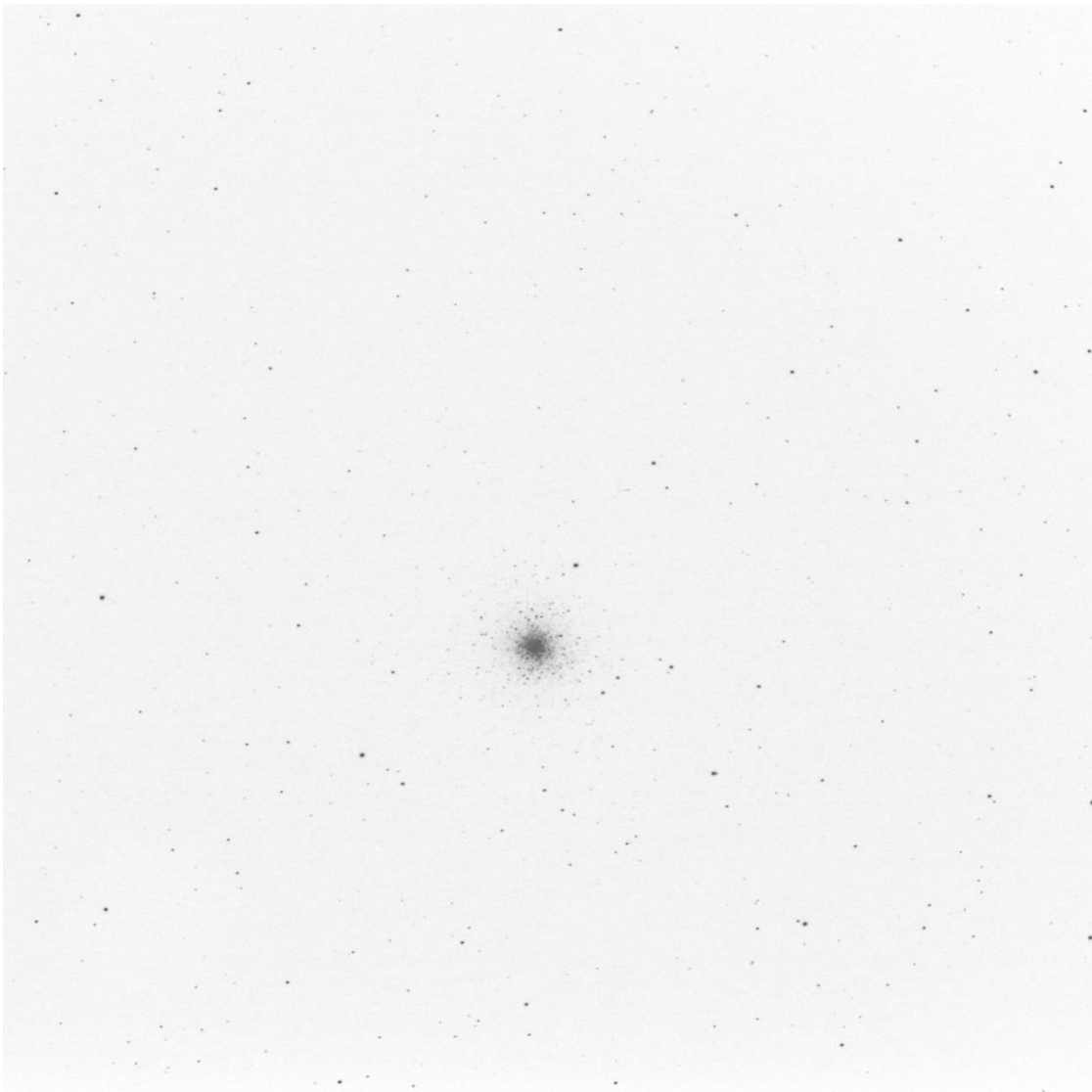
This was a great summertime project, and I was lucky enough to have a string of clear, moonless evenings to be able to complete the first 52. My plans are to continue to grab some of the remaining on the list and particularly the Andromeda globulars. I see this as a great challenge, but I need to wait a few more months until it is in a more favorable position in the sky.

Robert Wood

AL Member-at-Large

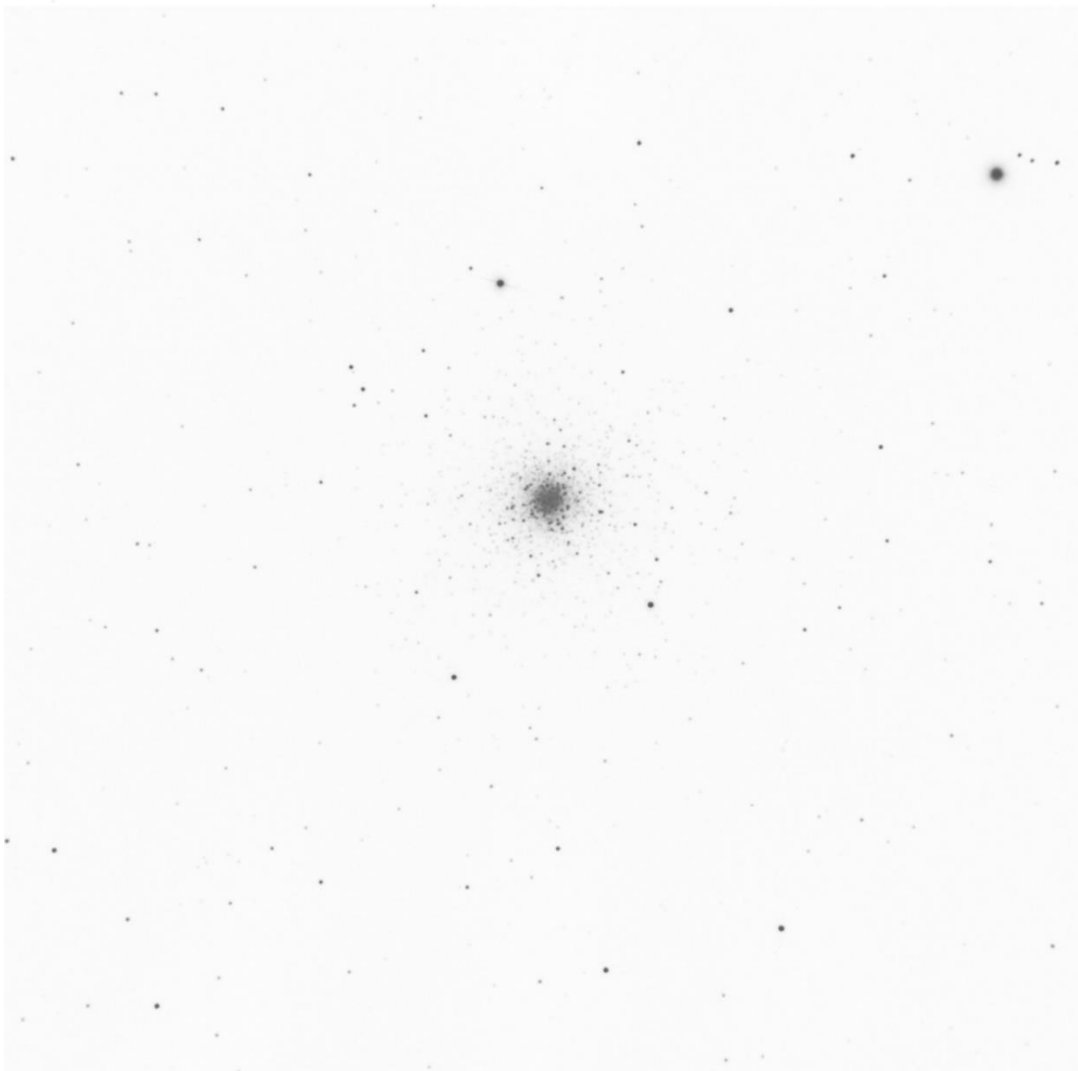
Observation Log Sheet

Object	Messier 2	Date	9/2/2023
Constellation	Aquarius	Time	22:15 CT
Magnitude	6.6	Sky: Transparency	Below Average
Concentration Class	II	Seeing	Average
Distance (ly)	49000	Location	West Columbia TX
Diameter (ly)	290	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	186	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



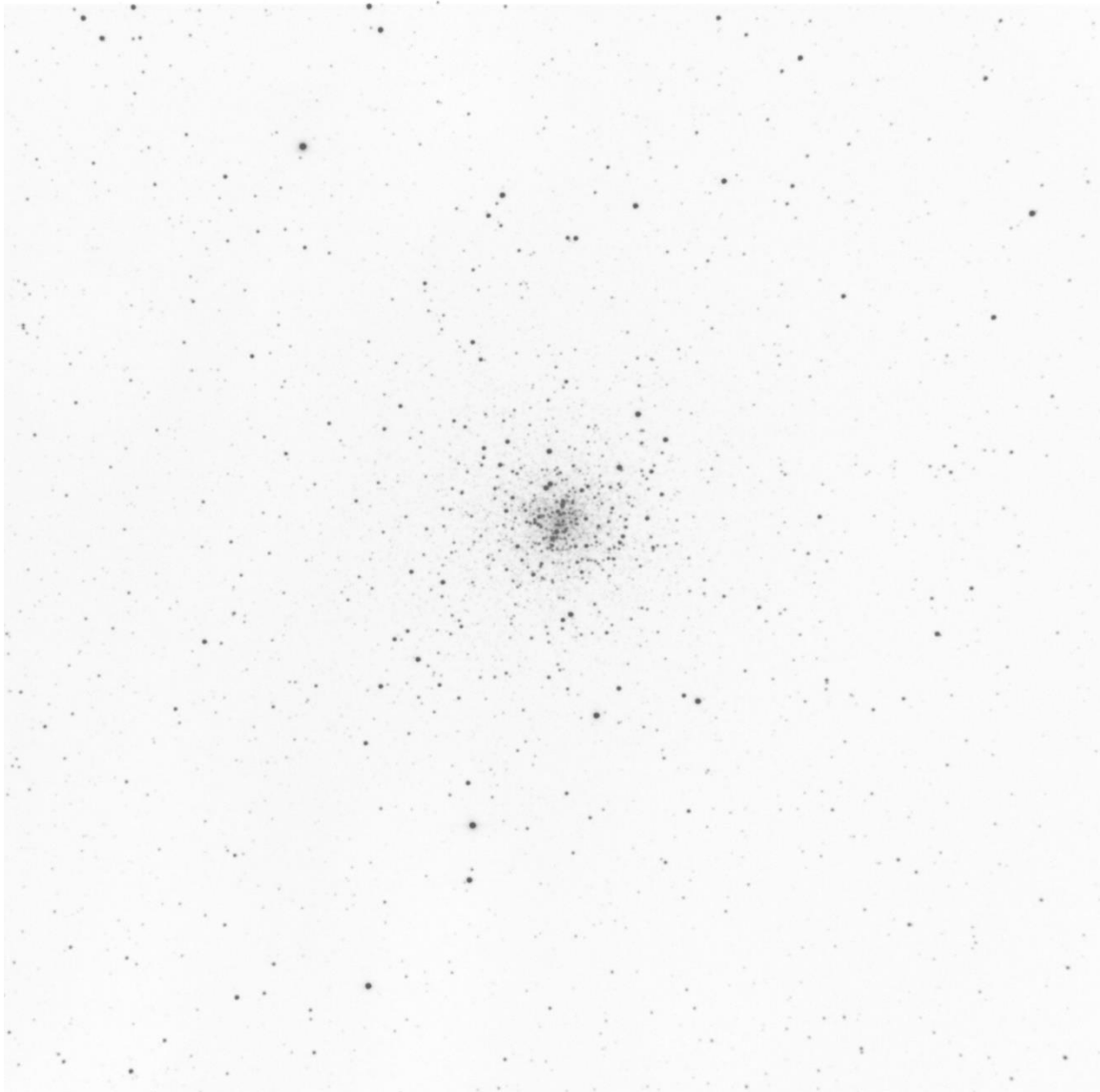
Observation Log Sheet

Object	Messier 3	Date	7/13/2023
Constellation	Canes Venatici	Time	23:45 CT
Magnitude	6.3	Sky: Transparency	Clear
Concentration Class	III (VI)	Seeing	Average
Distance (ly)	42,000	Location	West Columbia TX
Diameter (ly)	220	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	67	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



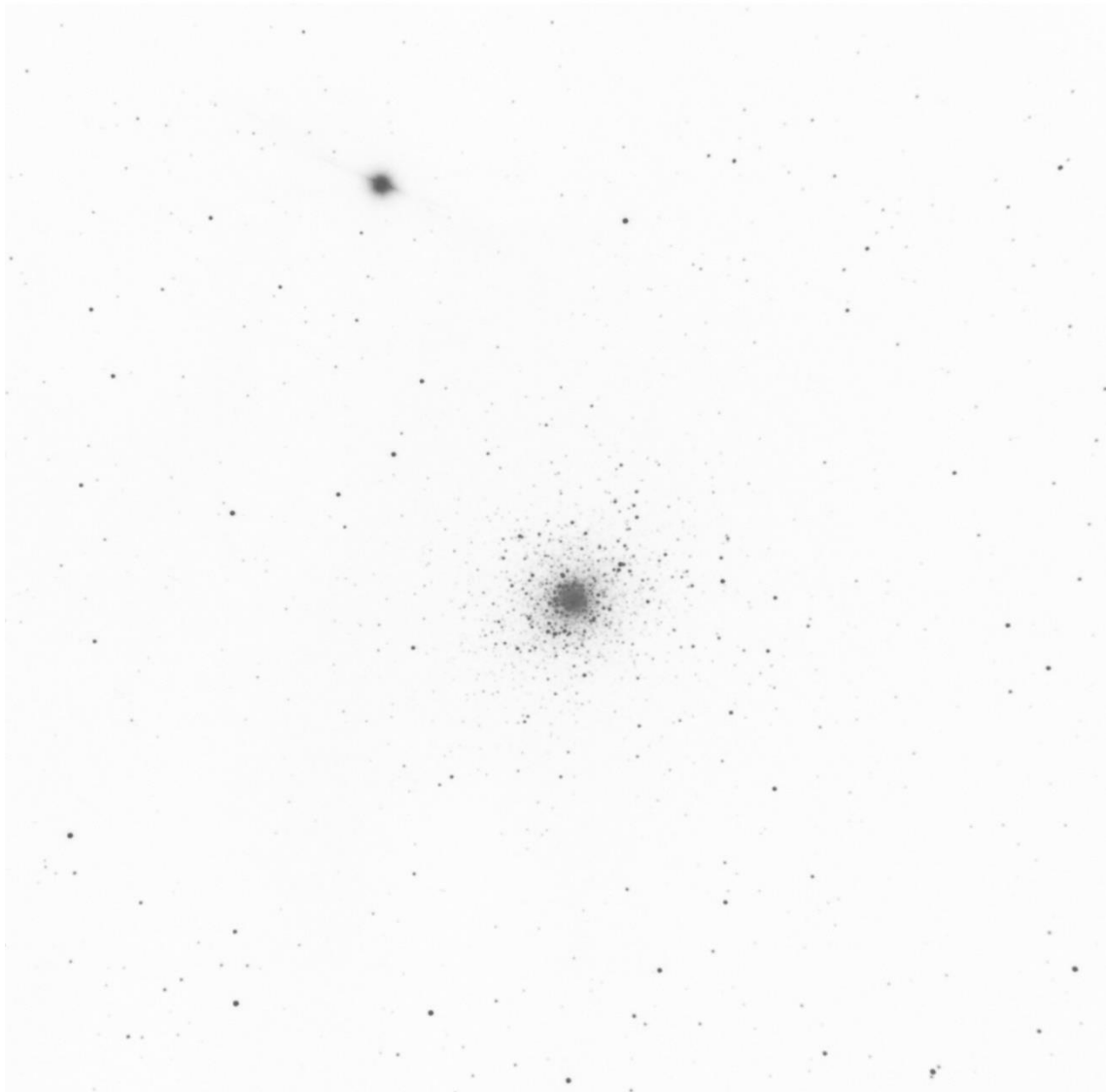
Observation Log Sheet

Object	Messier 4	Date	7/13/2023
Constellation	Scorpius	Time	23:59 CDST
Magnitude	5.4	Sky: Transparency	Clear
Concentration Class	IX	Seeing	Average
Distance (ly)	9,800	Location	West Columbia TX
Diameter (ly)	100	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	85	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



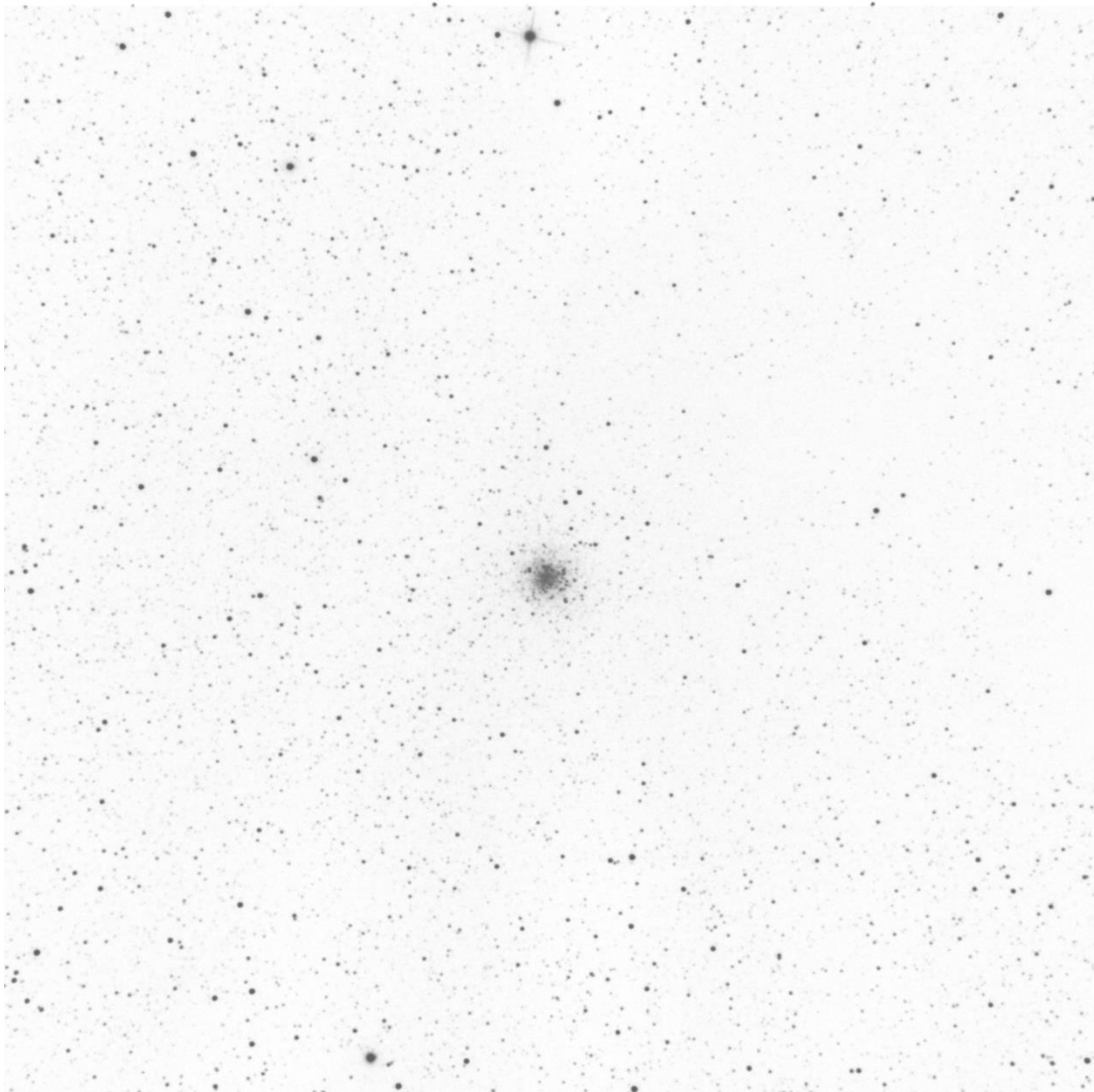
Observation Log Sheet

Object	Messier 5	Date	7/13/2023
Constellation	Serpens Caput	Time	23:39 CDST
Magnitude	5.7	Sky: Transparency	Clear
Concentration Class	VI (V)	Seeing	Average
Distance (ly)	29,000	Location	West Columbia TX
Diameter (ly)	200	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	77	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



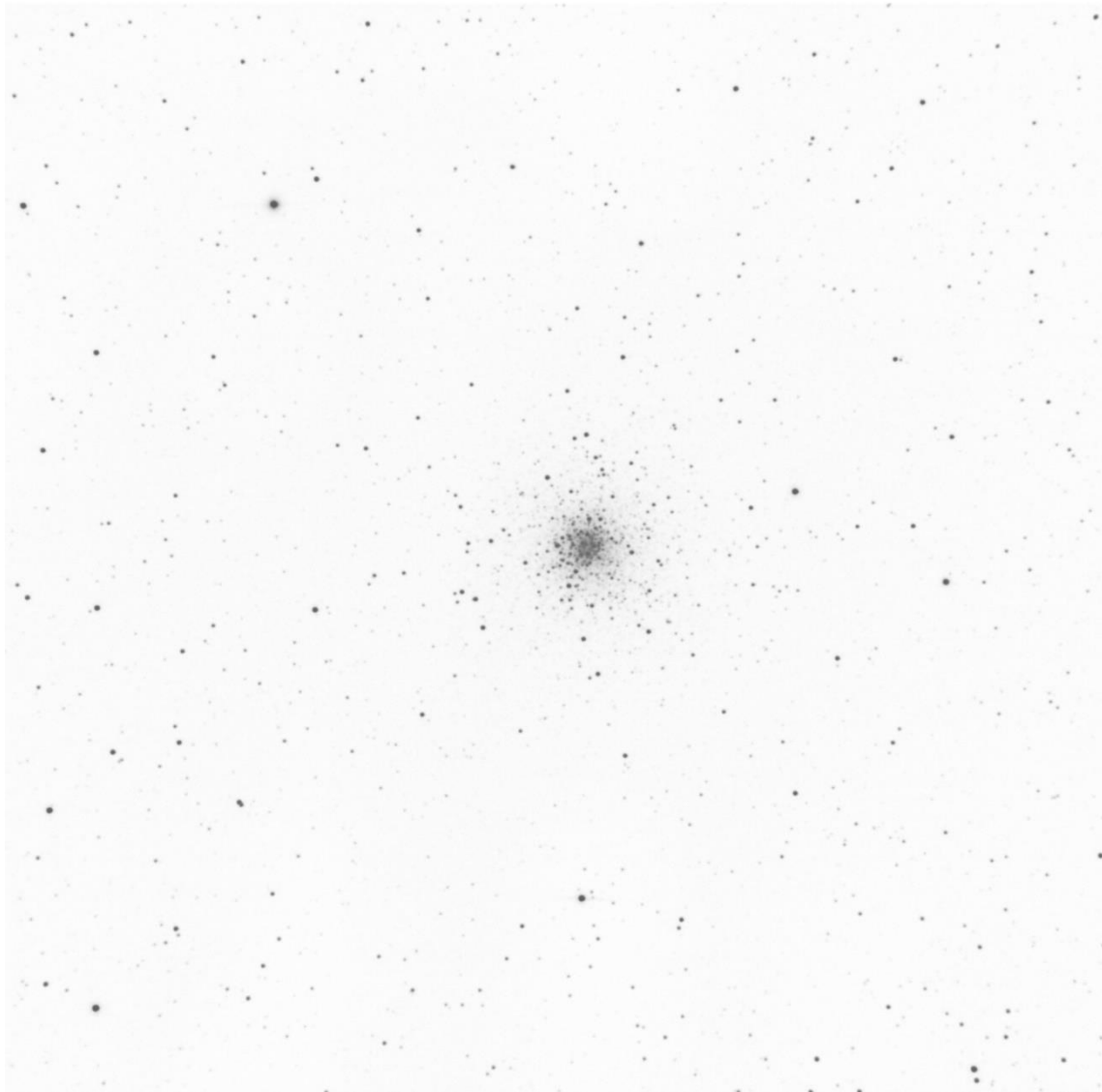
Observation Log Sheet

Object	Messier 9	Date	7/16/2023
Constellation	Ophiuchus	Time	00:16 CDST
Magnitude	7.8	Sky: Transparency	Clear
Concentration Class	V (VIII)	Seeing	Average
Distance (ly)	26,000	Location	West Columbia TX
Diameter (ly)	91	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	108	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



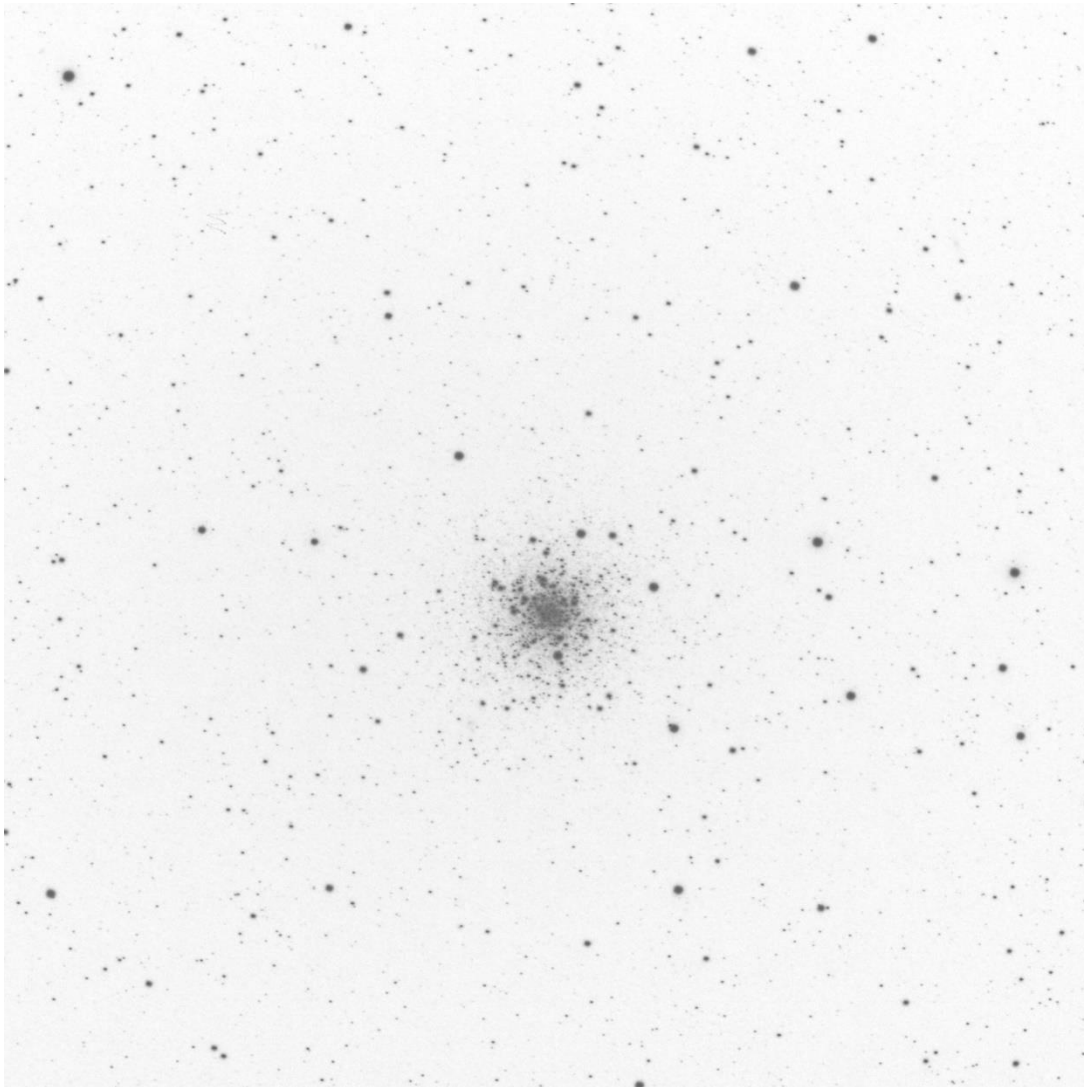
Observation Log Sheet

Object	Messier 10	Date	7/14/2023
Constellation	Ophiuchus	Time	22:53 CDST
Magnitude	5.6	Sky: Transparency	Clear
Concentration Class	VI (VII)	Seeing	Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	130	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	96	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



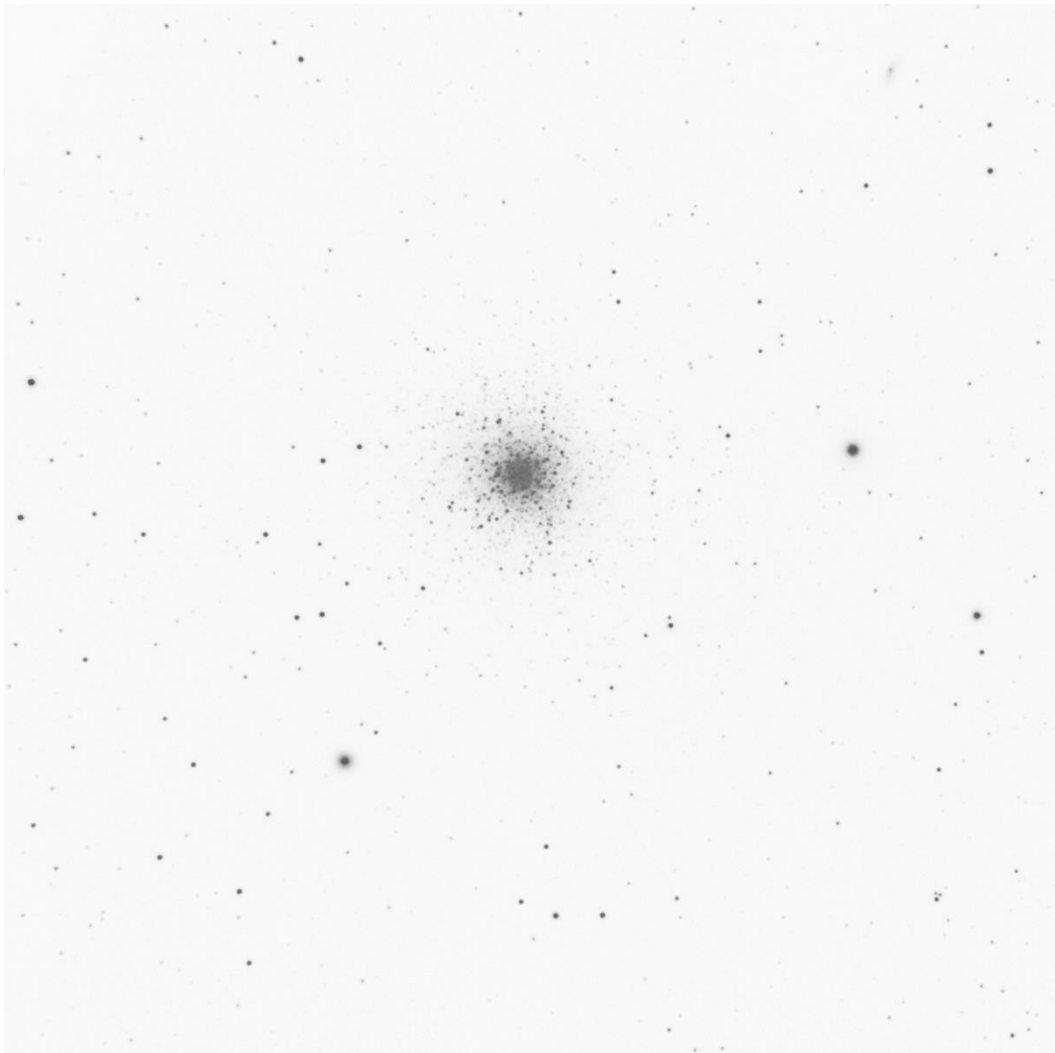
Observation Log Sheet

Object	Messier 12	Date	7/19/2023
Constellation	Ophiuchus	Time	21:26CDST
Magnitude	6.1	Sky: Transparency	Clear
Concentration Class	IX	Seeing	Above Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	94	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



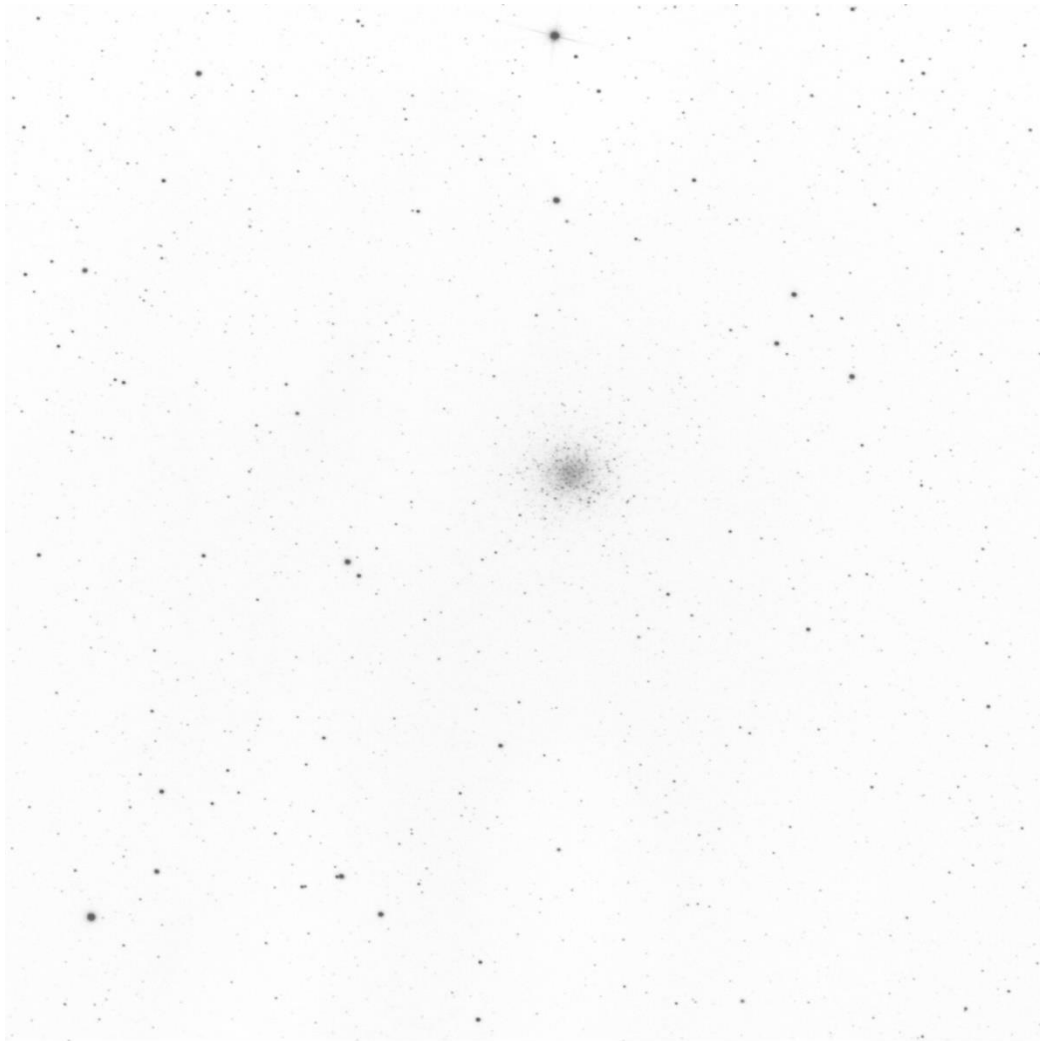
Observation Log Sheet

Object	Messier 13	Date	7/13/2023
Constellation	Hercules	Time	22:21 CDST
Magnitude	5.8	Sky: Transparency	Clear
Concentration Class	V	Seeing	Average
Distance (ly)	26,000	Location	West Columbia TX
Diameter (ly)	150	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	92	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



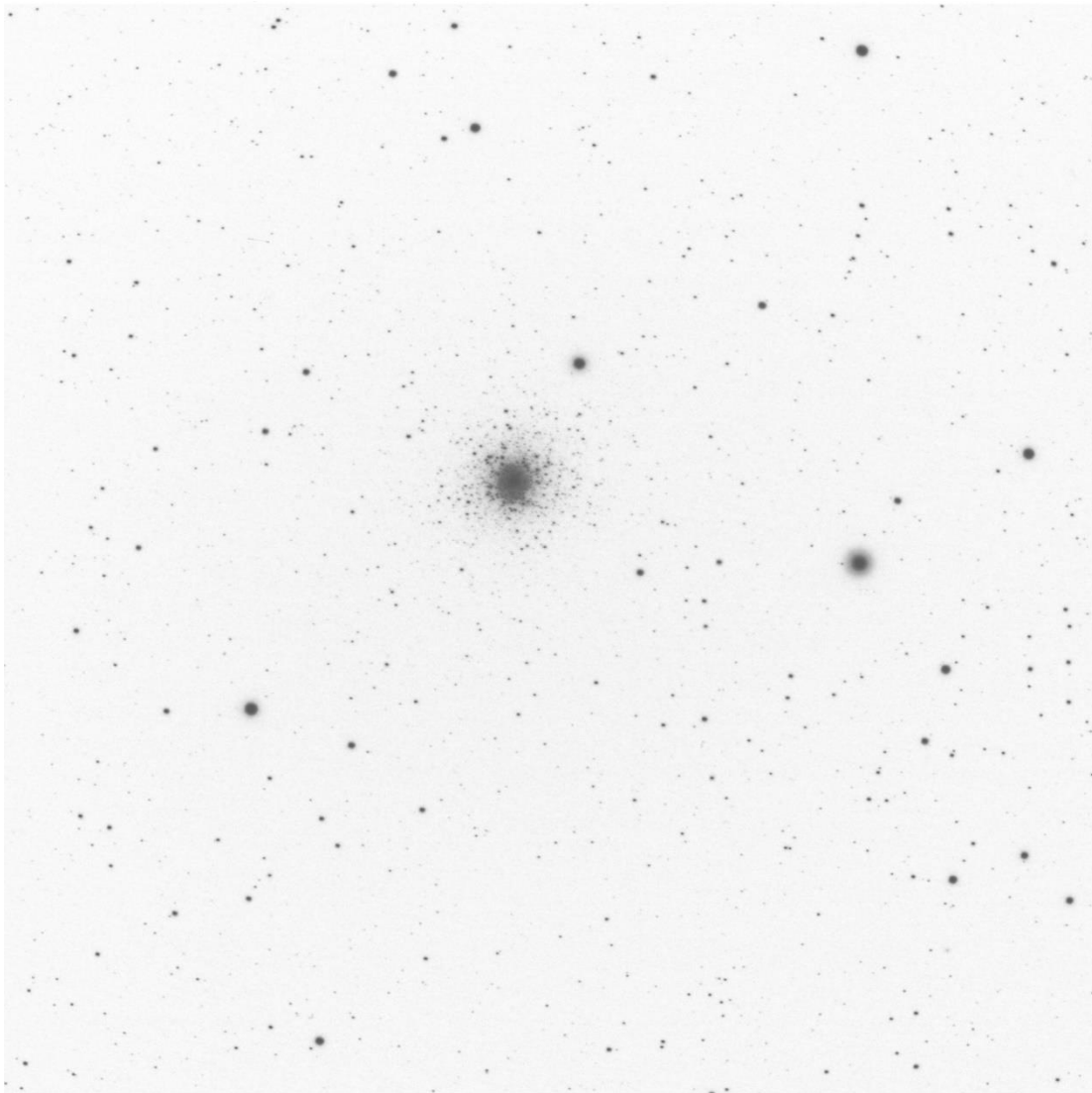
Observation Log Sheet

Object	Messier 14	Date	7/16/2023
Constellation	Ophiuchus	Time	21:17 CDST
Magnitude	7.6	Sky: Transparency	Some Haze
Concentration Class	VIII	Seeing	Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	73	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	125	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



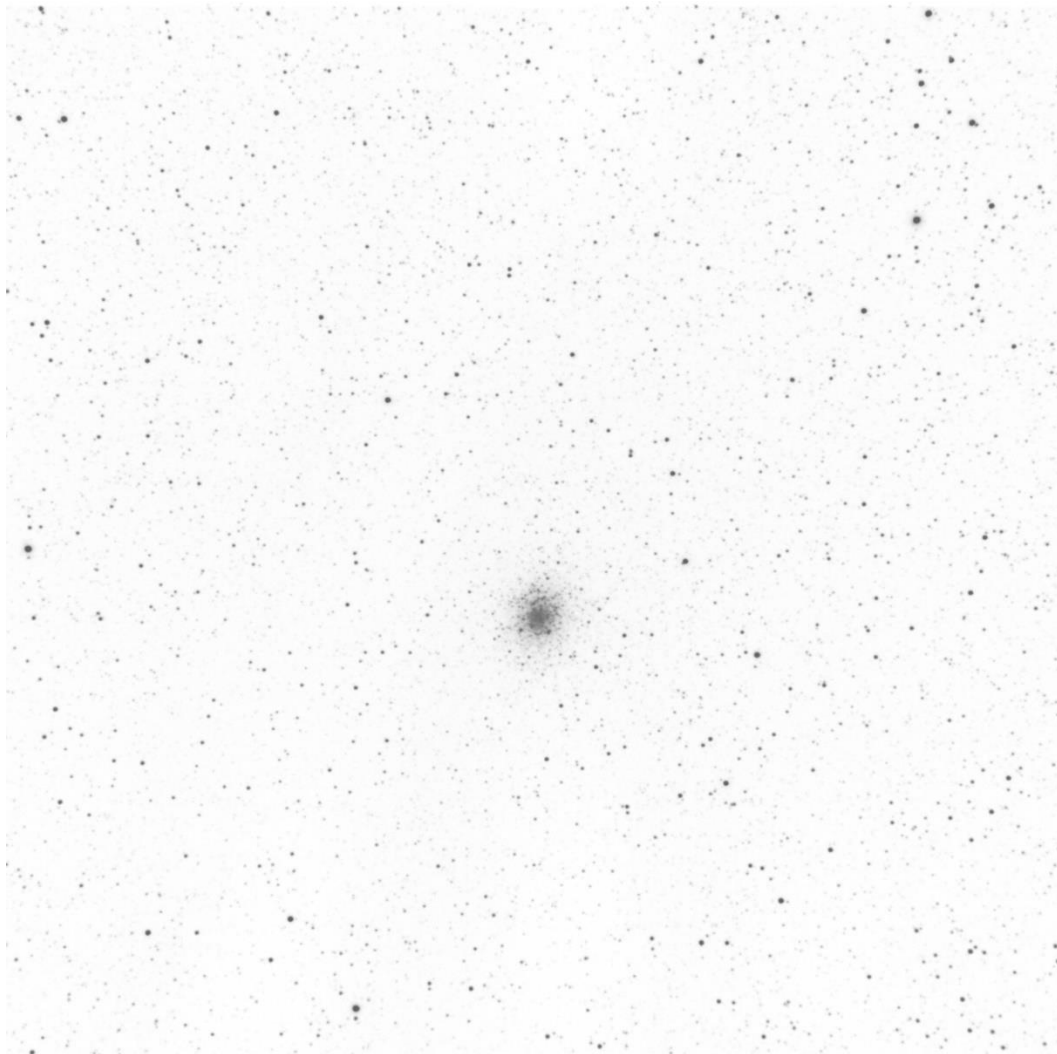
Observation Log Sheet

Object	Messier 15	Date	7/19/2023
Constellation	Pegasus	Time	23:12 CDST
Magnitude	6.3	Sky: Transparency	Clear
Concentration Class	III (IV)	Seeing	Above Average
Distance (ly)	42,000	Location	West Columbia TX
Diameter (ly)	220	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	185	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



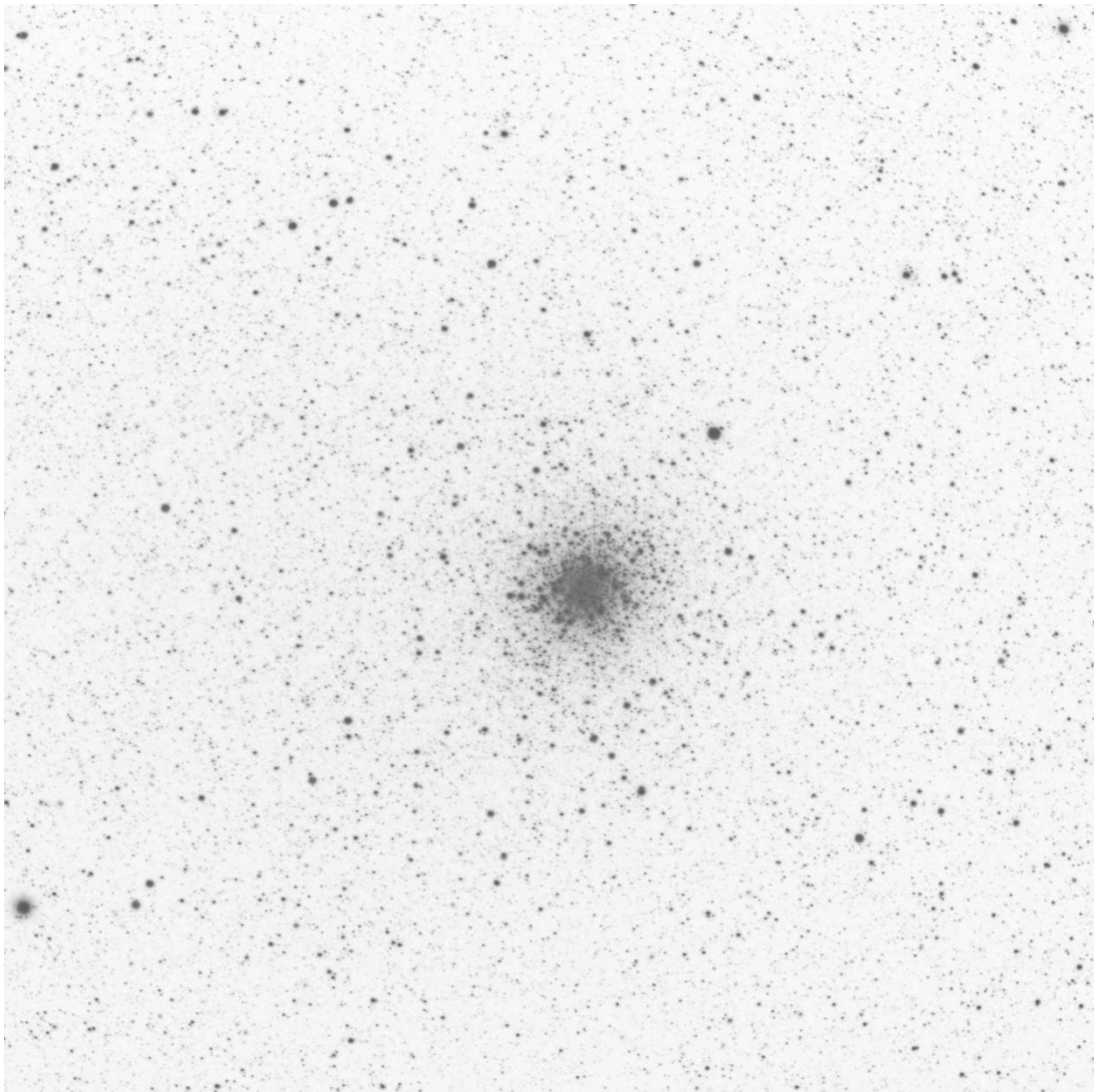
Observation Log Sheet

Object	Messier 19	Date	7/15/2023
Constellation	Ophiuchus	Time	23:13 CDST
Magnitude	6.8	Sky: Transparency	Clear
Concentration Class	VIII	Seeing	Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	100	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



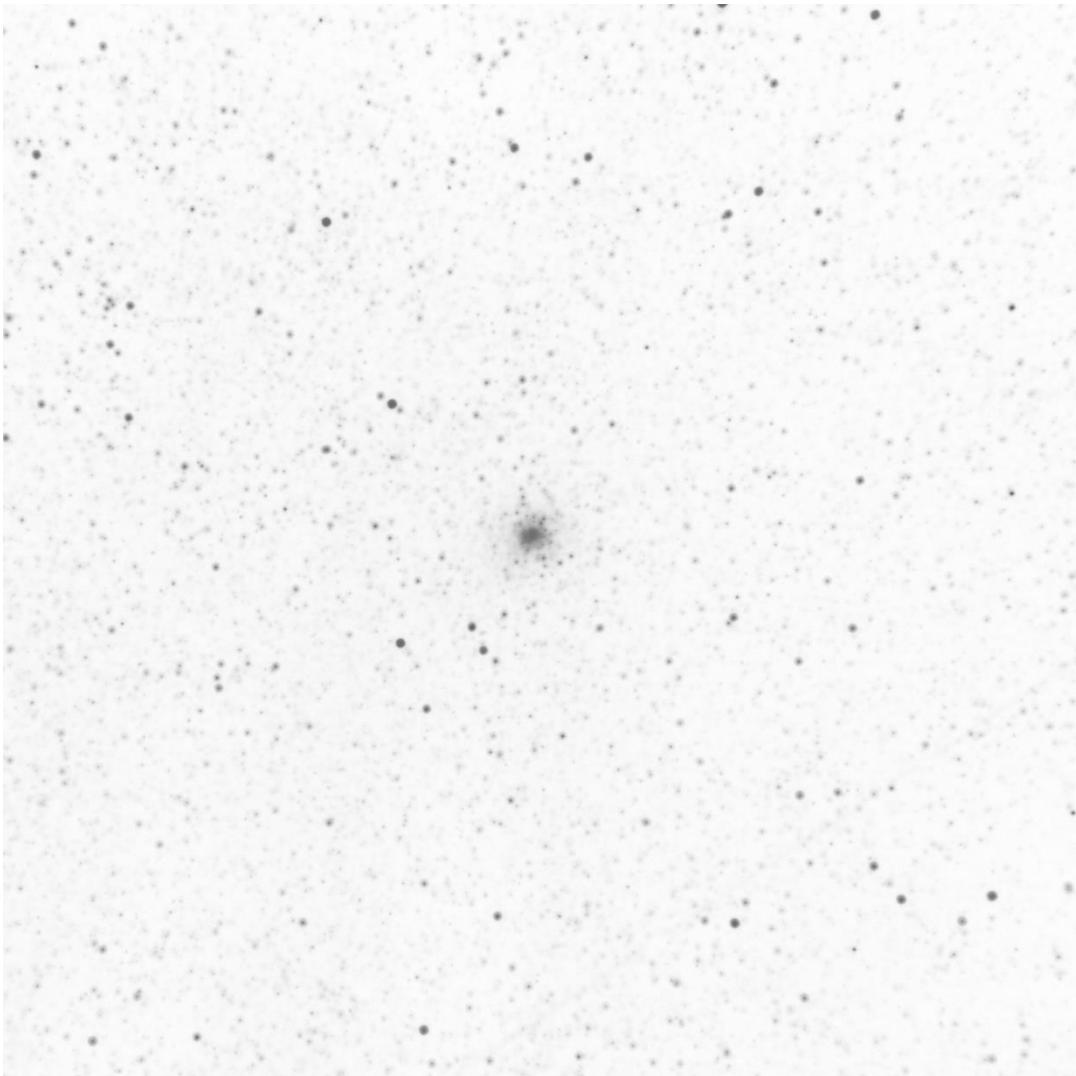
Observation Log Sheet

Object	Messier 22	Date	7/19/2023
Constellation	Sagittarius	Time	22:07 CDST
Magnitude	5.2	Sky: Transparency	Clear
Concentration Class	VI (VII)	Seeing	Above Average
Distance (ly)	9,800	Location	West Columbia TX
Diameter (ly)	91	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	163	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



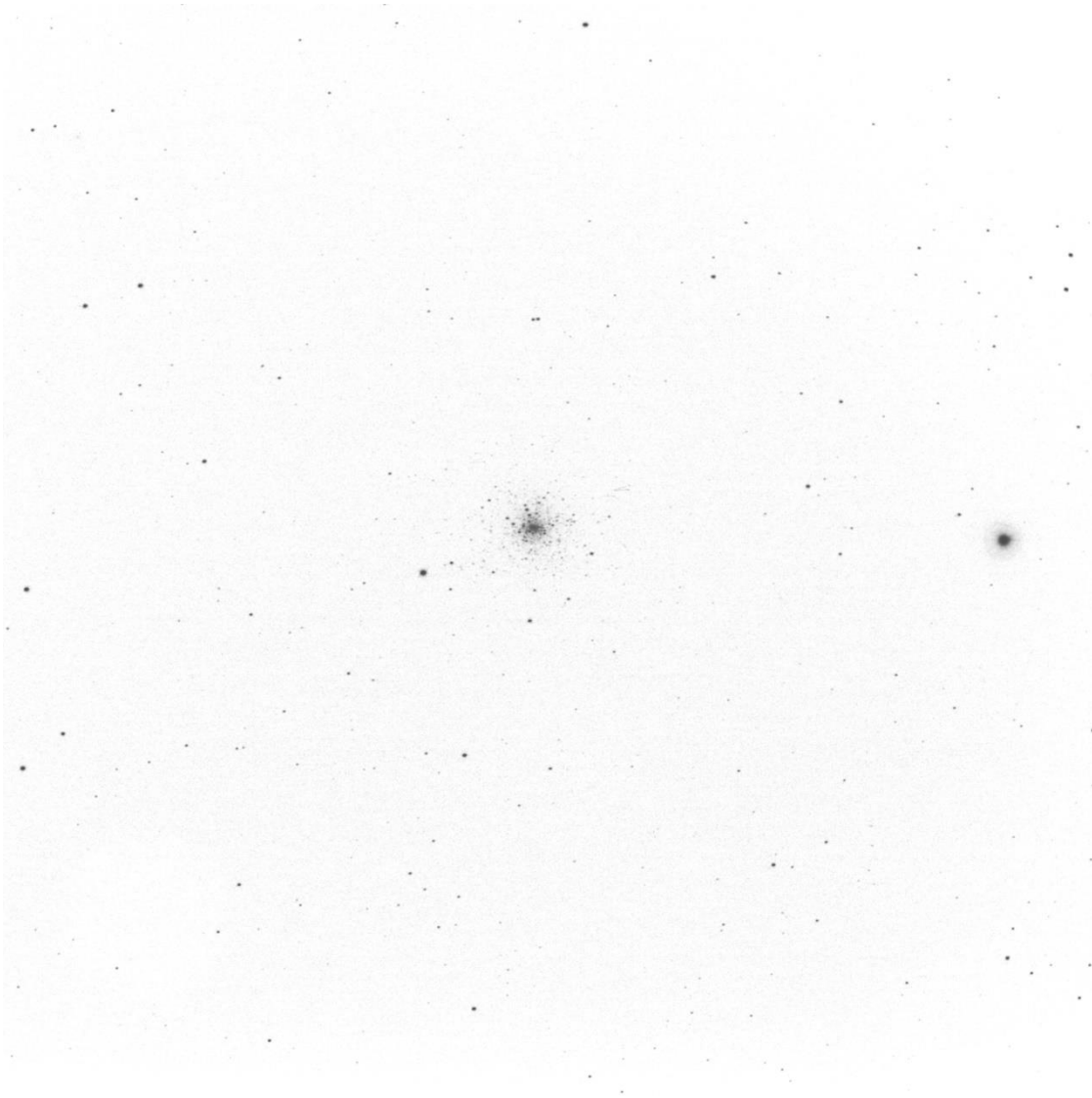
Observation Log Sheet

Object	Messier 28	Date	7/19/2023
Constellation	Sagittarius	Time	21:59 CDST
Magnitude	6.9	Sky: Transparency	Clear
Concentration Class	V (IV)	Seeing	Above Average
Distance (ly)	16,000	Location	West Columbia TX
Diameter (ly)	65	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	158	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



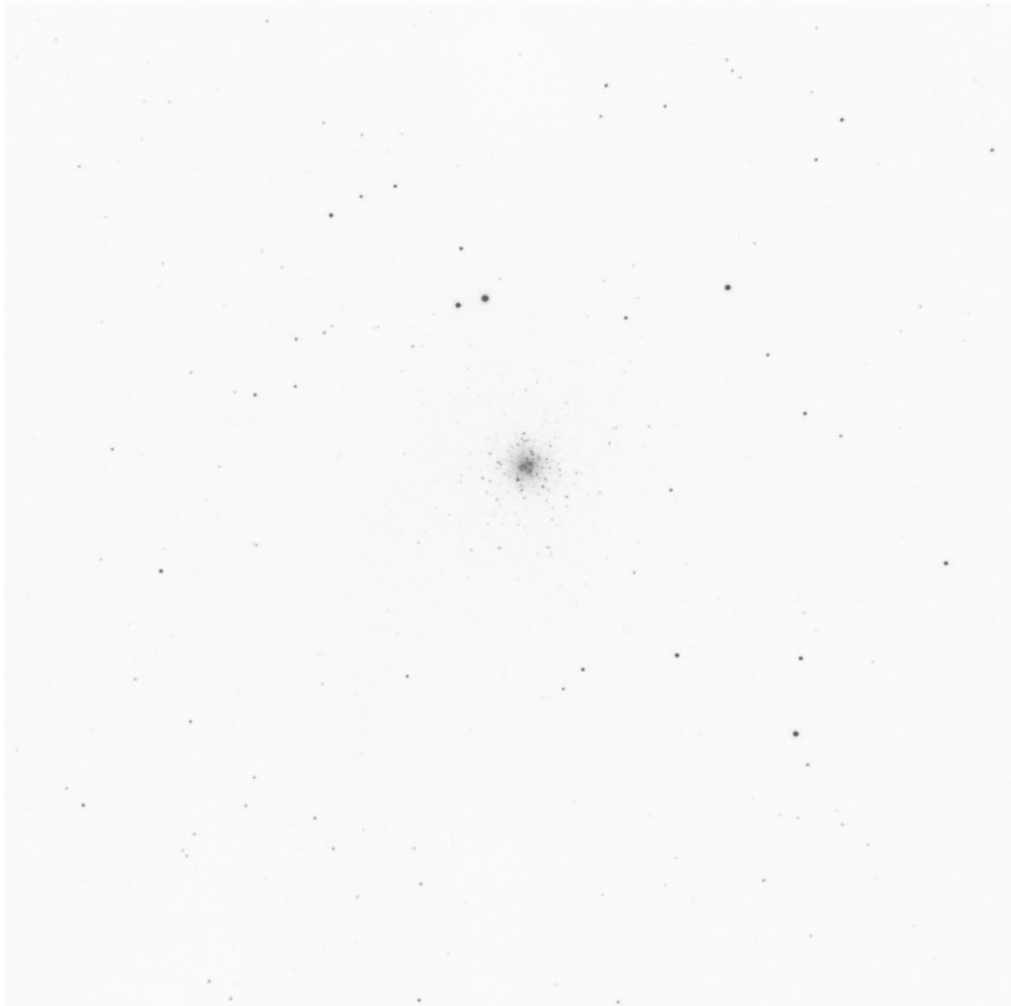
Observation Log Sheet

Object	Messier 30	Date	9/2/2023
Constellation	Capricorn	Time	21:59 CDST
Magnitude	6.9	Sky: Transparency	Below Average
Concentration Class	IX / (V)	Seeing	Average
Distance (ly)	39,000	Location	West Columbia TX
Diameter (ly)	140	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	187	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



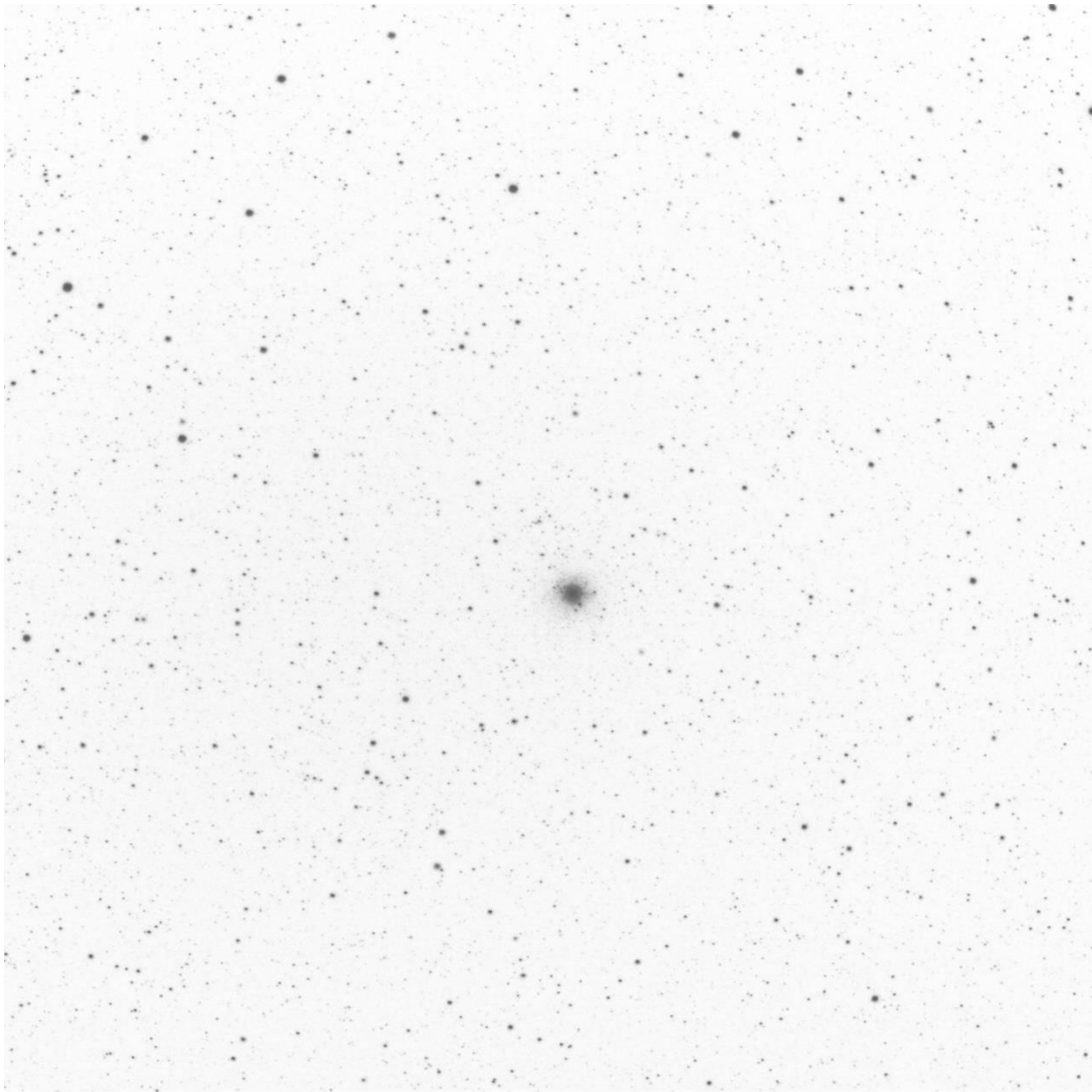
Observation Log Sheet

Object	Messier 53	Date	7/13/2023
Constellation	Coma Berenices	Time	23:08 CDST
Magnitude	7.7	Sky: Transparency	Clear
Concentration Class	V	Seeing	Average
Distance (ly)	26,000	Location	West Columbia TX
Diameter (ly)	250	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	64	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



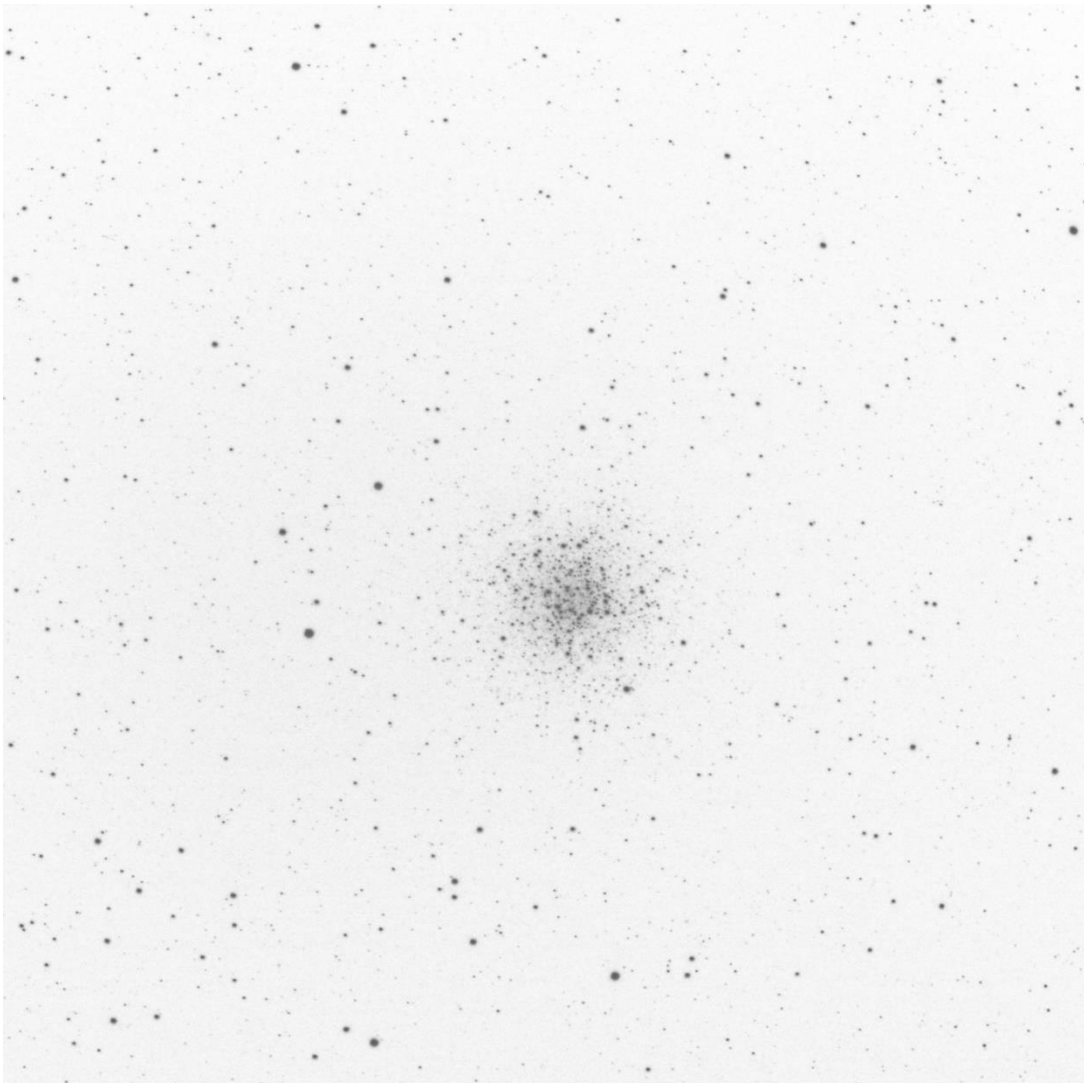
Observation Log Sheet

Object	Messier 54	Date	7/19/2023
Constellation	Sagittarius	Time	22:30 CDST
Magnitude	7.7	Sky: Transparency	Clear
Concentration Class	III	Seeing	Above Average
Distance (ly)	55,000	Location	West Columbia TX
Diameter (ly)	190	Instrument	Astro Tech AT80ED
Type	External	Camera	ZWO ASI183MC
AL Globular List #	167	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



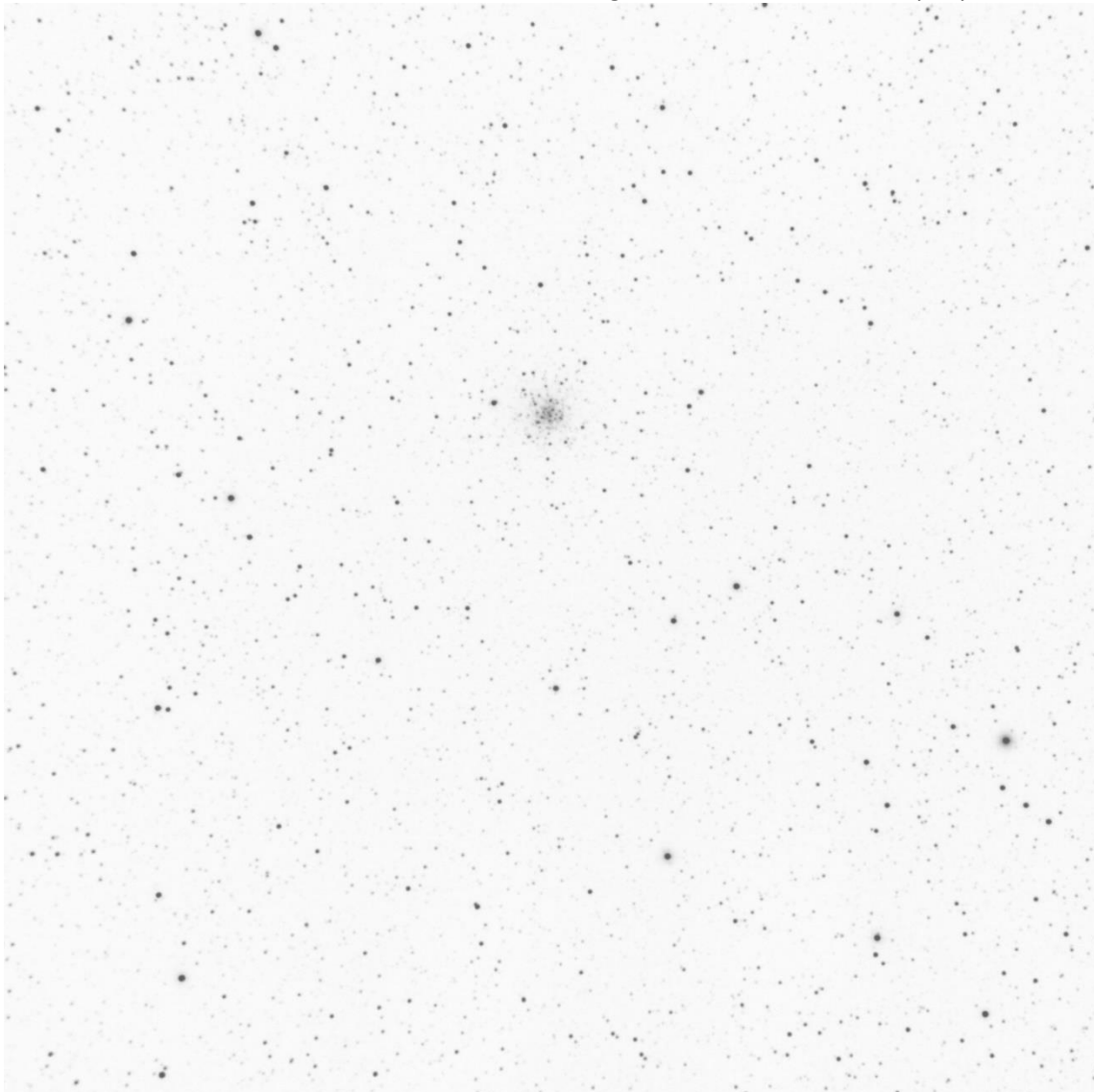
Observation Log Sheet

Object	Messier 55	Date	7/19/2023
Constellation	Sagittarius	Time	23:21 CDST
Magnitude	6.3	Sky: Transparency	Clear
Concentration Class	X (XI)	Seeing	Above Average
Distance (ly)	20,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type		Camera	ZWO ASI183MC
AL Globular List #		Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



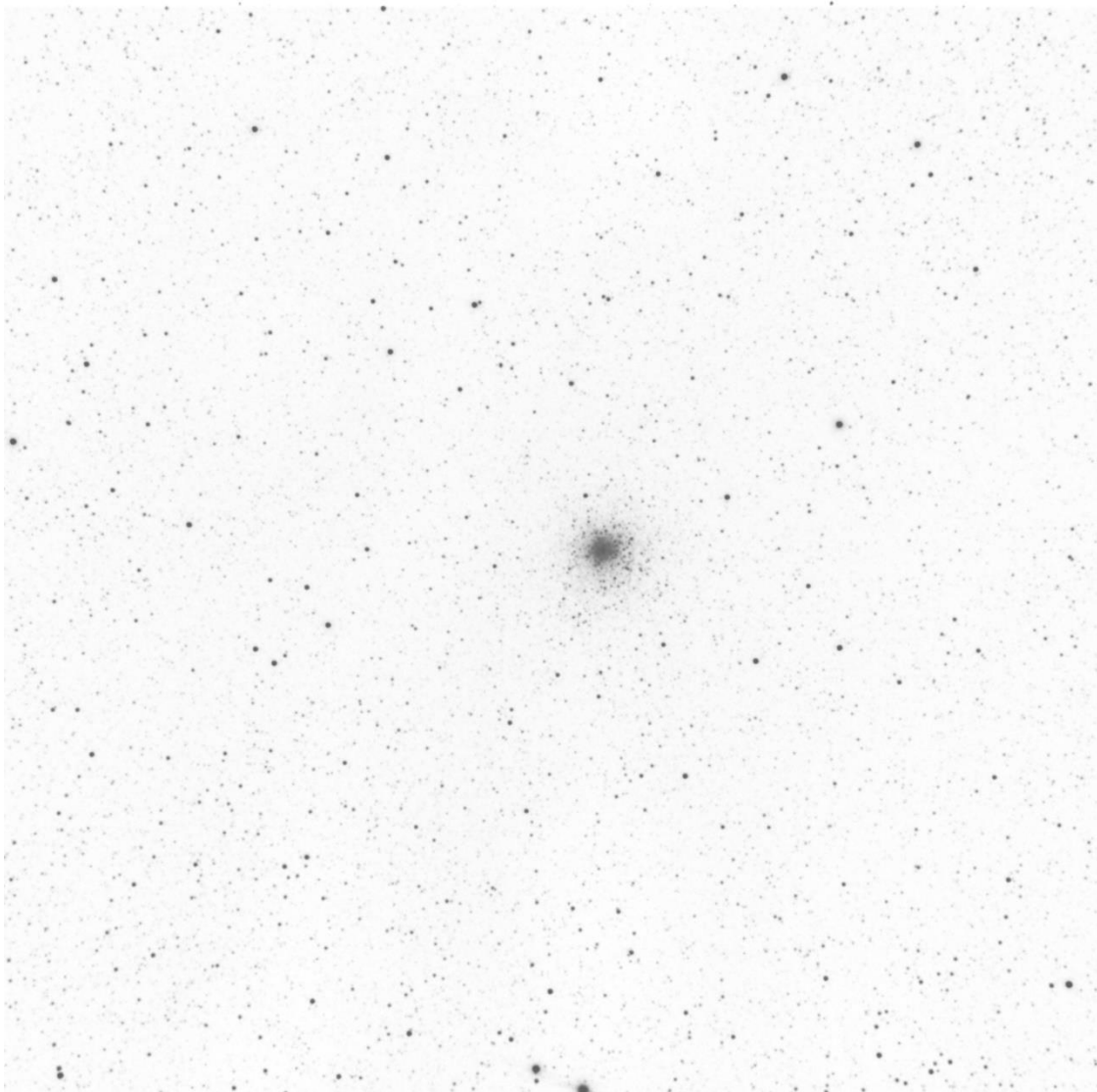
Observation Log Sheet

Object	Messier 56	Date	7/13/2023
Constellation	Lyra	Time	22:33 CDST
Magnitude	10.4	Sky: Transparency	Clear
Concentration Class	X (VIII)	Seeing	Average
Distance (ly)	42,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	173	Sub Exposure (sec)	15
		Total Exposure (min)	5
		Image Software	SharpCap 4.0



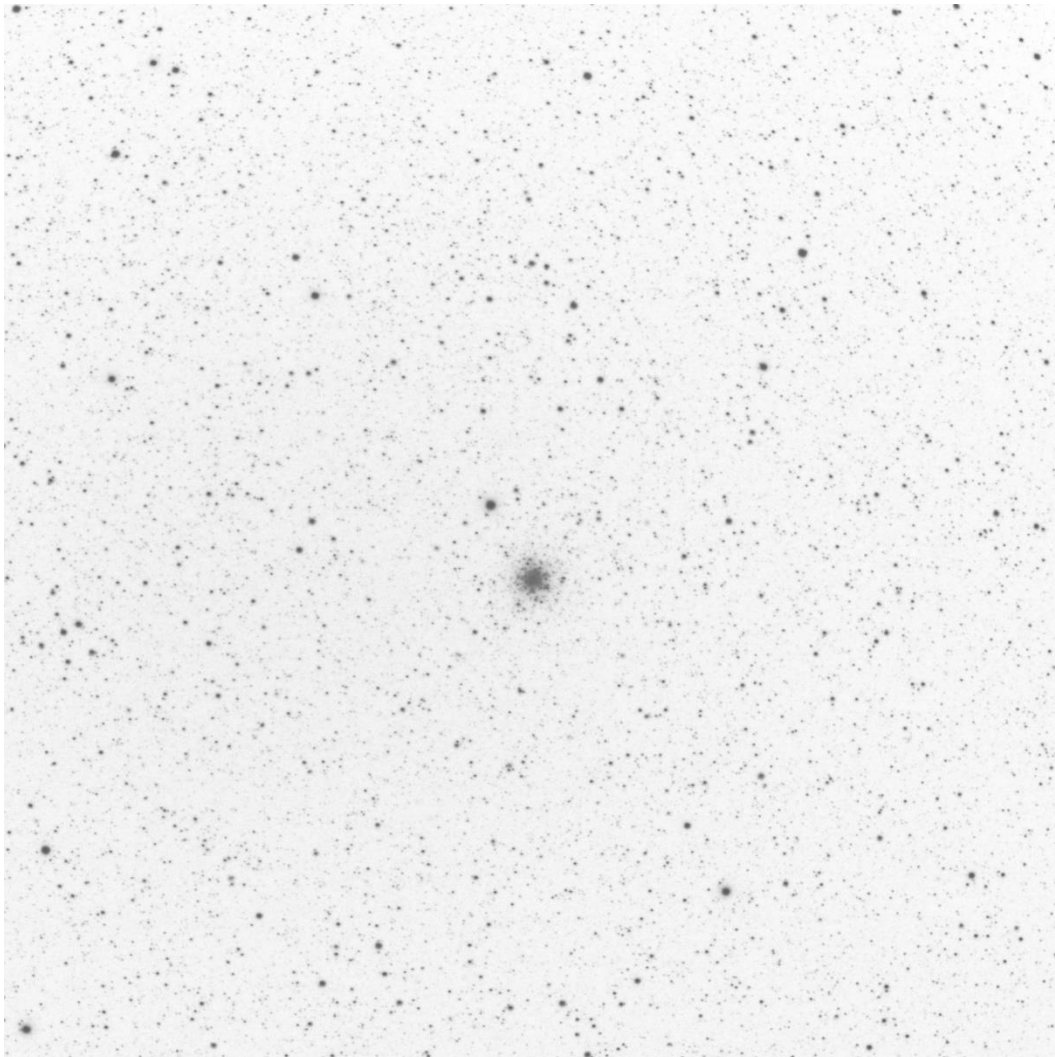
Observation Log Sheet

Object	Messier 62	Date	7/15/2023
Constellation	Ophiuchus	Time	23:05 CDST
Magnitude	6.4	Sky: Transparency	Clear
Concentration Class	V (IV)	Seeing	Average
Distance (ly)	26,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	99	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



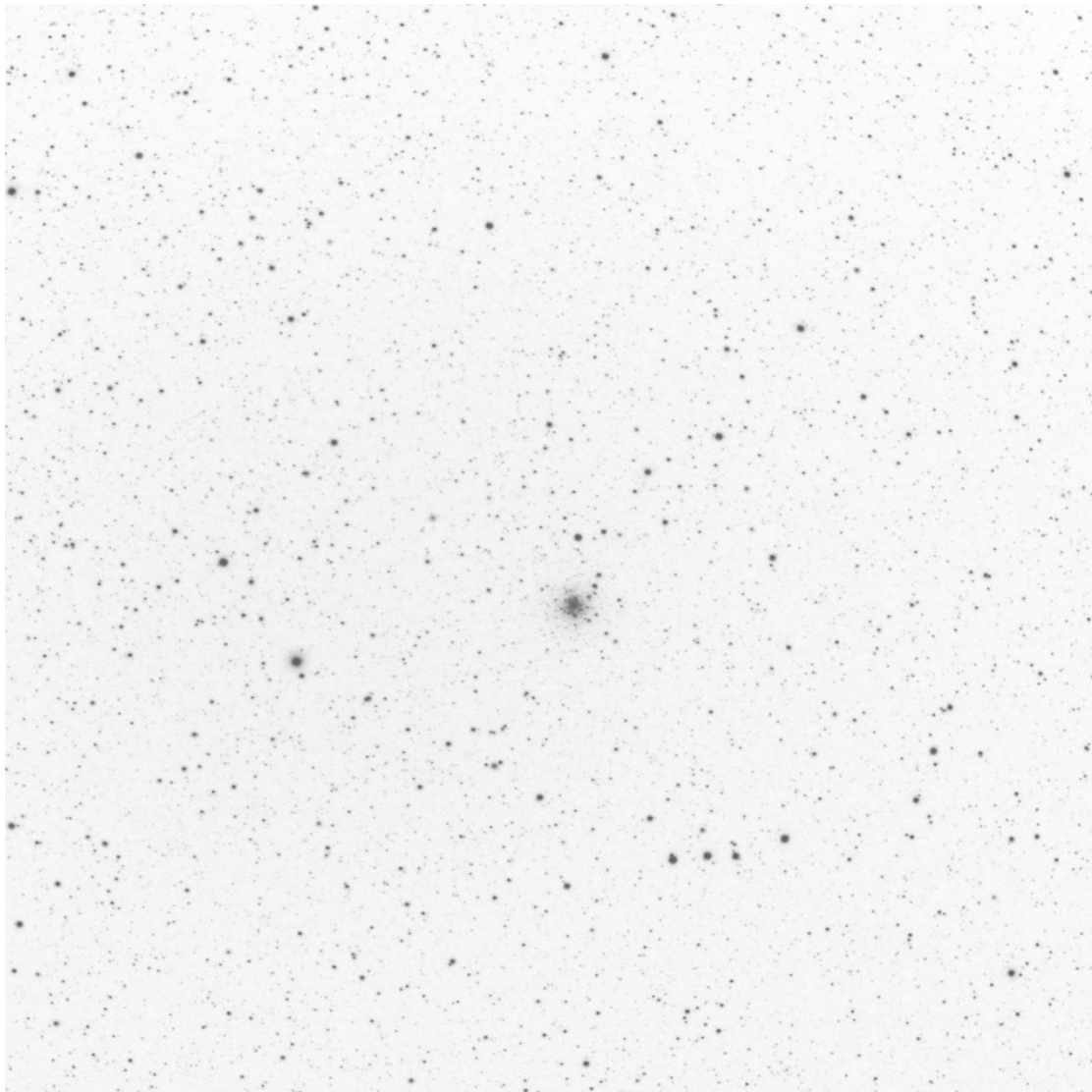
Observation Log Sheet

Object	Messier 69	Date	7/19/2023
Constellation	Sagittarius	Time	22:14 CDST
Magnitude	7.7	Sky: Transparency	Clear
Concentration Class	V	Seeing	Above Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	65	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	159	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



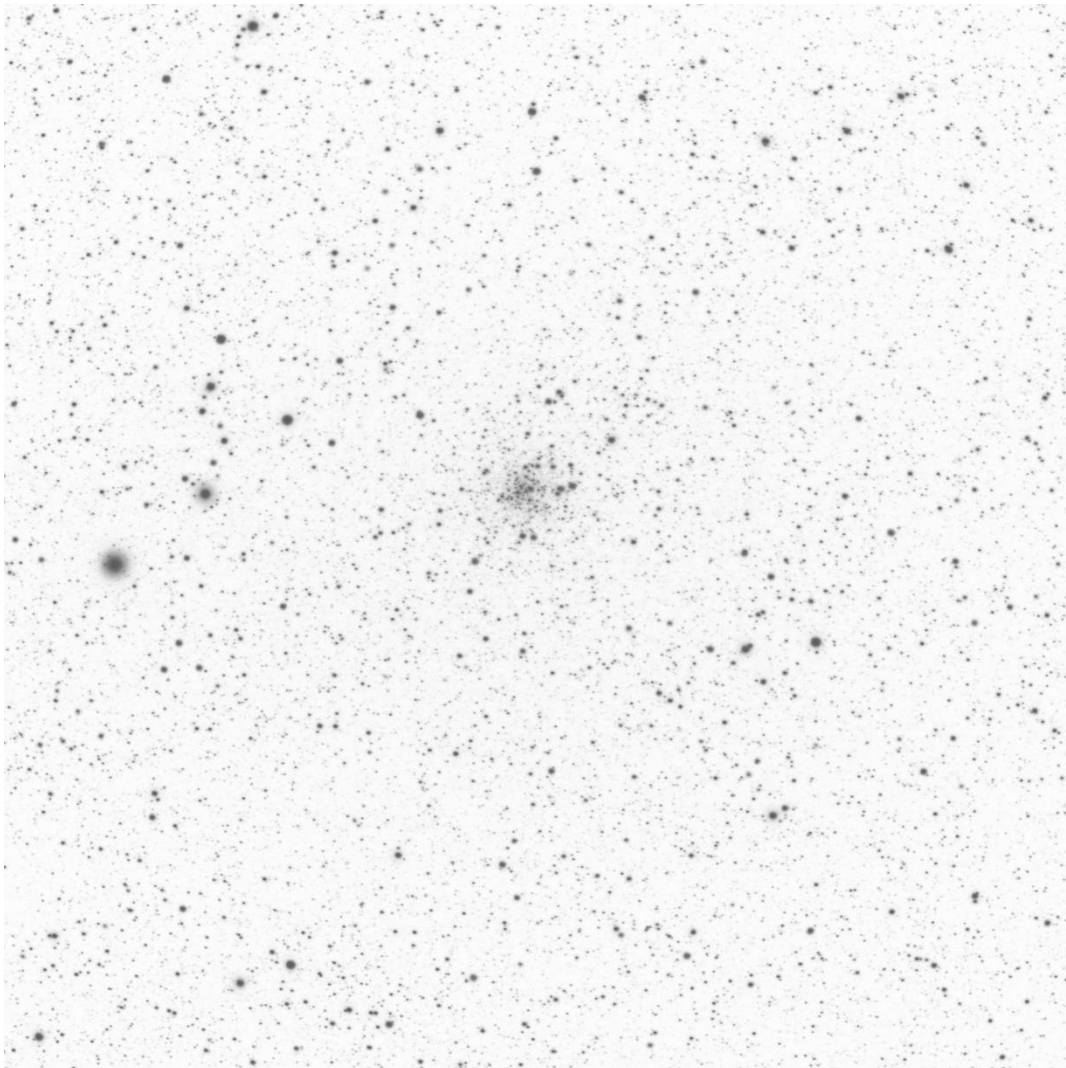
Observation Log Sheet

Object	Messier 70	Date	7/19/2023
Constellation	Sagittarius	Time	22:38 CDST
Magnitude	7.8	Sky: Transparency	Clear
Concentration Class	III (V)	Seeing	Above Average
Distance (ly)	65,000	Location	West Columbia TX
Diameter (ly)	150	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	165	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



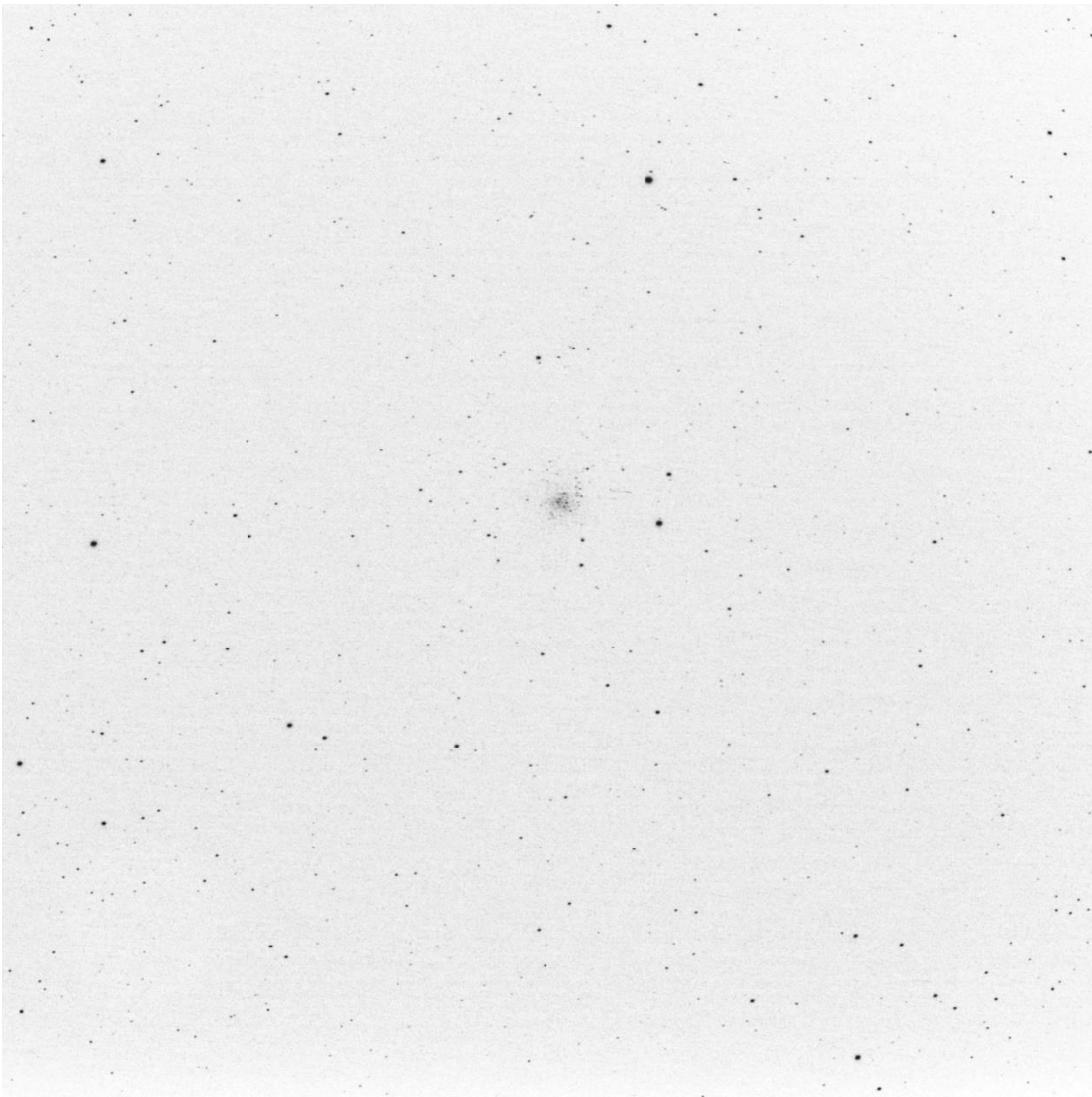
Observation Log Sheet

Object	Messier 71	Date	7/19/2023
Constellation	Sagitta	Time	23:04 CDST
Magnitude	8.4	Sky: Transparency	Clear
Concentration Class	Class VI (X)	Seeing	Above Average
Distance (ly)	16,000	Location	West Columbia TX
Diameter (ly)	19	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	180	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



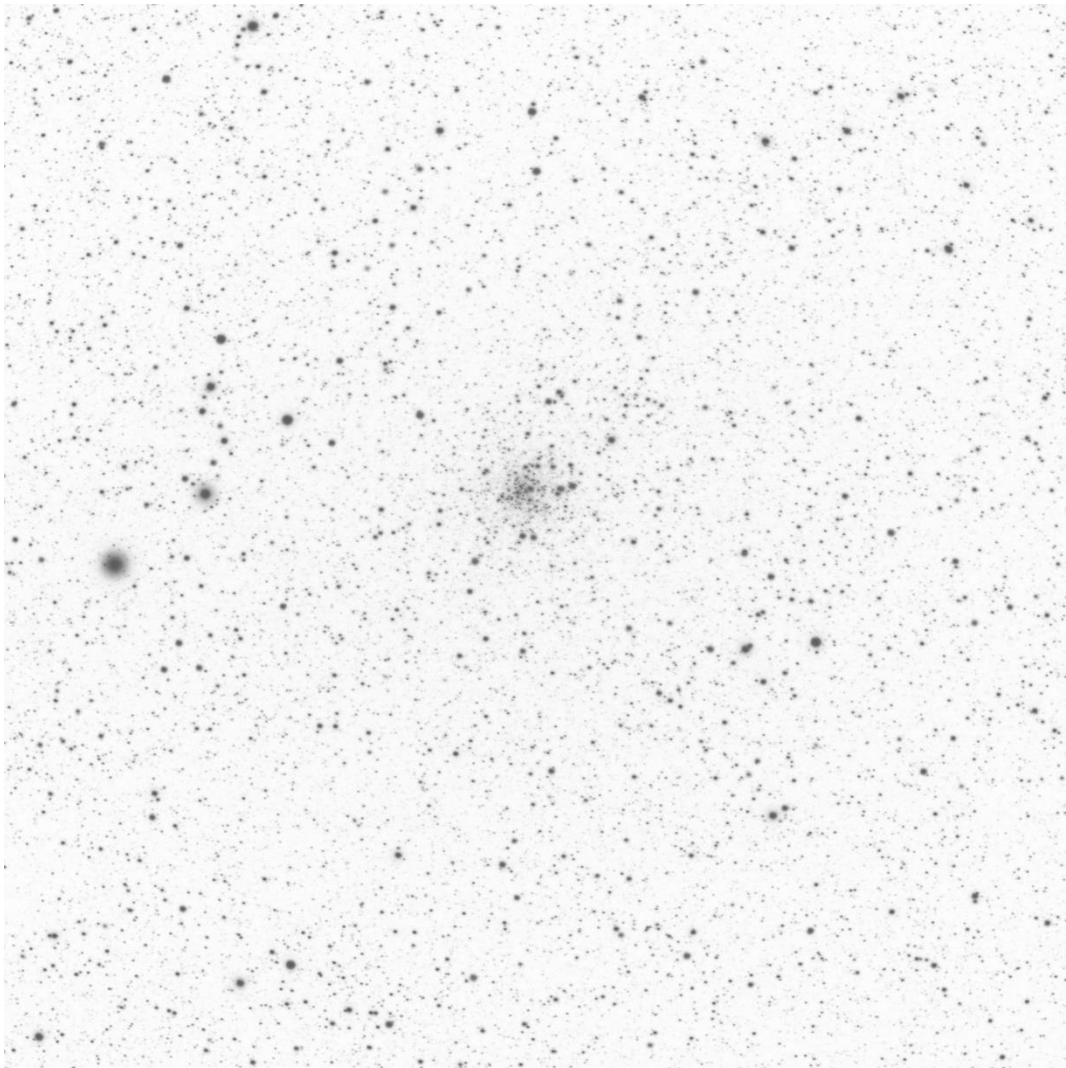
Observation Log Sheet

Object	Messier 72	Date	7/19/2023
Constellation	Aquarius	Time	23:04 CDST
Magnitude	9.2	Sky: Transparency	Clear
Concentration Class		Seeing	Above Average
Distance (ly)	68,000	Location	West Columbia TX
Diameter (ly)	130	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	183	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



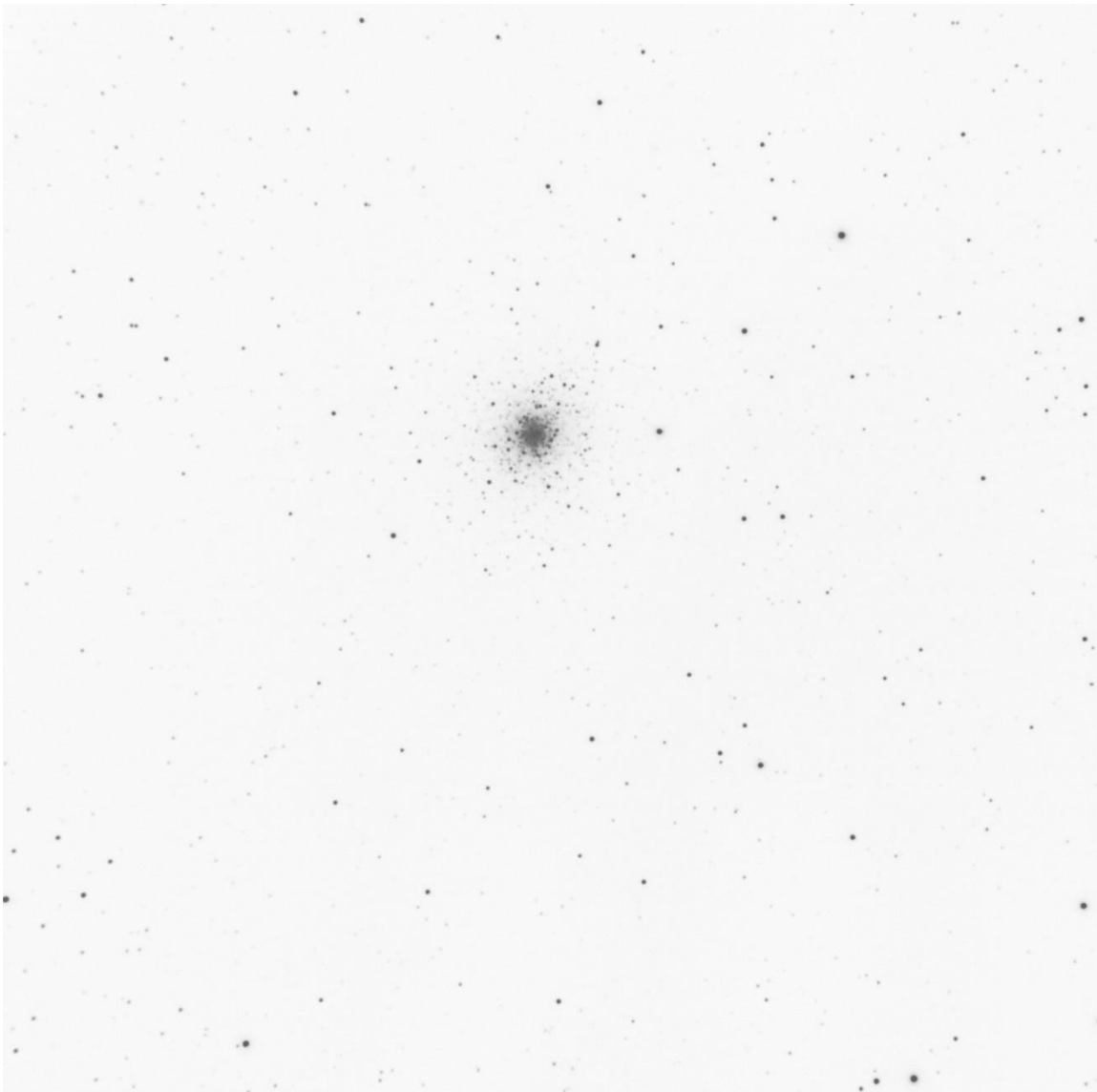
Observation Log Sheet

Object	Messier 75	Date	7/19/2023
Constellation	Sagittarius	Time	23:37 CDST
Magnitude	6.8	Sky: Transparency	Clear
Concentration Class	Class III (I)	Seeing	Above Average
Distance (ly)	95,000	Location	West Columbia TX
Diameter (ly)	190	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	181	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



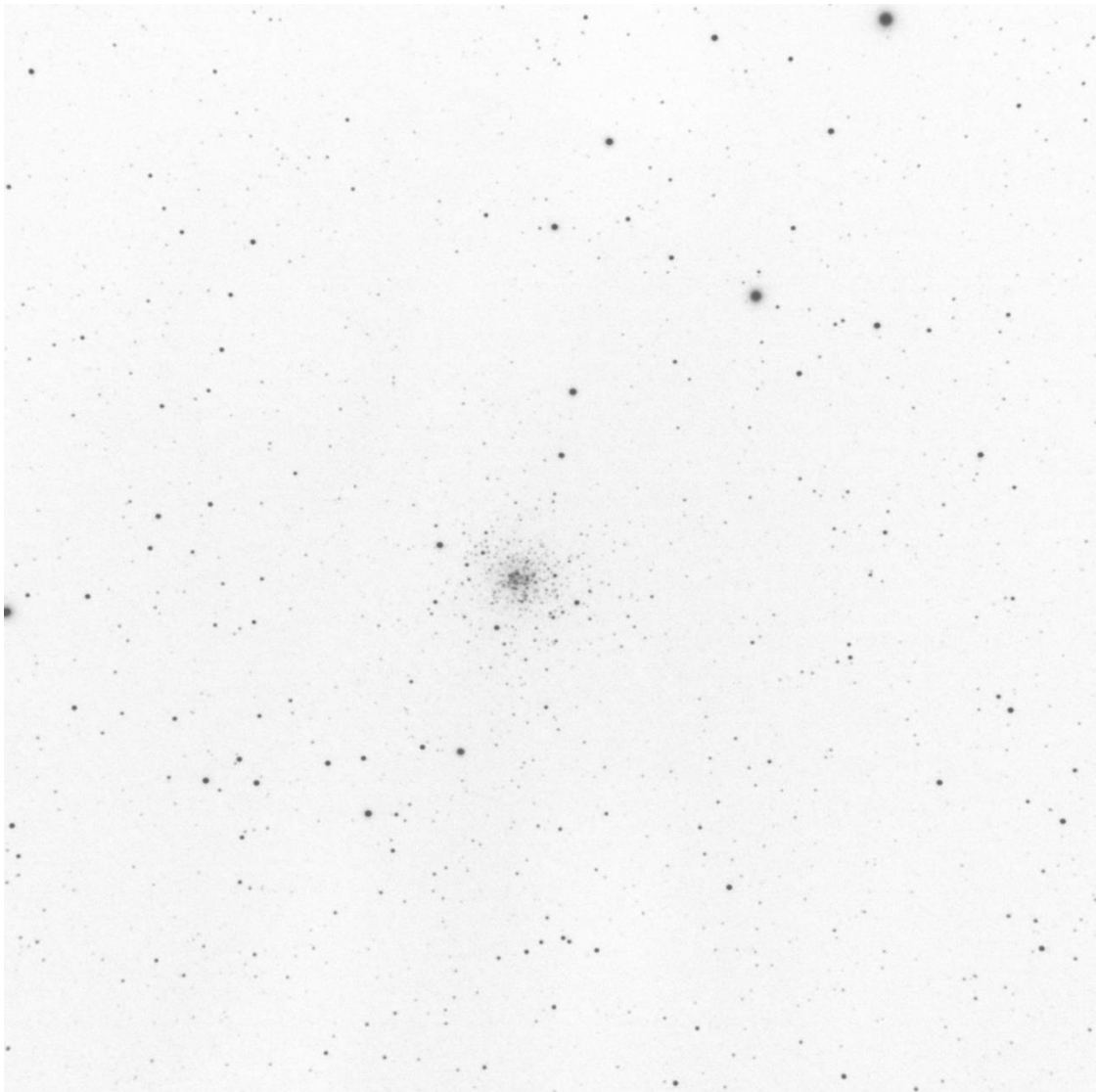
Observation Log Sheet

Object	Messier 92	Date	7/13/2023
Constellation	Hercules	Time	22:13 CDST
Magnitude	6.5	Sky: Transparency	Clear
Concentration Class	III	Seeing	Average
Distance (ly)	33,000	Location	West Columbia TX
Diameter (ly)	130	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	106	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	Messier 107	Date	7/15/2023
Constellation	Ophiuchus	Time	23:05 CDST
Magnitude	7.8	Sky: Transparency	Clear
Concentration Class	X	Seeing	Average
Distance (ly)	26,000	Location	West Columbia TX
Diameter (ly)	99	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	90	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 4147 (challenge)	Date	7/15/2023
Constellation	Coma Berenices	Time	21:41 CDST
Magnitude	10.4	Sky: Transparency	Clear
Concentration Class	VIII (VI)	Seeing	Average
Distance (ly)	85,000	Location	West Columbia TX
Diameter (ly)	110	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	59	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 5053 (challenge)	Date	7/13/2023
Constellation	Coma Berenices	Time	23:17 CDST
Magnitude	9.0	Sky: Transparency	Clear
Concentration Class	XI	Seeing	Average
Distance (ly)	55,000	Location	West Columbia TX
Diameter (ly)	160	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	65	Sub Exposure (sec)	15
		Total Exposure (min)	5
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 5466 (challenge)	Date	7/13/2023
Constellation	Bootes	Time	22:50 CDST
Magnitude	9.2	Sky: Transparency	Clear
Concentration Class	XII	Seeing	Average
Distance (ly)	52,000	Location	West Columbia TX
Diameter (ly)	140	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	70	Sub Exposure (sec)	15
		Total Exposure (min)	10
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 5634	Date	7/13/2023
Constellation	Virgo	Time	23:29 CDST
Magnitude	9.5	Sky: Transparency	Clear
Concentration Class	VI (IV)	Seeing	Average
Distance (ly)	75,000	Location	West Columbia TX
Diameter (ly)	120	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	71	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 5824	Date	7/15/2023
Constellation	Lupus	Time	21:51 CDST
Magnitude	9.1	Sky: Transparency	Clear
Concentration Class	II (I)	Seeing	Average
Distance (ly)	150,000	Location	West Columbia TX
Diameter (ly)	320	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	74	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



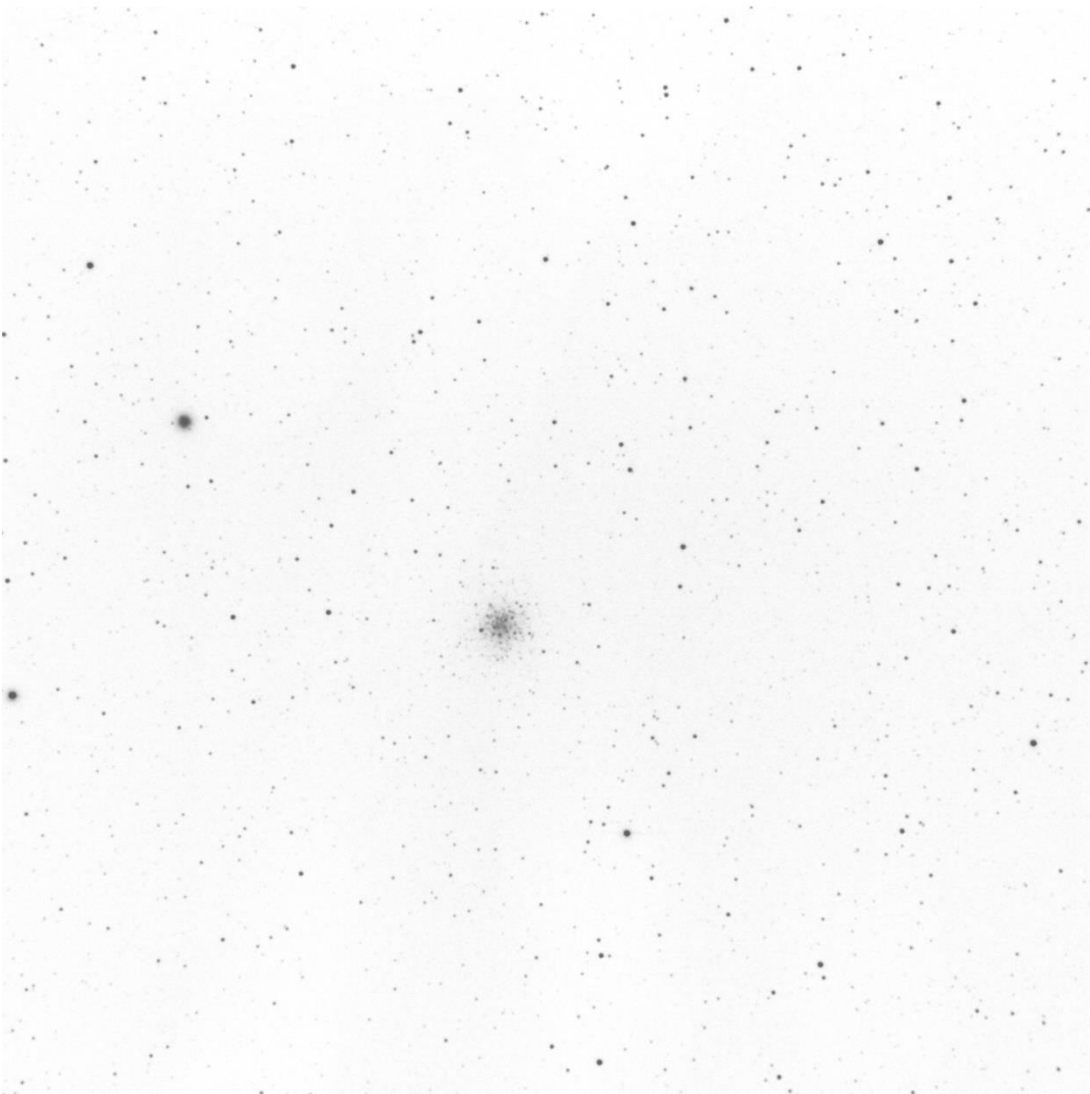
Observation Log Sheet

Object	NGC 5897	Date	7/15/2023
Constellation	Libra	Time	22:05 CDST
Magnitude	8.4	Sky: Transparency	Clear
Concentration Class	XI	Seeing	Average
Distance (ly)	46,000	Location	West Columbia TX
Diameter (ly)	150	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	76	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 5986	Date	7/15/2023
Constellation	Lupus	Time	22:13 CDST
Magnitude	7.6	Sky: Transparency	Clear
Concentration Class	VI (VII)	Seeing	Average
Distance (ly)	46,000	Location	West Columbia TX
Diameter (ly)	130	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	81	Sub Exposure (sec)	15
		Total Exposure (min)	4
		Image Software	SharpCap 4.0



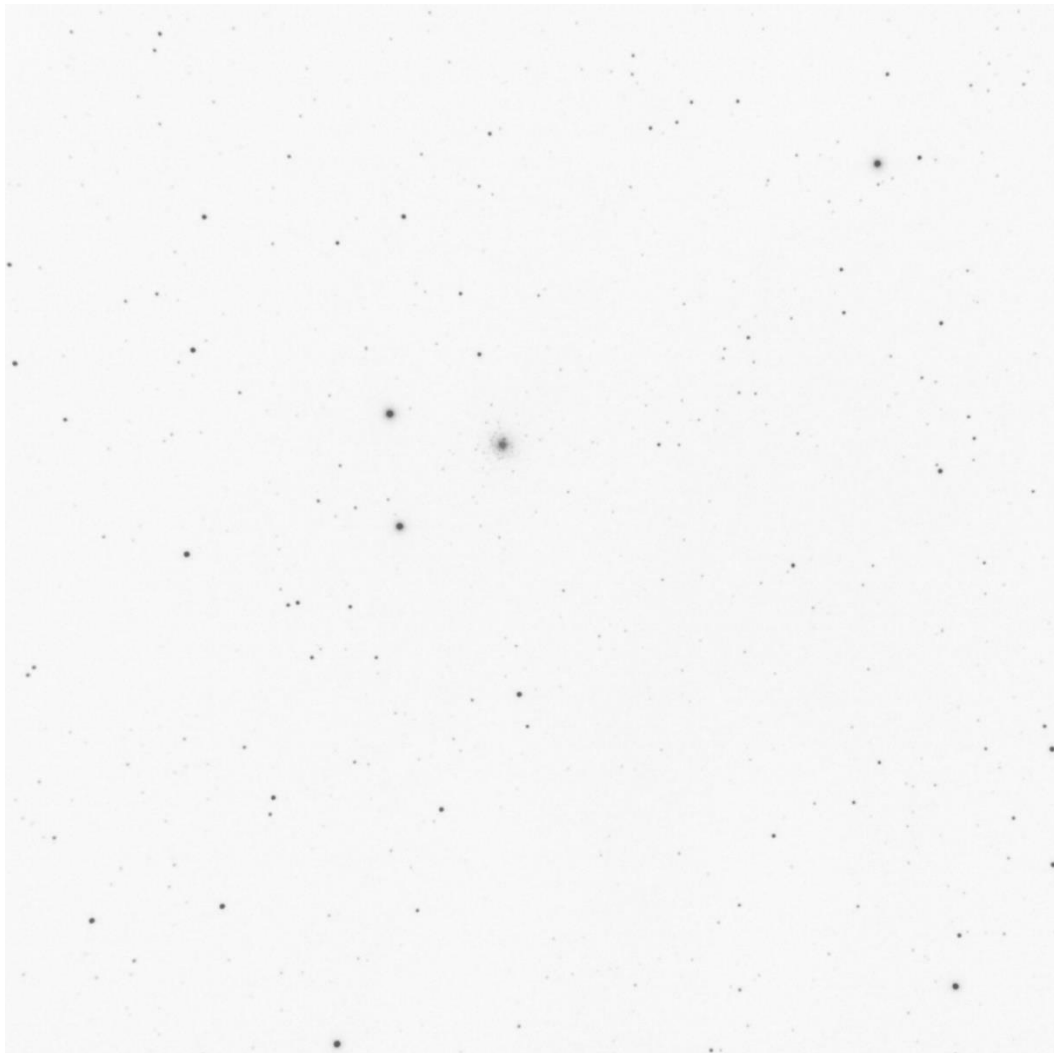
Observation Log Sheet

Object	NGC 6144	Date	7/14/2023
Constellation	Scorpius	Time	00:11 CDST
Magnitude	9.0	Sky: Transparency	Clear
Concentration Class	XI	Seeing	Average
Distance (ly)	33,000	Location	West Columbia TX
Diameter (ly)	70	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	87	Sub Exposure (sec)	15
		Total Exposure (min)	7
		Image Software	SharpCap 4.0



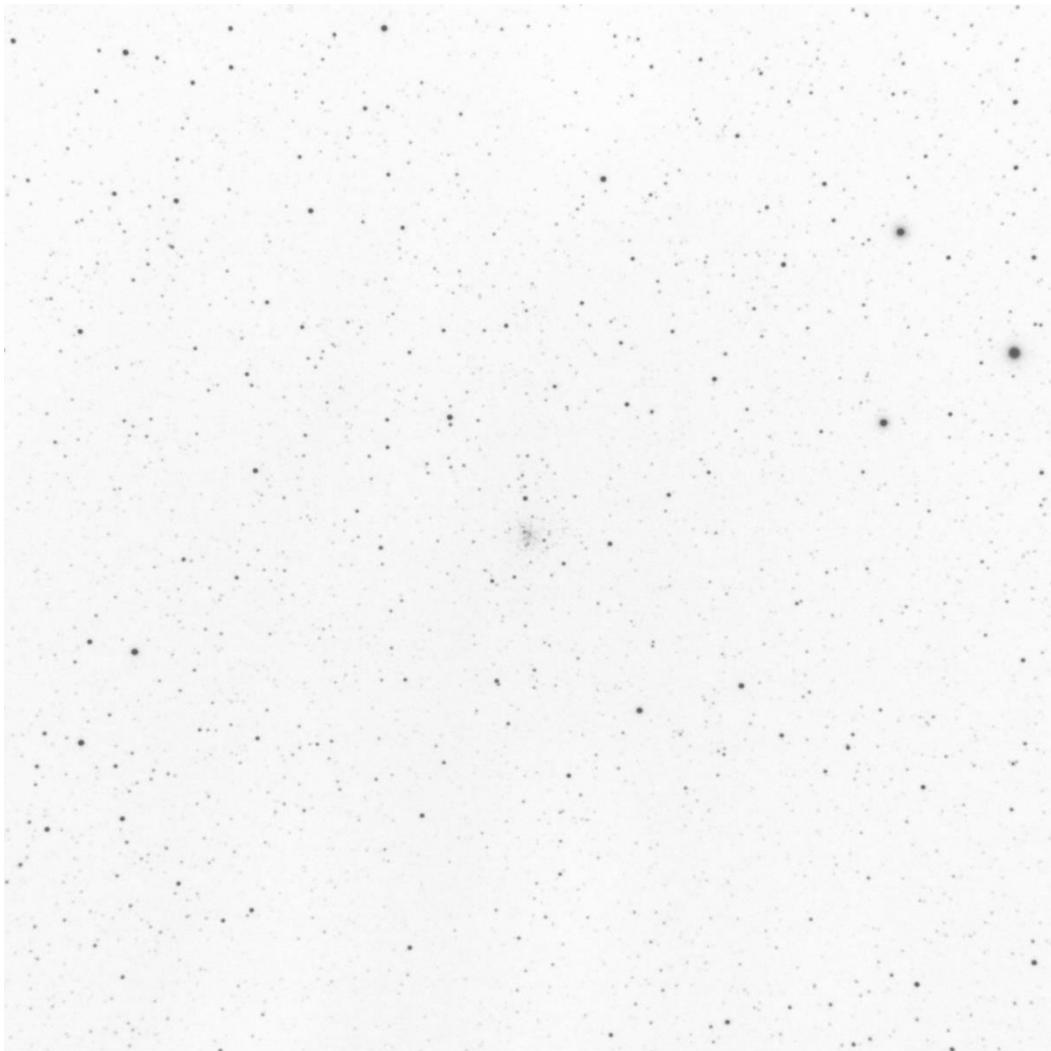
Observation Log Sheet

Object	NGC 6229	Date	7/13/2023
Constellation	Hercules	Time	23:26 CDST
Magnitude	9.4	Sky: Transparency	Clear
Concentration Class	IV	Seeing	Average
Distance	91,000	Location	West Columbia TX
Diameter (ly)	120	Instrument	Astro Tech AT80ED
Type	Far Halo	Camera	ZWO ASI183MC
AL Globular List #	93	Sub Exposure (sec)	15
		Total Exposure (min)	3
		Image Software	SharpCap 4.0



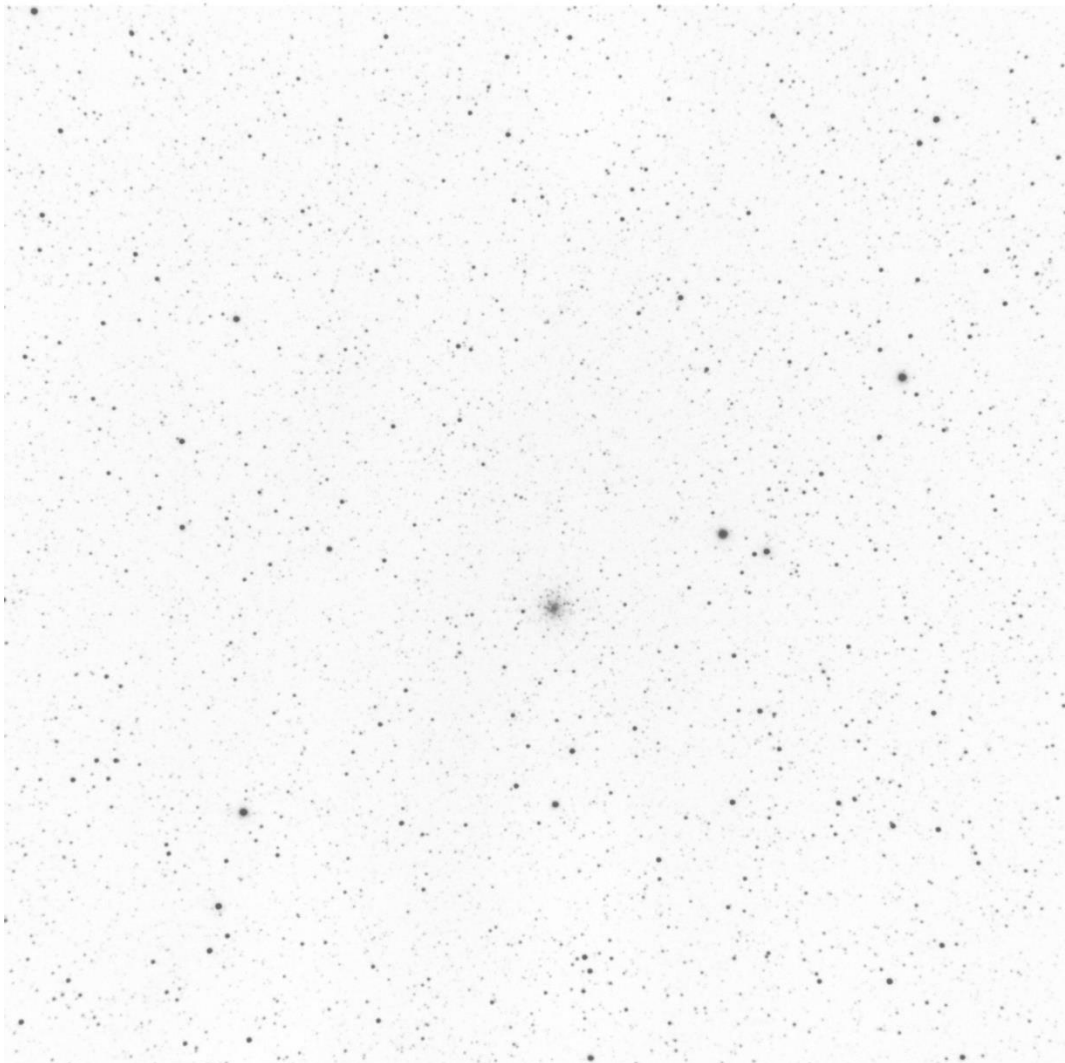
Observation Log Sheet

Object	NGC 6235	Date	7/15/2023
Constellation	Ophiuchus	Time	22:43 CDST
Magnitude	8.9	Sky: Transparency	Clear
Concentration Class	X	Seeing	Average
Distance (ly)	52,000	Location	West Columbia TX
Diameter (ly)	76	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	95	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



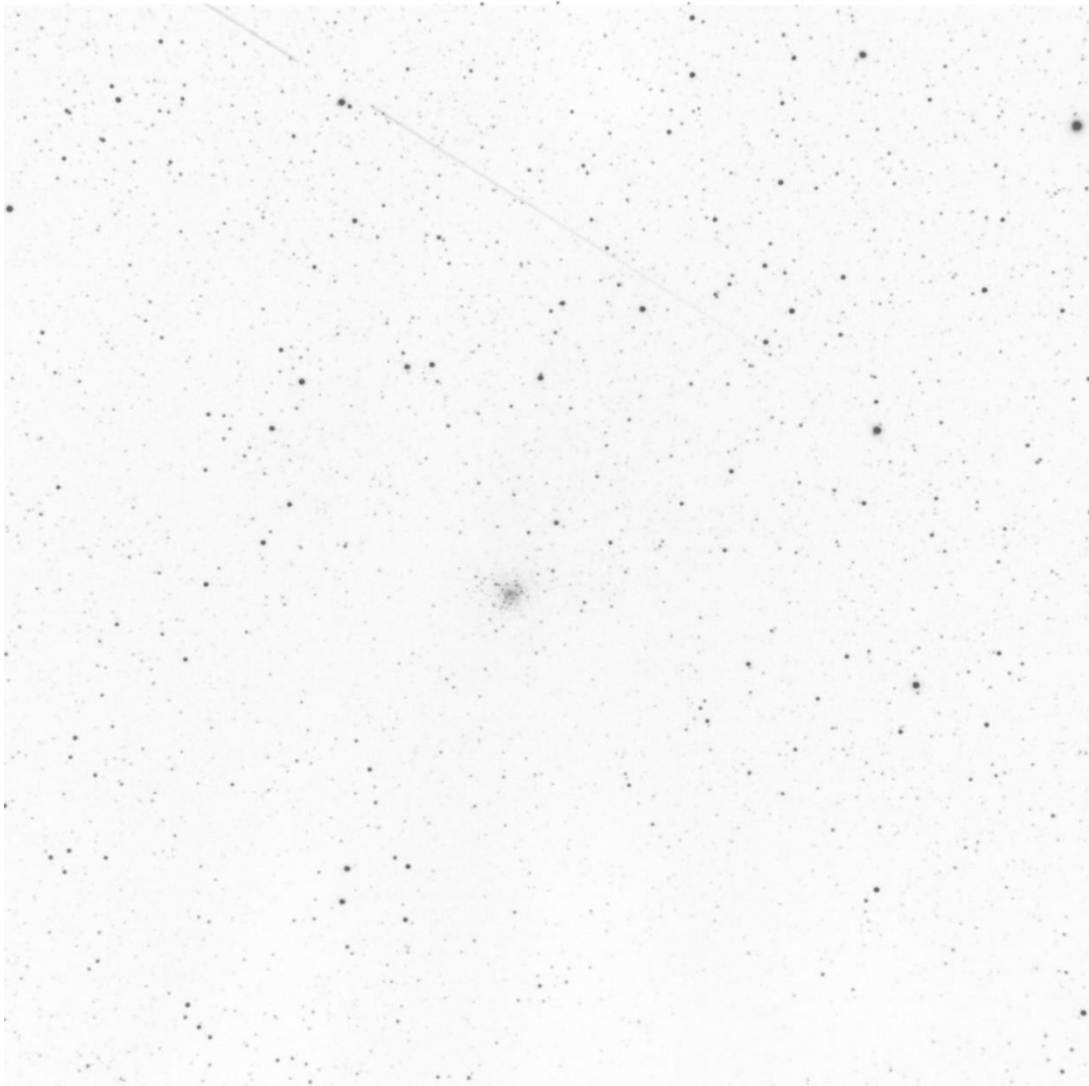
Observation Log Sheet

Object	NGC 6284	Date	7/15/2023
Constellation	Ophiuchus	Time	23:32 CDST
Magnitude	8.9	Sky: Transparency	Clear
Concentration Class	IV	Seeing	Average
Distance (ly)	55,000	Location	West Columbia TX
Diameter (ly)	100	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	101	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



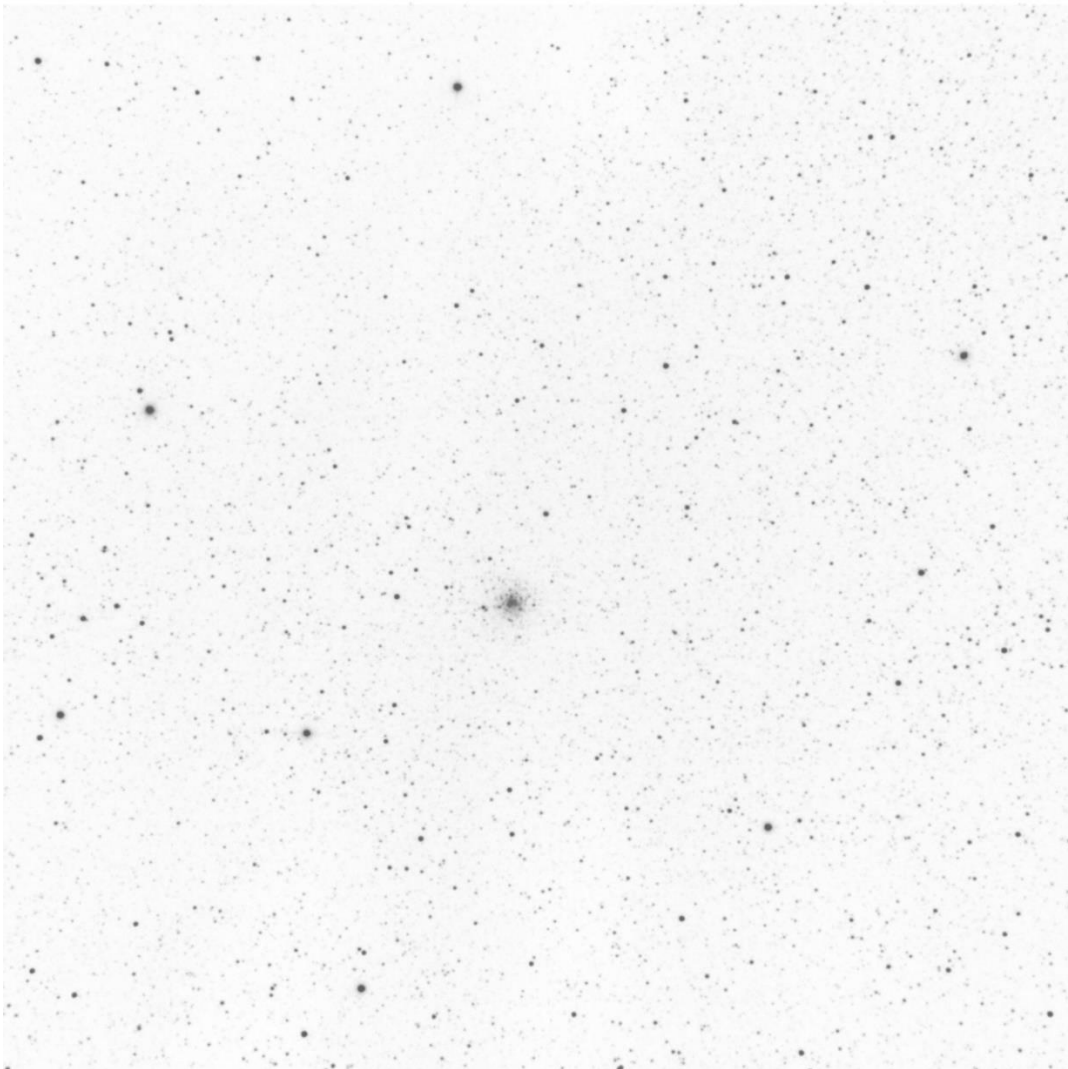
Observation Log Sheet

Object	NGC 6287	Date	7/15/2023
Constellation	Ophiuchus	Time	23:25 CDST
Magnitude	9.3	Sky: Transparency	Clear
Concentration Class	X (VII)	Seeing	Average
Distance (ly)	33,000	Location	West Columbia TX
Diameter (ly)	46	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	102	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



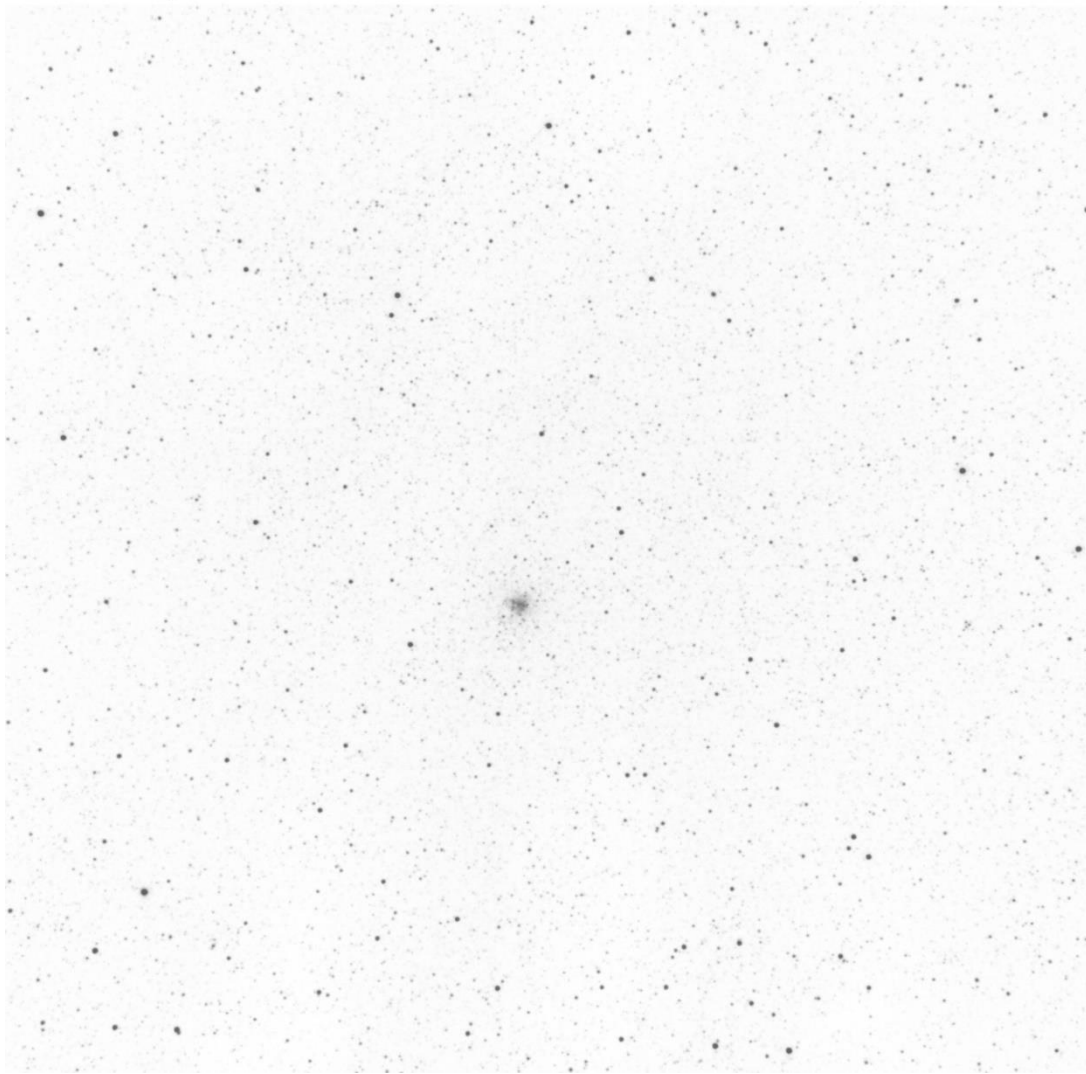
Observation Log Sheet

Object	NGC 6293	Date	7/15/2023
Constellation	Ophiuchus	Time	23:41 CDST
Magnitude	8.3	Sky: Transparency	Clear
Concentration Class	III (IV)	Seeing	Average
Distance (ly)	39,000	Location	West Columbia TX
Diameter (ly)	93	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	103	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



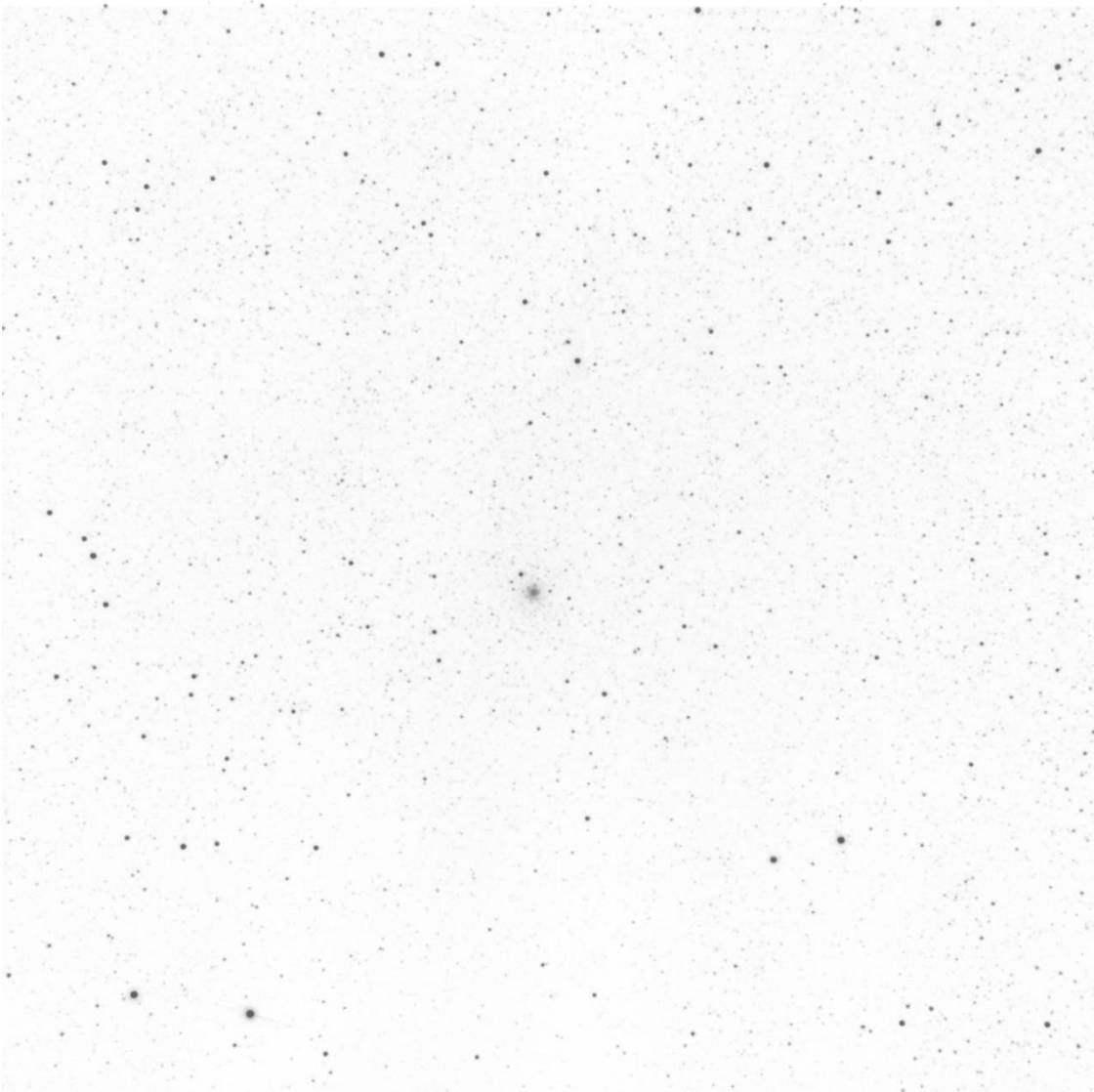
Observation Log Sheet

Object	NGC 6304	Date	7/15/2023
Constellation	Ophiuchus	Time	23:50 CDST
Magnitude	8.3	Sky: Transparency	Clear
Concentration Class	VI	Seeing	Average
Distance (ly)	20,000	Location	West Columbia TX
Diameter (ly)	46	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	104	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



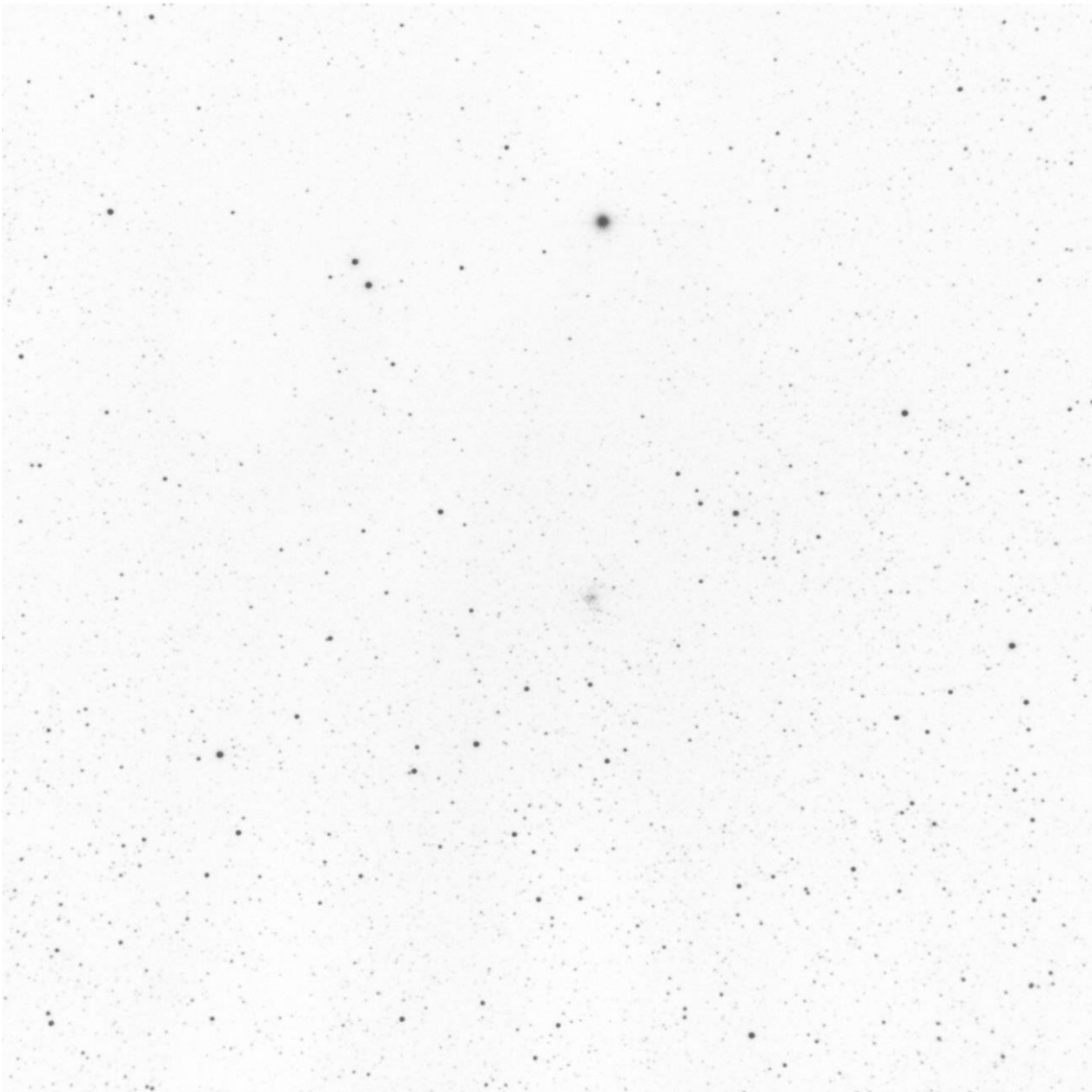
Observation Log Sheet

Object	NGC 6316	Date	7/15/2023
Constellation	Ophiuchus	Time	23:59 CDST
Magnitude	8.1	Sky: Transparency	Clear
Concentration Class	IV (III)	Seeing	Average
Distance (ly)	100,000	Location	West Columbia TX
Diameter (ly)	160	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	105	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6325	Date	7/16/2023
Constellation	Ophiuchus	Time	00:08 CDST
Magnitude	10.2	Sky: Transparency	Clear
Concentration Class	VI (IV)	Seeing	Average
Distance (ly)	150,000	Location	West Columbia TX
Diameter (ly)	180	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	107	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6342	Date	7/16/2023
Constellation	Ophiuchus	Time	21:24 CDST
Magnitude	9.5	Sky: Transparency	Some Haze
Concentration Class	V (IV)	Seeing	Average
Distance (ly)	130000	Location	West Columbia TX
Diameter (ly)	170	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	109	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



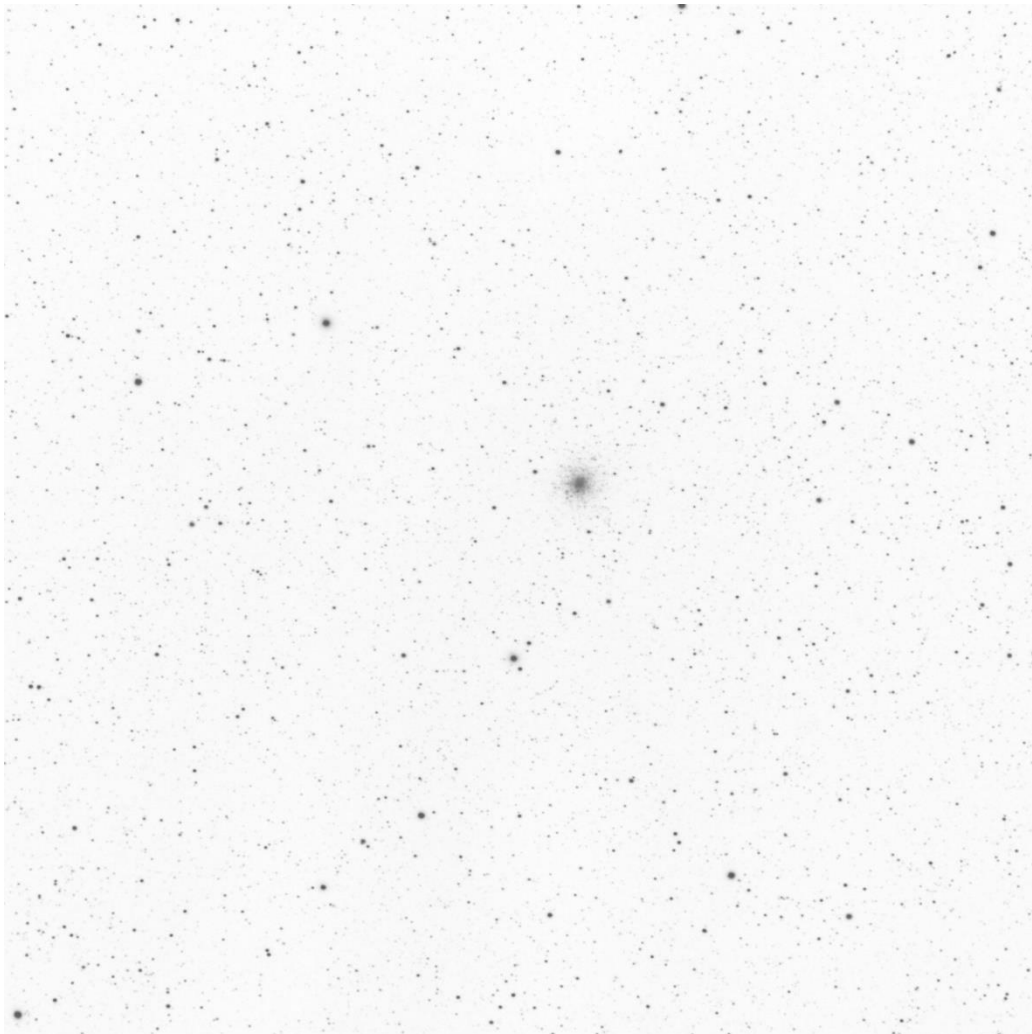
Observation Log Sheet

Object	NGC 6355	Date	7/16/2023
Constellation	Ophiuchus	Time	21:35 CDST
Magnitude	8.6	Sky: Transparency	Some Haze
Concentration Class	VI (?)	Seeing	Average
Distance (ly)		Location	West Columbia TX
Diameter (ly)		Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	110	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



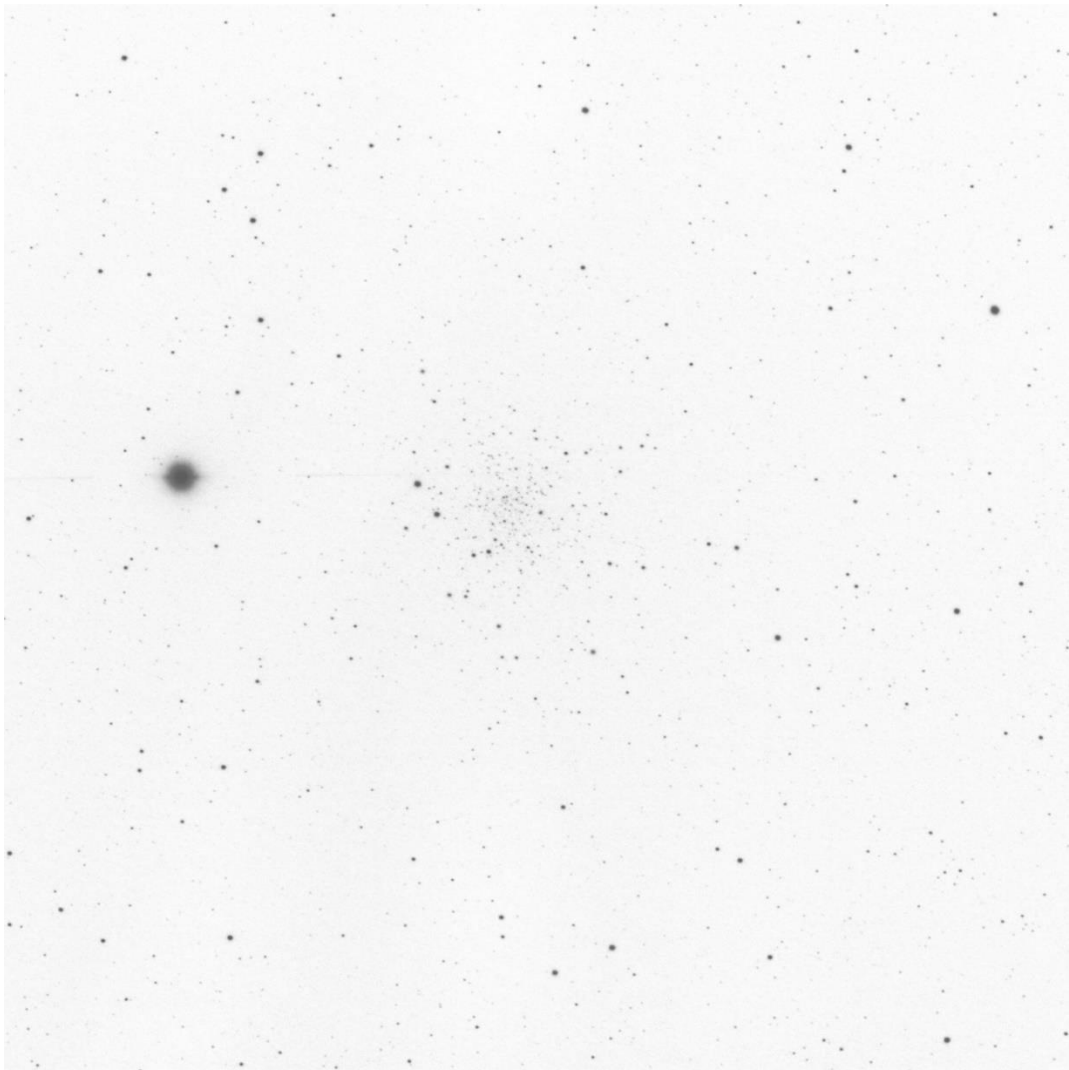
Observation Log Sheet

Object	NGC 6356	Date	7/16/2023
Constellation	Ophiuchus	Time	21:44 CDST
Magnitude	8.2	Sky: Transparency	Some Haze
Concentration Class	II	Seeing	Average
Distance (ly)	36,000	Location	West Columbia TX
Diameter (ly)	100	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	111	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6366	Date	7/16/2023
Constellation	Ophiuchus	Time	21:58 CDST
Magnitude	9.5	Sky: Transparency	Some Haze
Concentration Class	XI	Seeing	Average
Distance (ly)	6,500	Location	West Columbia TX
Diameter (ly)	25	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	114	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6401	Date	7/16/2023
Constellation	Ophiuchus	Time	22:05 CDST
Magnitude	7.4	Sky: Transparency	Some Haze
Concentration Class	Class VII (VIII)	Seeing	Average
Distance (ly)		Location	West Columbia TX
Diameter (ly)		Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	124	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



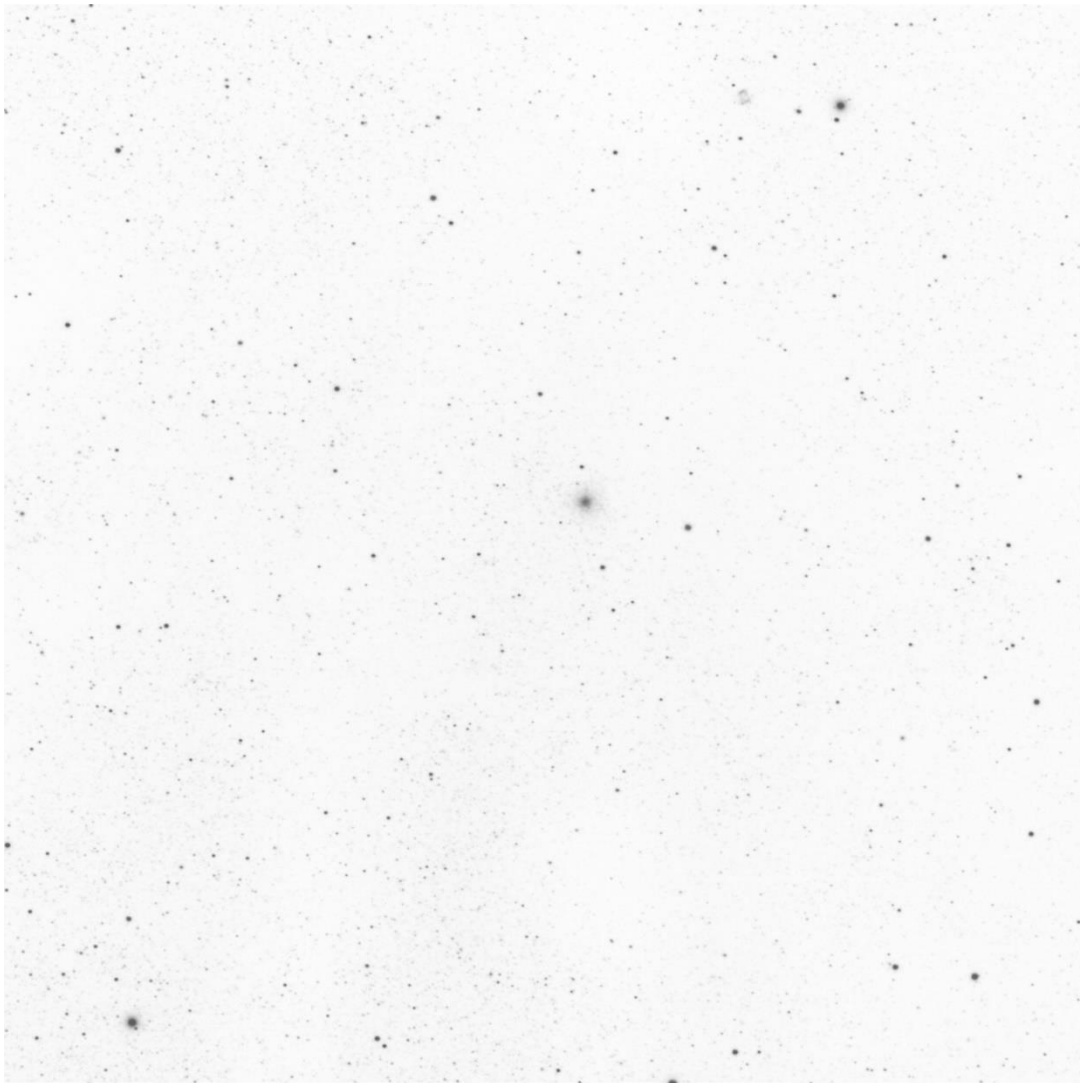
Observation Log Sheet

Object	NGC 6426	Date	7/16/2023
Constellation	Ophiuchus	Time	22:16 CDST
Magnitude	10.9	Sky: Transparency	Some Haze
Concentration Class	X (IX)	Seeing	Average
Distance (ly)	68,000	Location	West Columbia TX
Diameter (ly)	84	Instrument	Astro Tech AT80ED
Type	Halo	Camera	ZWO ASI183MC
AL Globular List #	128	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



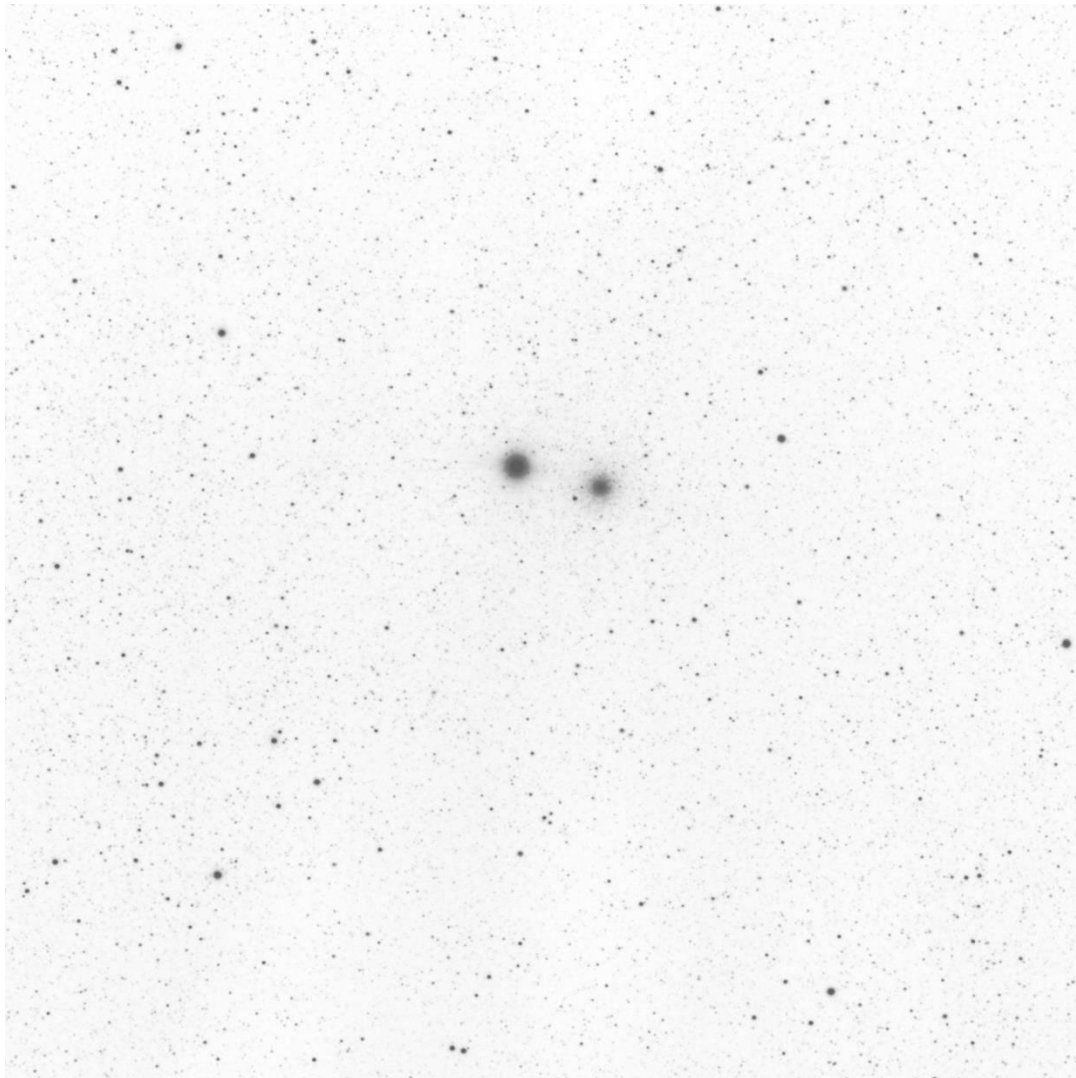
Observation Log Sheet

Object	NGC 6440	Date	7/16/2023
Constellation	Sagittarius	Time	22:26 CDST
Magnitude	9.3	Sky: Transparency	Some Haze
Concentration Class	III (V)	Seeing	Average
Distance (ly)	13,000	Location	West Columbia TX
Diameter (ly)	17	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	131	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



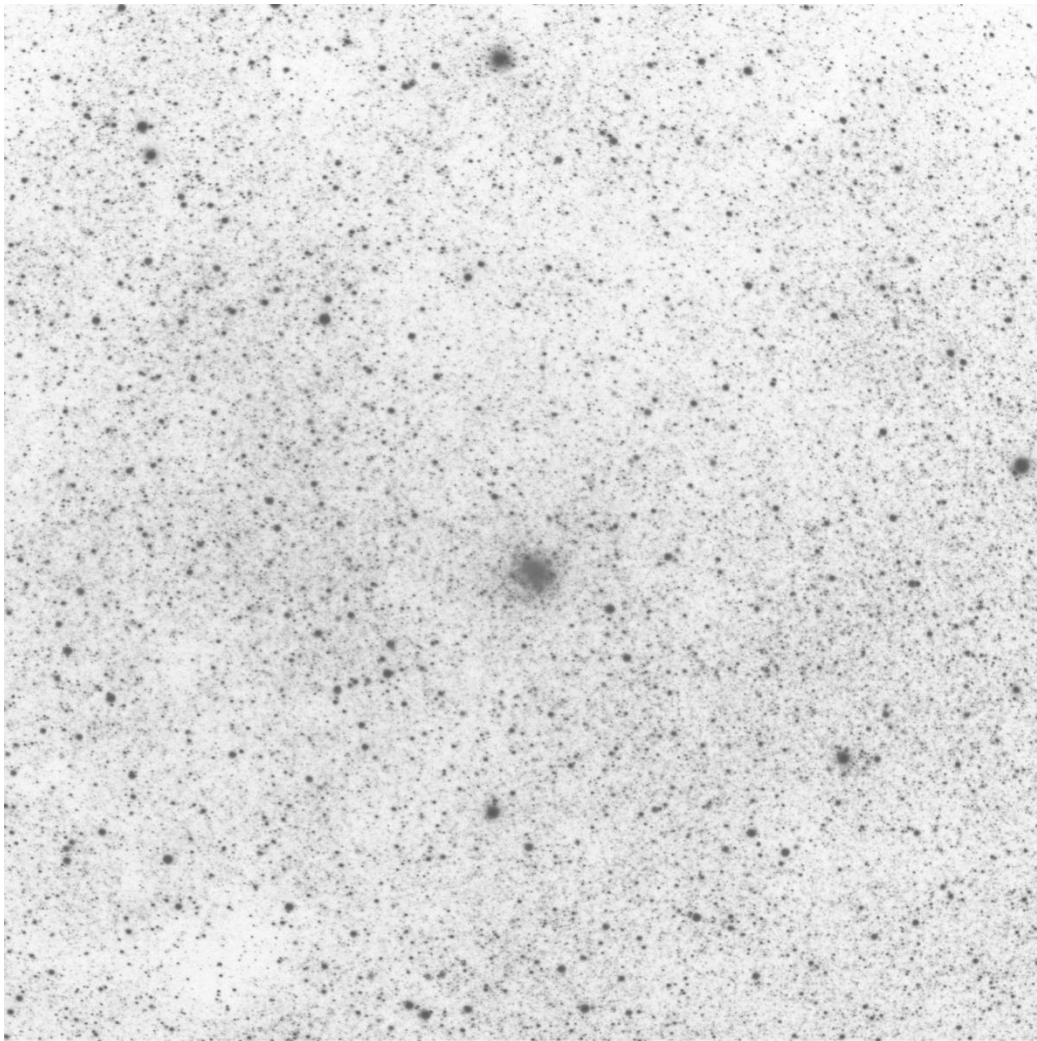
Observation Log Sheet

Object	NGC 6441	Date	7/16/2023
Constellation	Scorpius	Time	22:36 CDST
Magnitude	7.2	Sky: Transparency	Some Haze
Concentration Class	IV (III)	Seeing	Average
Distance (ly)	29,000	Location	West Columbia TX
Diameter (ly)	82	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	132	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



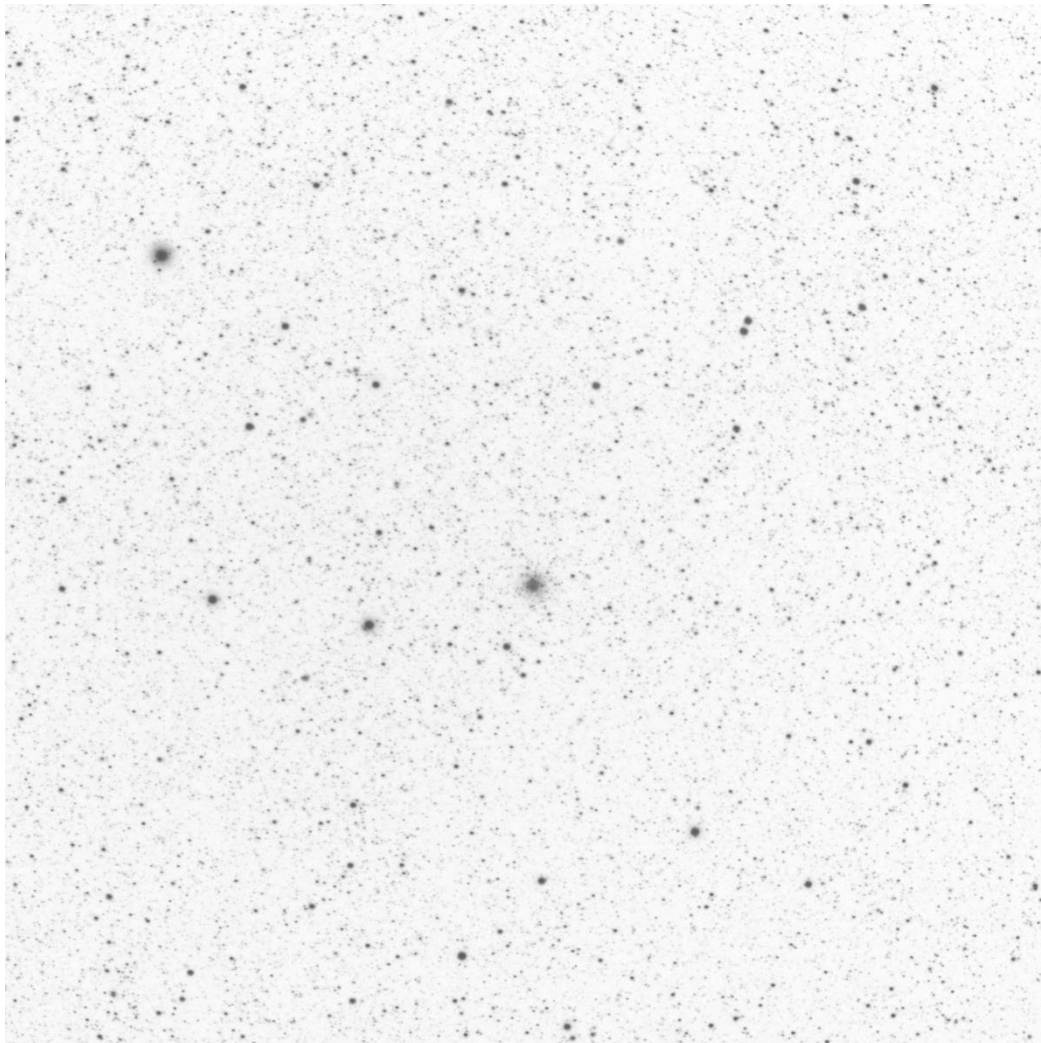
Observation Log Sheet

Object	NGC 6553	Date	7/19/2023
Constellation	Sagittarius	Time	22:14 CDST
Magnitude	8.3	Sky: Transparency	Clear
Concentration Class	X (XI)	Seeing	Above Average
Distance (ly)	87,000	Location	West Columbia TX
Diameter (ly)	230	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	149	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



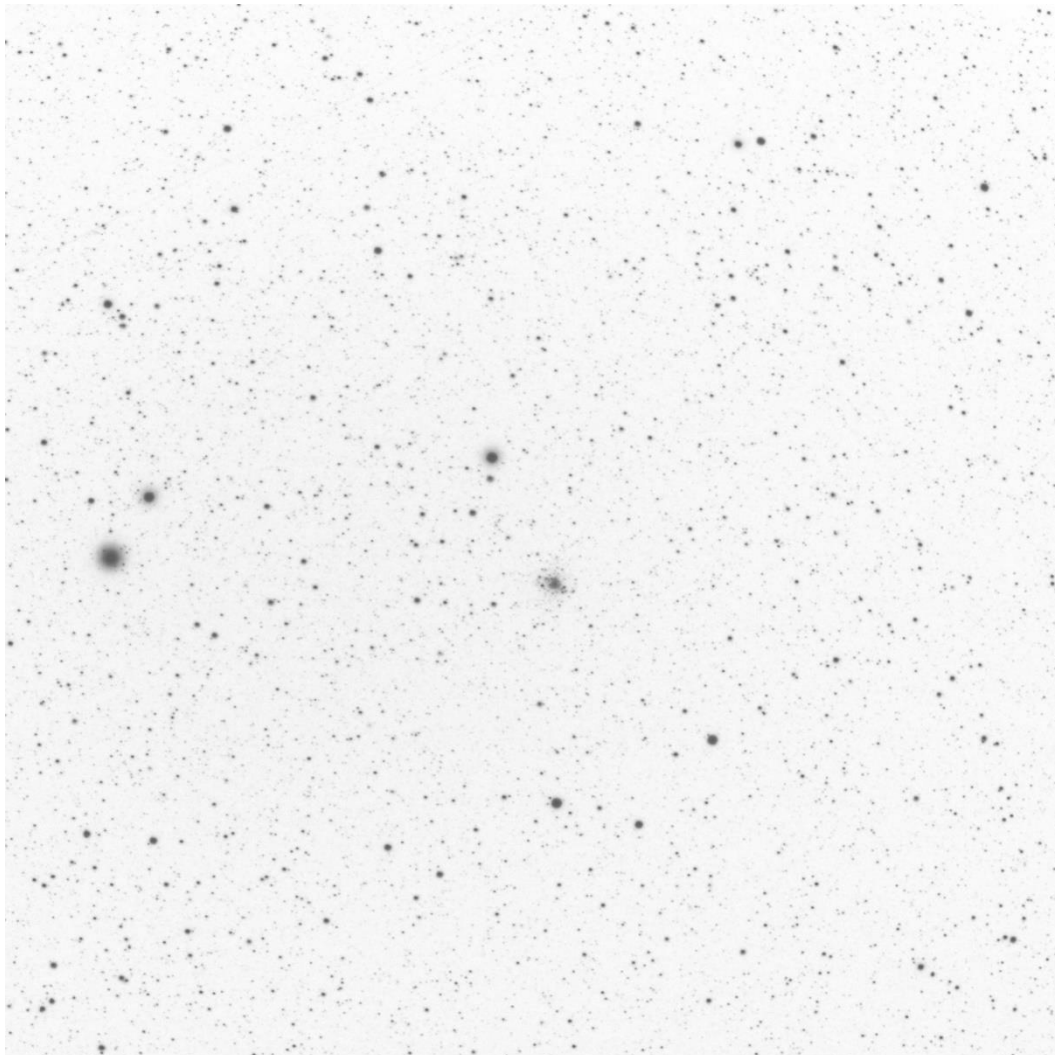
Observation Log Sheet

Object	NGC 6638	Date	7/19/2023
Constellation	Sagittarius	Time	22:45 CDST
Magnitude	9.2	Sky: Transparency	Clear
Concentration Class	VI	Seeing	Above Average
Distance (ly)	49,000	Location	West Columbia TX
Diameter (ly)	100	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	160	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



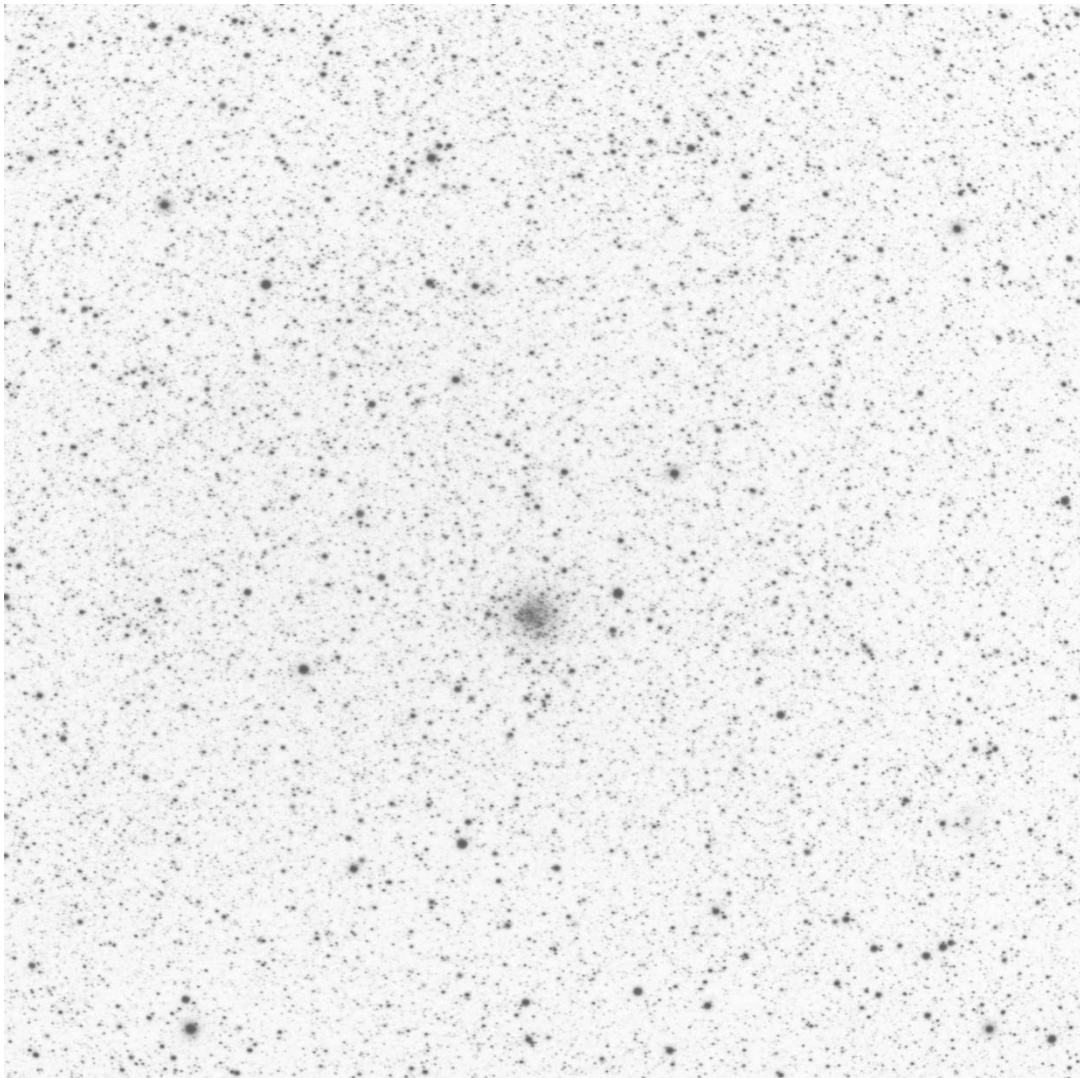
Observation Log Sheet

Object	NGC 6652	Date	7/19/2023
Constellation	Sagittarius	Time	22:22 CDST
Magnitude	8.5	Sky: Transparency	Clear
Concentration Class	III (VI)	Seeing	Above Average
Distance (ly)	52,000	Location	West Columbia TX
Diameter (ly)	91	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	162	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



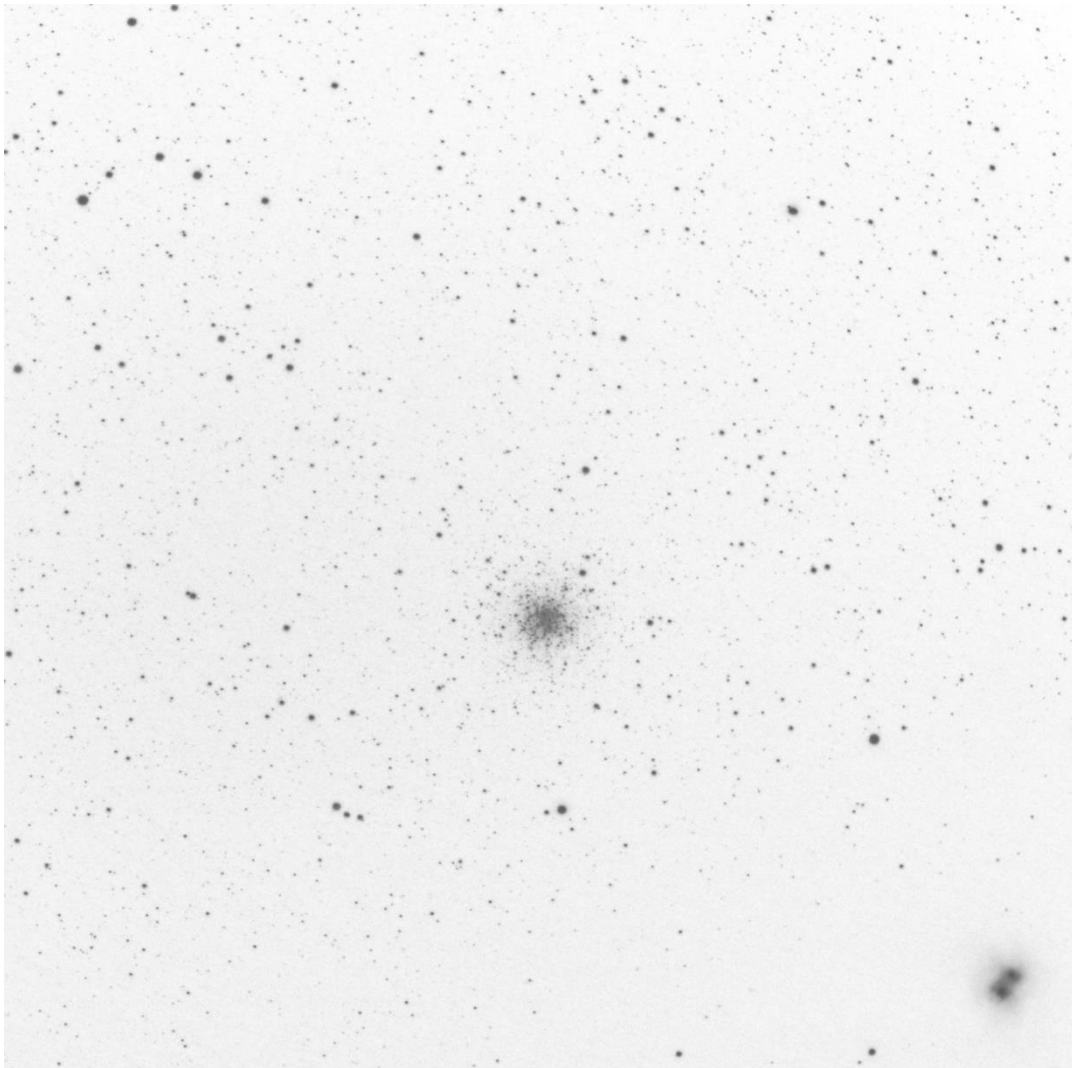
Observation Log Sheet

Object	NGC 6712	Date	7/19/2023
Constellation	Scutum	Time	23:46 CDST
Magnitude	8.1	Sky: Transparency	Clear
Concentration Class	VIII (IX)	Seeing	Above Average
Distance (ly)	23,000	Location	West Columbia TX
Diameter (ly)	65	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	166	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6723	Date	7/19/2023
Constellation	Sagittarius	Time	23:49 CDST
Magnitude	6.8	Sky: Transparency	Clear
Concentration Class	VII	Seeing	Above Average
Distance (ly)	33,000	Location	West Columbia TX
Diameter (ly)	120	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	169	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0



Observation Log Sheet

Object	NGC 6760	Date	7/19/2023
Constellation	Aquila	Time	22:54 CDST
Magnitude	9.0	Sky: Transparency	Clear
Concentration Class	VI (IX)	Seeing	Above Average
Distance (ly)	13,000	Location	West Columbia TX
Diameter (ly)	36	Instrument	Astro Tech AT80ED
Type	Hub	Camera	ZWO ASI183MC
AL Globular List #	172	Sub Exposure (sec)	15
		Total Exposure (min)	6
		Image Software	SharpCap 4.0

