

Sky Atlas and calendar events for 2020

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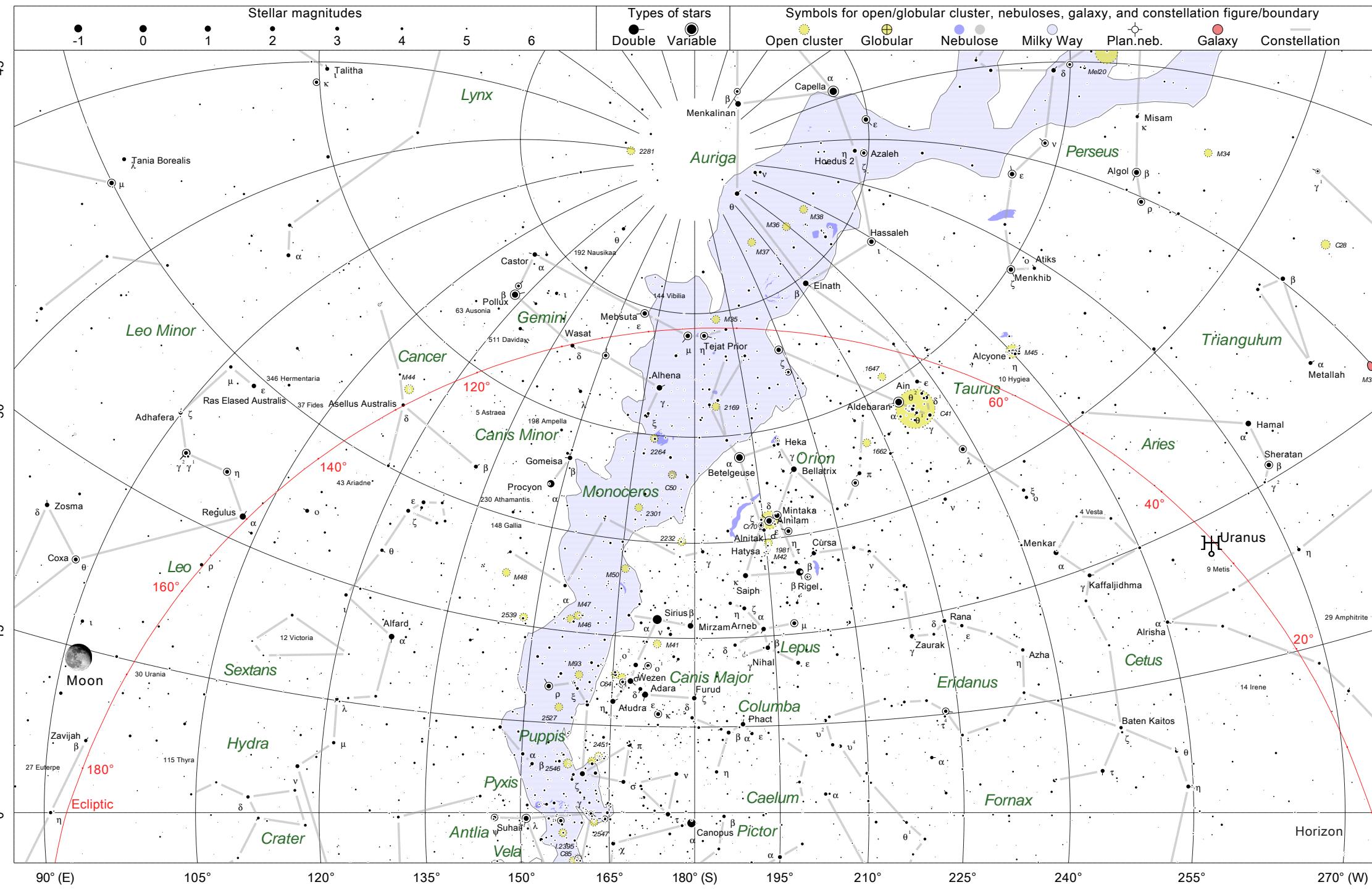
This simple sky atlas is focused on amateur astronomers that don't need a basic atlas neither a too much detailed one. It is designed to be printed in long side duplex mode and A4 size, and handled in landscape orientation. The first part shows the sky for each month (for a latitude of 40.0° N), including a detailed list of the astronomical events for each month. Limiting magnitudes are 6.5 for stars and deep sky objects. The second section shows the sky atlas itself, with stars up to magnitude 8.25 and deep sky objects brighter than magnitude 11 (some fainter ones will appear if they are in Messier or Caldwell lists). For each chart there is a table showing the deep sky objects visible on it, sorted by magnitude. Additional tables show the main double stars (from <https://www.stelledoppie.it>, primary/secondary brighter than magnitude 7/8.5 and with a minimum separation of $10''$) and variable stars on that chart. Coordinates for the atlas are astrometric, referred to the Julian epoch of the atlas year. Some events or objects could not appear in the tables when there are too much entries. The total number of stars in the atlas is around 60000, with 1100 deep sky objects (850 in the tables), 450 double stars and 75 variable stars. This atlas is free and has been developed by Tomás Alonso, using the JPARSEC astronomical package (<http://conga.oan.es/%7Ealonso/doku.php?id=jparsec>), which is distributed as free software under GPL license. This document is distributed under the terms of the Creative Commons license. There are other free alternatives with less detail, like the beginners atlas by Ed Vazhorov (<http://www.eproject.ru/edownload/19062005/page1.htm>), and more detailed ones, like the Bungee Sky Atlas by Angelo Nicolini (<https://bitbucket.org/anjiloh/bungeeskyatlas/downloads/>), also based on JPARSEC.

Chart	Central right ascension (h)	Central declination ($^{\circ}$)	Constellations
1	4.0	70.0	Camelopardalis, Cassiopeia, Cepheus, Ursa Major, Ursa Minor
2	12.0	70.0	Draco, Ursa Major, Ursa Minor, Camelopardalis, Cepheus
3	20.0	70.0	Draco, Cepheus, Cygnus, Cassiopeia, Ursa Minor
4	2.0	35.0	Triangulum, Andromeda, Perseus, Pisces, Aries
5	6.0	35.0	Auriga, Gemini, Taurus, Orion, Lynx
6	10.0	35.0	Leo Minor, Ursa Major, Lynx, Cancer, Canes Venatici
7	14.0	35.0	Canes Venatici, Bootes, Ursa Major, Coma Berenices, Corona Borealis
8	18.0	35.0	Hercules, Lyra, Cygnus, Draco, Corona Borealis
9	22.0	35.0	Pegasus, Lacerta, Cygnus, Vulpecula, Andromeda
10	2.0	0.0	Cetus, Pisces, Aries, Taurus, Fornax
11	5.0	0.0	Orion, Eridanus, Taurus, Lepus, Monoceros
12	8.0	0.0	Canis Minor, Hydra, Monoceros, Cancer, Puppis
13	11.0	0.0	Leo, Sextans, Virgo, Crater, Coma Berenices
14	14.0	0.0	Virgo, Bootes, Libra, Serpens Caput, Coma Berenices
15	17.0	0.0	Ophiuchus, Hercules, Serpens Caput, Scorpius, Serpens Cauda
16	20.0	0.0	Aquila, Aquarius, Delphinus, Sagittarius, Pegasus
17	23.0	0.0	Pisces, Pegasus, Aquarius, Cetus, Capricornus
18	2.0	-35.0	Fornax, Sculptor, Phoenix, Cetus, Eridanus
19	6.0	-35.0	Columba, Canis Major, Puppis, Lepus, Caelum
20	10.0	-35.0	Antlia, Hydra, Pyxis, Vela, Crater
21	14.0	-35.0	Centaurus, Hydra, Lupus, Libra, Virgo
22	18.0	-35.0	Sagittarius, Scorpius, Corona Australis, Ophiuchus, Ara
23	22.0	-35.0	Piscis Austrinus, Grus, Sculptor, Aquarius, Capricornus
24	4.0	-70.0	Hydrus, Mensa, Dorado, Reticulum, Volans
25	12.0	-70.0	Musca, Carina, Circinus, Centaurus, Chamaeleon
26	20.0	-70.0	Pavo, Octans, Indus, Telescopium, Triangulum Australe

Seasonal Sky

Date (UT)	Event description	Date (UT)	Event description
1, 01:13	Conjunction Moon-Neptune	12, 16:25	Conjunction 289P/Blanpain MPC102102-NGC433
2, 01:30	Moon's apogee (parallax = 54' 11.881")	12, 21:33	Conjunction 289P/Blanpain MPC102102-Del Cas
2, 03:11	Conjunction (192) Nausikaa-Alp Gem	13, 02:56	Conjunction 289P/Blanpain MPC102102-NGC581 (M103)
2, 03:15	Conjunction (192) Nausikaa-Alp Gem	13, 03:00 → 06:06	Shadow transit of Ganymede on top of Jupiter
2, 09:15 → 12:20	Eclipse of Ganymede by Jupiter	13, 03:28 → 05:47	Eclipse of Io by Jupiter
2, 09:37 → 12:43	Occultation of Ganymede by Jupiter	13, 03:45 → 06:04	Occultation of Io by Jupiter
2, 10:05	Conjunction Mercury-Lam Sgr	13, 04:07 → 07:15	Transit of Ganymede on top of Jupiter
2, 12:37 → 14:55	Eclipse of Io by Jupiter	13, 06:25	Conjunction 289P/Blanpain MPC102102-Tr1
2, 12:42 → 15:01	Occultation of Io by Jupiter	13, 13:42	Conjunction Moon-Alp Leo
2, 15:17	Conjunction Mercury-Jupiter	13, 15:18	Conjunction of Saturn (elongation 0.036°)
2, 21:35	Conjunction (18) Melpomene-Del Cap	13, 20:20	Moon's perigee (parallax = 59' 54.516")
2, 22:00	Lunar Transient Phenomena Lunar-X	13, 20:29	Conjunction 289P/Blanpain MPC102102-NGC637
3, 04:45	Moon's first quarter	14, 00:14	Conjunction 289P/Blanpain MPC102102-Eps Cas
4, 08:30	Maximum of Quadrantids	14, 04:01	Conjunction Venus-(18) Melpomene
4, 23:13	Conjunction Jupiter-NGC6642	14, 04:54 → 05:06	NGC3368 (M96) behind Moon
4, 23:38	Conjunction Moon-Uranus	14, 11:45	Conjunction Saturn-(8) Flora
5, 07:46	Minimum distance of Sun (0.983 AU)	16, 14:06	Conjunction (1) Ceres-(8) Flora
5, 23:01 → 6, 02:06	Shadow transit of Ganymede on top of Jupiter	16, 14:24	Conjunction (7) Iris-NGC6284
5, 23:38 → 6, 02:45	Transit of Ganymede on top of Jupiter	16, 16:25 → 18:44	Eclipse of Io by Jupiter
6, 01:34 → 03:52	Eclipse of Io by Jupiter	16, 16:46 → 19:05	Occultation of Io by Jupiter
6, 01:43 → 04:02	Occultation of Io by Jupiter	16, 17:13 → 20:20	Eclipse of Ganymede by Jupiter
6, 22:43 → 7, 01:01	Shadow transit of Io on top of Jupiter	16, 18:34 → 21:44	Occultation of Ganymede by Jupiter
6, 22:53 → 7, 01:11	Transit of Io on top of Jupiter	17, 12:58	Moon's last quarter
7, 00:37 → 03:11	Shadow transit of Callisto on top of Jupiter	17, 20:40	Lunar Transient Phenomena Lunar-X
7, 02:12 → 04:55	Transit of Callisto on top of Jupiter	18, 09:45	Conjunction Mars-Alp Sco
7, 05:56	Conjunction Venus-Gam Cap	18, 22:20	Maximum of ?Ursae Minorids
7, 14:20	Conjunction Moon-Del1 Tau	20, 05:22 → 07:41	Eclipse of Io by Jupiter
7, 17:43	Conjunction Moon-Eps Tau	20, 05:46 → 08:05	Occultation of Io by Jupiter
7, 18:59	Conjunction Moon-Alp Tau	20, 06:59 → 10:06	Shadow transit of Ganymede on top of Jupiter
8, 12:30	Conjunction Mars-Bet1 Sco	20, 08:35 → 11:46	Transit of Ganymede on top of Jupiter
8, 16:17	Conjunction Venus-Del Cap	20, 20:03	Conjunction Moon-Mars
9, 00:32	Conjunction Moon-Zet Tau	22, 19:35 → 20:20	NGC6642 behind Moon
9, 05:55	Conjunction Mars-Ome1 Sco	23, 01:42	Conjunction Moon-Jupiter
9, 08:35	Conjunction Jupiter-NGC6656 (M22)	23, 03:37	Moon's minimum declination (-23.222°)
9, 13:14 → 16:20	Eclipse of Ganymede by Jupiter	23, 14:38	Conjunction Venus-Lam Aqr
9, 14:06 → 17:14	Occultation of Ganymede by Jupiter	23, 18:19 → 20:38	Eclipse of Io by Jupiter
9, 14:22	Conjunction Moon-Eta Gem	23, 18:34 → 21:21	Shadow transit of Callisto on top of Jupiter
9, 14:31 → 16:50	Eclipse of Io by Jupiter	23, 18:47 → 21:06	Occultation of Io by Jupiter
9, 14:44 → 17:03	Occultation of Io by Jupiter	23, 21:11 → 24, 00:19	Eclipse of Ganymede by Jupiter
9, 16:47 → 17:39	Mu Gem behind Moon	23, 22:49 → 24, 01:52	Transit of Callisto on top of Jupiter
9, 17:59	Comet 289P/Blanpain MPC102102 with maximum magnitude	23, 23:01 → 24, 02:13	Occultation of Ganymede by Jupiter
10, 06:02	Moon's maximum declination (23.220°)	24, 01:14	Conjunction Moon-Saturn
10, 09:37	Minimum elongation of Mercury (1.921°)	24, 03:01	Conjunction 289P/Blanpain MPC102102-NGC2403
10, 15:58	Conjunction Moon-Del Gem	24, 21:42	New Moon
10, 19:10	Lunar eclipse (penumbral, mag 0.89)	25, 17:24 → 17:52	Neomenia
10, 19:21	Full Moon	25, 20:46	Conjunction Moon-Mercury
11, 11:59	Minimum distance of 289P/Blanpain MPC102102 (0.091 AU)	27, 18:31	Conjunction (7) Iris-The Oph
11, 15:55	Conjunction Mercury-(8) Flora	27, 20:06	Conjunction Venus-Neptune
12, 03:05	Conjunction Saturn-(1) Ceres	28, 07:36	Conjunction Moon-Neptune
12, 05:00	Conjunction Mercury-(1) Ceres	28, 08:55	Conjunction Moon-Venus
12, 08:59	Conjunction Mercury-Saturn	28, 18:15	Conjunction Jupiter-NGC6717
12, 11:09	Conjunction 289P/Blanpain MPC102102-NGC436	29, 17:59	Comet 289P/Blanpain MPC102102 ends to be visible to naked eye
		29, 21:28	Moon's apogee (parallax = 54' 5.376")

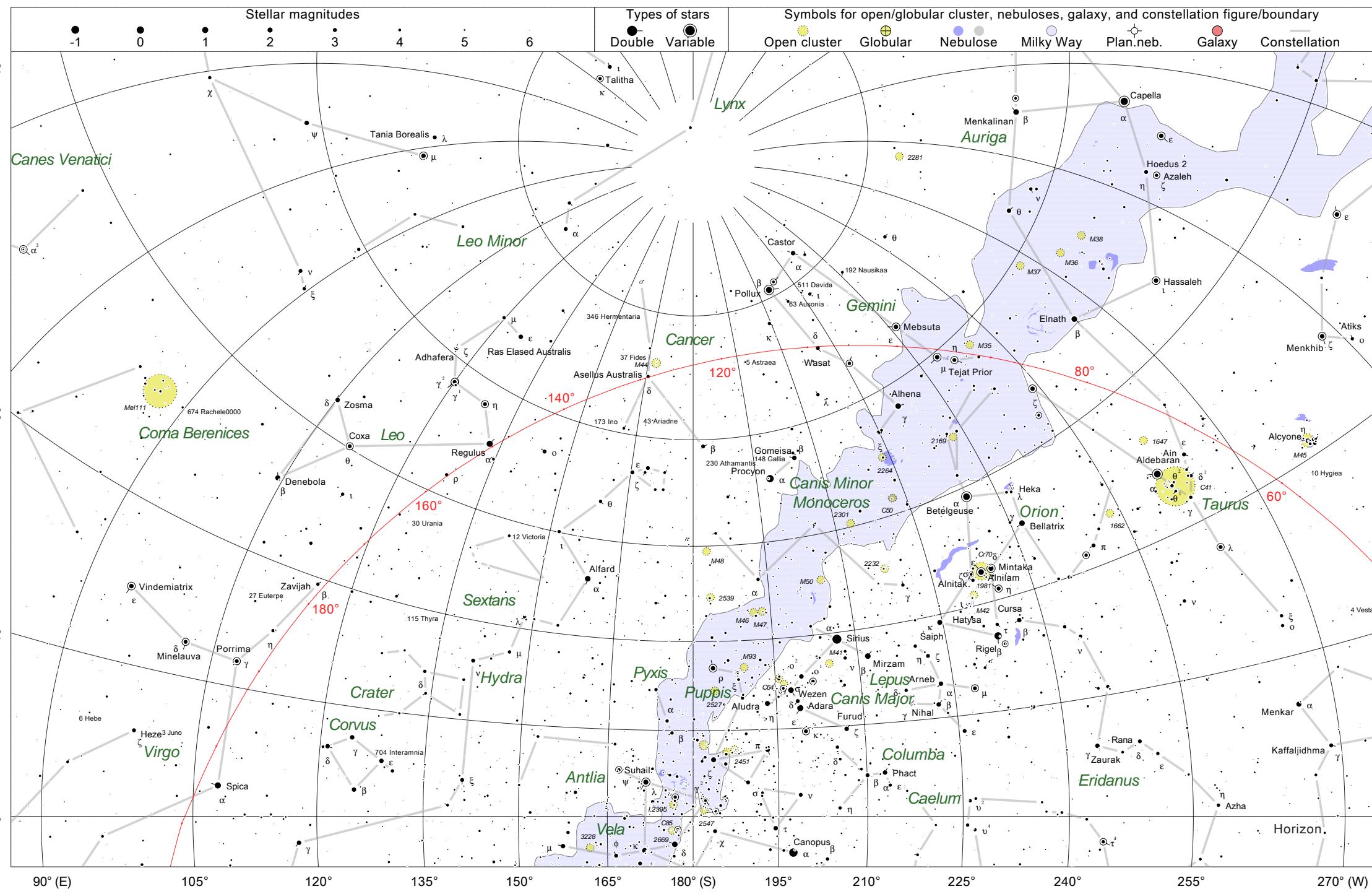
Sky on January 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
1, 02:24 → 05:09	Shadow transit of Europa on top of Jupiter	11, 19:56	Conjunction Mars-(7) Iris
1, 03:35 → 06:22	Transit of Europa on top of Jupiter	15, 22:17	Moon's last quarter
1, 05:21 → 08:17	Eclipse of Callisto by Jupiter	16, 11:40	Lunar Transient Phenomena Lunar-X
1, 05:56	Conjunction Moon-Uranus	17, 22:52 → 18, 02:04	Shadow transit of Ganymede on top of Jupiter
1, 11:48	Lunar Transient Phenomena Lunar-X	17, 23:17 → 18, 02:25	Eclipse of Callisto by Jupiter
2, 01:42	Moon's first quarter	18, 02:17 → 05:34	Transit of Ganymede on top of Jupiter
2, 07:59	(4) Vesta behind Moon	18, 07:11 → 10:42	Occultation of Callisto by Jupiter
4, 02:38	Conjunction Moon-Del1 Tau	18, 10:06 → 12:24	Shadow transit of Io on top of Jupiter
4, 05:08	Conjunction Moon-Eps Tau	18, 10:57 → 13:16	Transit of Io on top of Jupiter
4, 07:04	Conjunction Moon-Alp Tau	18, 14:16 → 15:04	Shadow transit of Io on top of Jupiter
4, 10:32 → 11:08	NGC1647 behind Moon	18, 15:18 → 15:54	Transit of Io on top of Jupiter
5, 09:38 → 10:07	Zet Tau behind Moon	18, 23:33 → 19, 00:13	Mars behind Moon
6, 02:26 → 03:23	Eta Gem behind Moon	19, 01:17 → 01:54	NGC6546 behind Moon
6, 05:36 → 06:18	Mu Gem behind Moon	19, 08:58	NGC6642 behind Moon
6, 16:10	Moon's maximum declination (23.264°)	19, 20:14	NGC6656 (M22) behind Moon
7, 05:00	Conjunction Moon-Del Gem	20, 16:06	Moon's minimum declination (-23.315°)
7, 17:43	Conjunction (7) Iris-NGC6401	23, 15:32	Conjunction Moon-Jupiter
8, 10:16	Conjunction Jupiter-Omi Sgr	24, 20:06	Conjunction Moon-Saturn
8, 19:08	Maximum of ?-Centaurids	25, 13:16	New Moon
9, 07:33	Full Moon	26, 01:58	Conjunction Moon-Neptune
9, 12:31 → 15:31	Shadow transit of Callisto on top of Jupiter	26, 03:54	Conjunction (7) Iris-NGC6523 (M8)
9, 13:44 → 16:02	Shadow transit of Io on top of Jupiter	26, 06:29 → 09:39	Minimum elongation of Mercury (3.720°)
9, 14:27 → 16:46	Transit of Io on top of Jupiter	26, 09:20 → 11:39	Conjunction (7) Iris-NGC6530
9, 22:52	Conjunction Moon-Alp Leo	26, 10:18 → 12:37	Shadow transit of Callisto on top of Jupiter
10, 03:41	Conjunction Neptune-(18) Melpomene	26, 11:35	Eclipse of Io by Jupiter
10, 13:09 → 13:49	NGC3368 (M96) behind Moon	28, 04:46	Occultation of Io by Jupiter
10, 13:57	Maximum elongation of Mercury (18.197° E)	28, 13:26	Moon's apogee (parallax = 53' 58.292")
10, 20:31	Moon's perigee (parallax = 1° 0' 49.237")	28, 17:25	Conjunction (7) Iris-NGC6544
			Conjunction (7) Iris-NGC6546
			Conjunction Moon-Uranus

Astronomical events for February

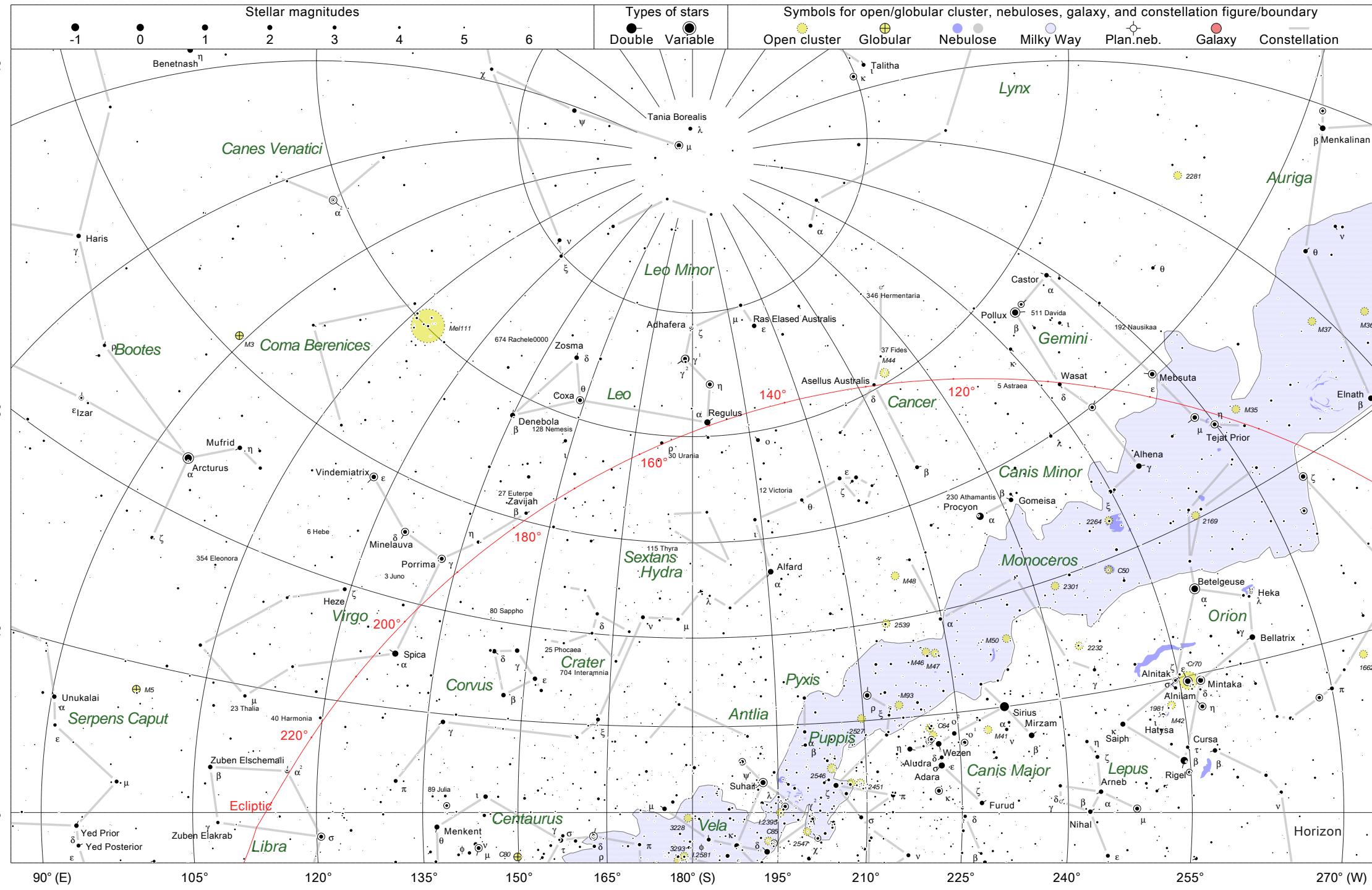
Sky on February 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
1, 10:36	Conjunction (7) Iris-Cr367	17, 14:46 → 18:01	Shadow transit of Ganymede on top of Jupiter
2, 01:25	Lunar Transient Phenomena Lunar-X	17, 17:40 → 19:59	Shadow transit of Io on top of Jupiter
2, 08:32	Conjunction Moon-Del1 Tau	17, 18:51 → 21:11	Transit of Io on top of Jupiter
2, 11:21	Conjunction Moon-Eps Tau	17, 19:29 → 22:53	Transit of Ganymede on top of Jupiter
2, 12:41	Conjunction Moon-Alp Tau	18, 09:25	Conjunction Moon-Mars
2, 19:57	Moon's first quarter	18, 12:36	Conjunction Moon-Jupiter
3, 10:57 → 14:17	Transit of Ganymede on top of Jupiter	18, 23:13	Conjunction Moon-Saturn
3, 13:53 → 16:12	Shadow transit of Io on top of Jupiter	20, 03:50	Spring equinox
3, 14:55 → 17:15	Transit of Io on top of Jupiter	20, 05:20	Conjunction (7) Iris-NGC6642
3, 16:53 → 18:13	NGC1952 (M1) behind Moon	20, 10:46	Conjunction Mars-Jupiter
3, 19:00	Conjunction Moon-Zet Tau	20, 23:59	New Persian
4, 10:00 → 10:42	Eta Gem behind Moon	21, 04:56 → 08:12	Eclipse of Ganymede by Jupiter
4, 12:51 → 13:34	Mu Gem behind Moon	21, 06:37 → 08:56	Shadow transit of Io on top of Jupiter
5, 01:34	Moon's maximum declination (23.438°)	21, 07:49 → 10:09	Transit of Io on top of Jupiter
5, 12:39	Conjunction Moon-Del Gem	21, 09:45 → 13:09	Occultation of Ganymede by Jupiter
5, 17:14 → 20:32	Eclipse of Callisto by Jupiter	21, 20:55	Conjunction Moon-Mercury
5, 20:10 → 22:58	Eclipse of Europa by Jupiter	22, 22:30 → 23, 02:26	Occultation of Callisto by Jupiter
5, 22:18 → 6, 01:08	Occultation of Europa by Jupiter	23, 01:05 → 03:25	Shadow transit of Io on top of Jupiter
6, 03:05 → 06:50	Occultation of Callisto by Jupiter	23, 01:17	Conjunction Moon-Neptune
6, 05:42 → 08:01	Eclipse of Io by Jupiter	23, 02:19 → 04:39	Transit of Io on top of Jupiter
6, 06:46 → 09:05	Occultation of Io by Jupiter	24, 02:09	Maximum elongation of Mercury (27.782° W)
7, 01:18 → 04:39	Occultation of Ganymede by Jupiter	24, 07:33	Conjunction (7) Iris-NGC6656 (M22)
7, 02:50 → 05:09	Shadow transit of Io on top of Jupiter	24, 09:28	New Moon
7, 03:54 → 06:14	Transit of Io on top of Jupiter	24, 15:23	Moon's apogee (parallax = 53' 55.006")
8, 10:19	Conjunction Moon-Alp Leo	24, 18:44 → 22:01	Shadow transit of Ganymede on top of Jupiter
8, 12:19	Conjunction of Neptune (elongation 1.016°)	24, 19:34 → 21:53	Shadow transit of Io on top of Jupiter
8, 14:11	Conjunction Venus-Uranus	24, 20:48 → 23:08	Transit of Io on top of Jupiter
9, 00:36 → 01:27	NGC3368 (M96) behind Moon	24, 21:44	Maximum elongation of Venus (46.077° E)
9, 17:48	Full Moon (supermoon)	26, 06:11	Conjunction (18) Melpomene-IC1613
10, 06:33	Moon's perigee (parallax = 1° 1' 25.305")	26, 16:24	Conjunction (192) Nausikaa-NGC2331
10, 15:15 → 18:37	Transit of Ganymede on top of Jupiter	27, 00:03	Conjunction Moon-Uranus
10, 15:47 → 18:06	Shadow transit of Io on top of Jupiter	28, 08:31 → 10:50	Shadow transit of Io on top of Jupiter
10, 16:53 → 19:13	Transit of Io on top of Jupiter	28, 08:53 → 12:11	Eclipse of Ganymede by Jupiter
14, 00:26 → 03:47	Shadow transit of Callisto on top of Jupiter	28, 09:46 → 12:06	Transit of Io on top of Jupiter
14, 00:58 → 04:13	Eclipse of Ganymede by Jupiter	29, 19:49 → 20:24	Eps Tau behind Moon
14, 04:43 → 07:02	Shadow transit of Io on top of Jupiter	29, 23:12	Conjunction Moon-Alp Tau
14, 05:33 → 08:55	Occultation of Ganymede by Jupiter	30, 17:13 → 20:02	Eclipse of Europa by Jupiter
14, 05:52 → 08:12	Transit of Io on top of Jupiter	30, 18:24 → 21:54	Shadow transit of Callisto on top of Jupiter
14, 09:52	Maximum of ?-Normids	30, 19:46 → 22:39	Occultation of Europa by Jupiter
16, 09:34	Moon's last quarter	31, 01:45 → 02:27	NGC1952 (M1) behind Moon
16, 13:17	Conjunction (1) Ceres-Zet Cap	31, 03:08	Conjunction Moon-Zet Tau
16, 18:54	Conjunction Mercury-(8) Flora	31, 14:37	Lunar Transient Phenomena Lunar-X
16, 19:25 → 19:58	NGC6546 behind Moon	31, 17:33	Conjunction Mars-Saturn
17, 01:45	Lunar Transient Phenomena Lunar-X	31, 19:00	Conjunction Moon-Eta Gem
17, 14:07	Moon's minimum declination (-23.538°)	31, 21:27 → 1, 00:47	Shadow transit of Io on top of Jupiter

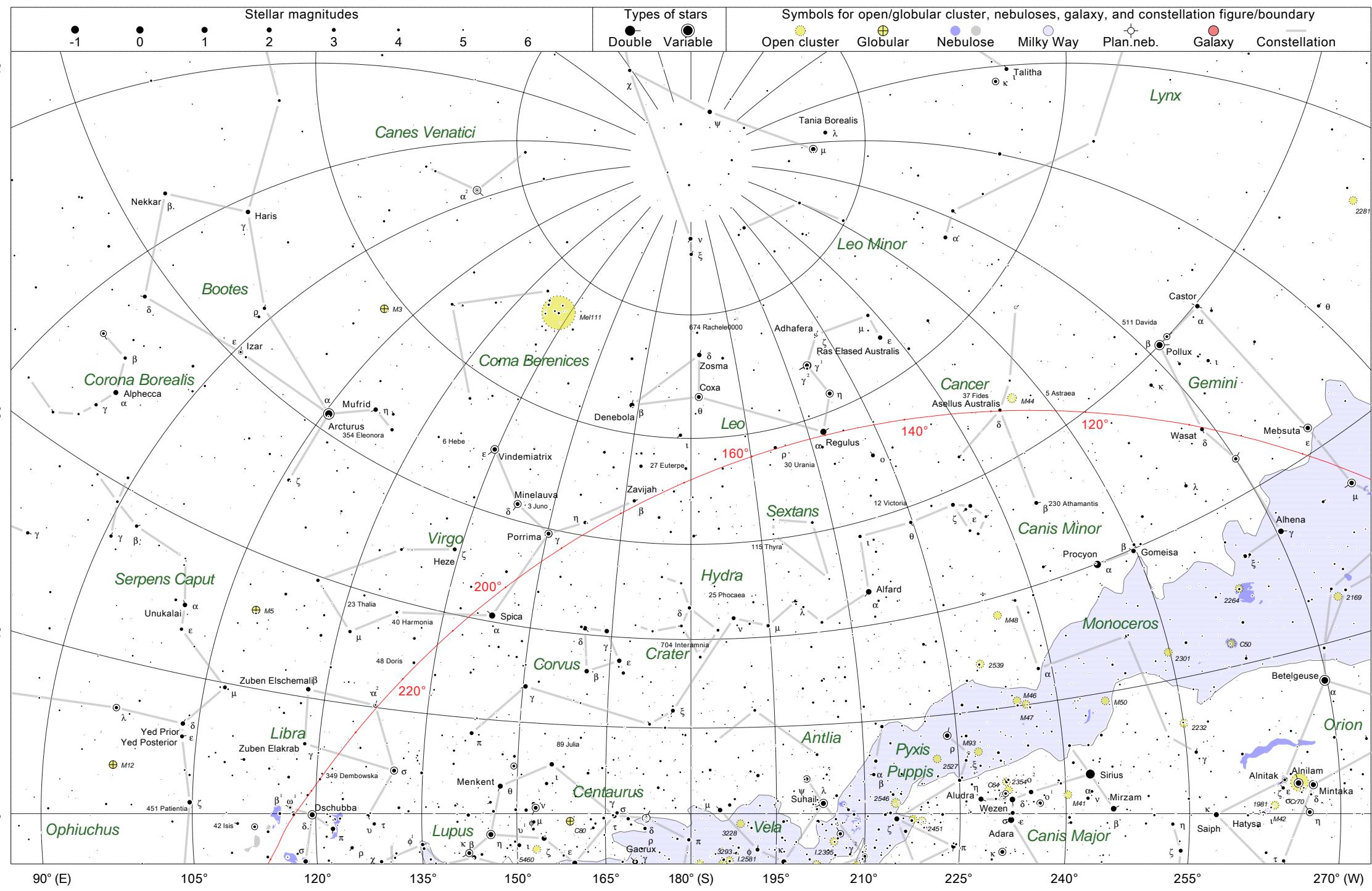
Astronomical events for March

Sky on March 15, 2020, 00:00 h



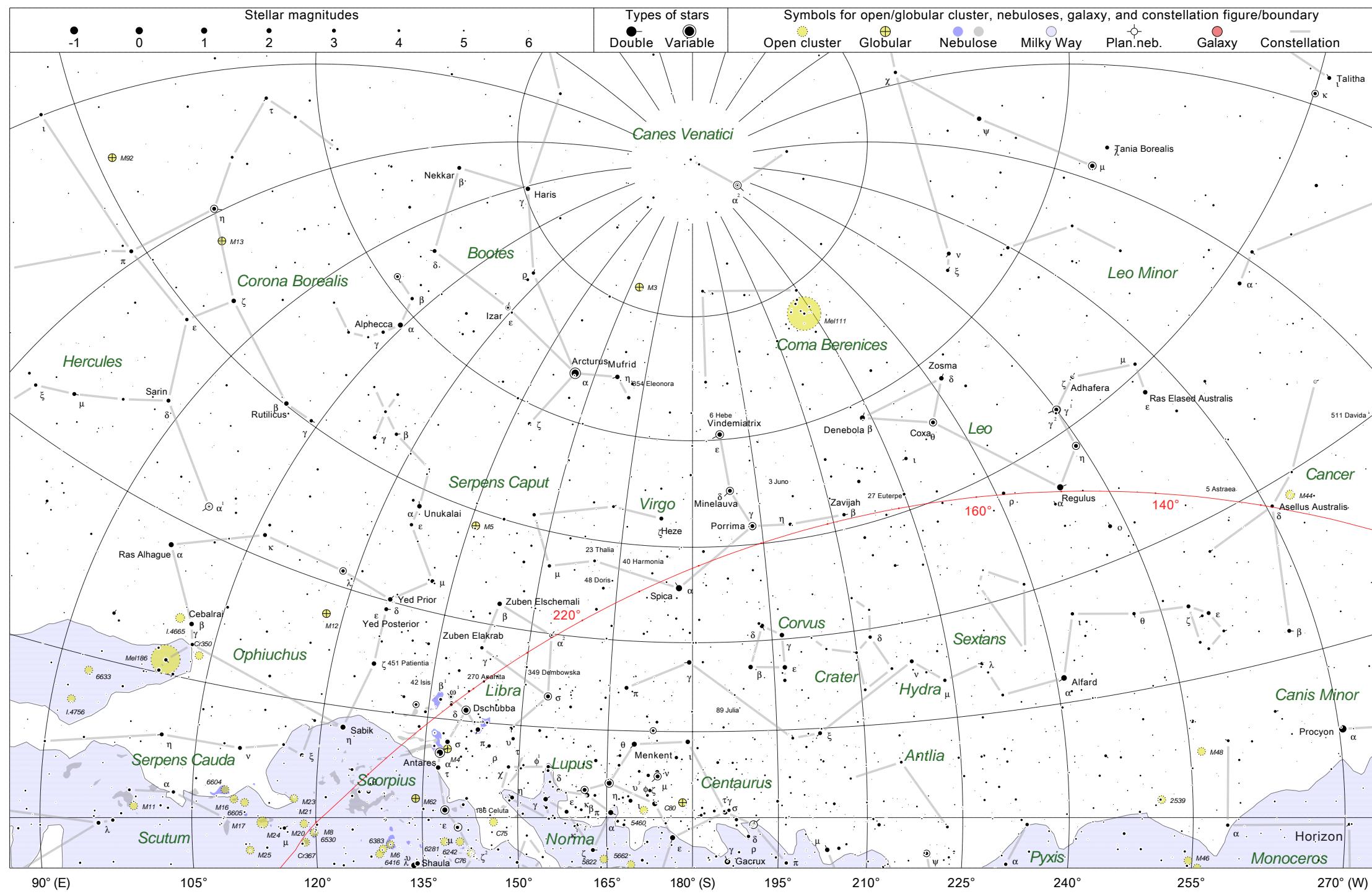
Date (UT)	Event description	Date (UT)	Event description
31, 22:42 → 1, 02:00	Shadow transit of Ganymede on top of Jupiter	19, 06:41 → 09:29	Shadow transit of Europa on top of Jupiter
31, 22:44 → 1, 01:04	Transit of Io on top of Jupiter	19, 09:15 → 12:06	Transit of Europa on top of Jupiter
31, 23:32	Conjunction Moon-Mu Gem	19, 11:30 → 13:49	Eclipse of Io by Jupiter
1, 09:12	Moon's maximum declination (23.701°)	19, 12:48 → 15:08	Occultation of Io by Jupiter
1, 10:21	Moon's first quarter	19, 13:17	Conjunction Moon-Neptune
3, 09:45	Conjunction Venus-star #3440134	20, 19:01	Moon's apogee (parallax = 53' 56.814")
3, 17:16	Conjunction Venus-star #3450121	21, 01:00 → 03:50	Eclipse of Europa by Jupiter
4, 00:31	Conjunction Mercury-Neptune	21, 03:39 → 06:33	Occultation of Europa by Jupiter
4, 00:48	Conjunction Venus-Eta Tau	21, 05:58 → 08:17	Eclipse of Io by Jupiter
4, 10:10	Conjunction Venus-star #3490031	21, 07:16 → 09:36	Occultation of Io by Jupiter
4, 10:24 → 12:44	Shadow transit of Io on top of Jupiter	21, 20:55	Conjunction Moon-Mercury
4, 11:42 → 14:02	Transit of Io on top of Jupiter	22, 06:39	Maximum of Lyrids
4, 12:52 → 16:10	Eclipse of Ganymede by Jupiter	22, 19:58 → 22:46	Shadow transit of Europa on top of Jupiter
4, 21:58	Conjunction Moon-Alp Leo	22, 22:32 → 23, 01:22	Transit of Europa on top of Jupiter
5, 10:43 → 11:17	NGC3368 (M96) behind Moon	23, 00:27 → 02:46	Eclipse of Io by Jupiter
7, 18:08	Moon's perigee (parallax = 1° 1' 25.533")	23, 01:45 → 04:04	Occultation of Io by Jupiter
7, 23:21 → 8, 01:40	Shadow transit of Io on top of Jupiter	23, 02:26	New Moon
8, 00:39 → 03:00	Transit of Io on top of Jupiter	23, 10:05	Conjunction Moon-Uranus
8, 02:35	Full Moon (supermoon)	23, 11:41	Maximum of -?Puppids
8, 02:40 → 05:58	Shadow transit of Ganymede on top of Jupiter	23, 19:02 → 19:21	Neomenia
8, 05:08 → 08:45	Eclipse of Callisto by Jupiter	24, 14:18 → 17:09	Eclipse of Europa by Jupiter
8, 07:54 → 11:20	Transit of Ganymede on top of Jupiter	24, 16:56 → 19:50	Occultation of Europa by Jupiter
8, 14:50 → 17:38	Shadow transit of Europa on top of Jupiter	24, 18:55 → 21:14	Eclipse of Io by Jupiter
8, 17:15 → 21:20	Occultation of Callisto by Jupiter	24, 20:12 → 22:32	Occultation of Io by Jupiter
8, 17:24 → 20:15	Transit of Europa on top of Jupiter	26, 00:47 → 01:30	Eps Tau behind Moon
8, 20:40 → 22:59	Eclipse of Io by Jupiter	26, 02:57	Conjunction Moon-Alp Tau
8, 21:58 → 9, 00:18	Occultation of Io by Jupiter	26, 05:58 → 09:27	Occultation of Ganymede by Jupiter
11, 01:32	Conjunction (3) Juno-Del Vir	26, 09:05	Conjunction of Uranus (elongation 0.447°)
11, 02:00	Conjunction Moon-Bet1 Sco	26, 09:14 → 12:02	Shadow transit of Europa on top of Jupiter
11, 23:59	Easter date	26, 11:47 → 14:38	Transit of Europa on top of Jupiter
13, 00:21	Conjunction (15) Eunomia-Gam2 Ari	26, 13:23 → 15:42	Eclipse of Io by Jupiter
13, 01:17 → 01:45	NGC6530 behind Moon	26, 14:40 → 17:00	Occultation of Io by Jupiter
13, 11:49	Conjunction (4) Vesta-Eps Tau	27, 05:37 → 06:20	NGC1952 (M1) behind Moon
13, 15:48 → 16:19	NGC6656 (M22) behind Moon	27, 06:48	Conjunction Moon-Zet Tau
13, 21:03	Moon's minimum declination (-23.804°)	27, 19:12 → 19:56	NGC2129 behind Moon
13, 23:59	New Hindu solar year	28, 01:21	Conjunction Moon-Eta Gem
14, 08:52	Conjunction (15) Eunomia-Bet Ari	28, 03:35 → 06:26	Eclipse of Europa by Jupiter
14, 21:59	Conjunction Moon-Jupiter	28, 03:59	Conjunction Moon-Mu Gem
14, 22:56	Moon's last quarter	28, 06:13 → 09:07	Occultation of Europa by Jupiter
15, 12:19	Conjunction Moon-Saturn	28, 07:51 → 10:11	Eclipse of Io by Jupiter
15, 14:27	Lunar Transient Phenomena Lunar-X	28, 09:08 → 11:28	Occultation of Io by Jupiter
15, 17:24 → 20:12	Shadow transit of Europa on top of Jupiter	28, 15:23	Moon's maximum declination (23.935°)
15, 19:59 → 22:50	Transit of Europa on top of Jupiter	29, 04:31	Conjunction Moon-Del Gem
15, 22:34 → 16, 00:53	Eclipse of Io by Jupiter	29, 07:44	Conjunction (192) Nausikaa-Kap Gem
15, 23:52 → 16, 02:11	Occultation of Io by Jupiter	29, 19:46 → 23:15	Transit of Ganymede on top of Jupiter
16, 04:16	Conjunction Moon-Mars	29, 22:31 → 30, 01:19	Shadow transit of Europa on top of Jupiter
17, 11:42 → 14:33	Eclipse of Europa by Jupiter	30, 01:02 → 03:53	Transit of Europa on top of Jupiter
17, 14:22 → 17:15	Occultation of Europa by Jupiter	30, 02:20 → 04:39	Eclipse of Io by Jupiter
17, 17:02 → 19:21	Eclipse of Io by Jupiter	30, 03:20	Lunar Transient Phenomena Lunar-X
17, 18:20 → 20:40	Occultation of Io by Jupiter	30, 03:36 → 05:56	Occultation of Io by Jupiter
17, 22:07	Conjunction (7) Iris-NGC6717	30, 20:38	Moon's first quarter

Sky on April 15, 2020, 00:00 h



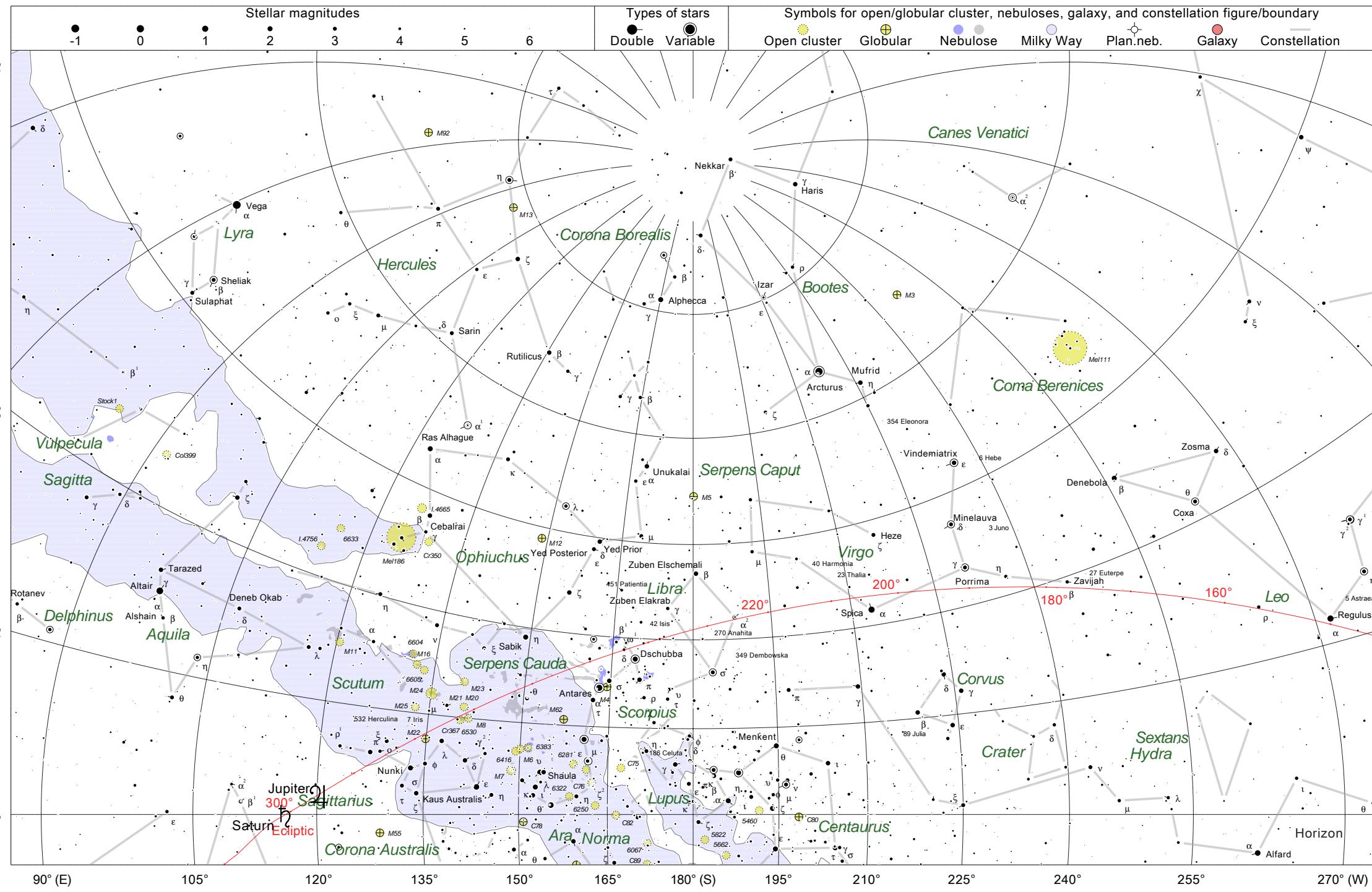
Date (UT)	Event description	Date (UT)	Event description
1, 03:57	Conjunction Mercury-Uranus	19, 11:23 → 14:15	Eclipse of Europa by Jupiter
1, 16:17	Conjunction Mars-Gam Cap	19, 13:31 → 15:50	Eclipse of Io by Jupiter
1, 16:54 → 19:45	Eclipse of Europa by Jupiter	19, 13:41 → 16:36	Occultation of Europa by Jupiter
1, 19:29 → 22:24	Occultation of Europa by Jupiter	19, 14:38 → 16:58	Occultation of Io by Jupiter
1, 20:48 → 23:07	Eclipse of Io by Jupiter	20, 10:43 → 13:03	Shadow transit of Io on top of Jupiter
1, 22:04 → 2, 00:24	Occultation of Io by Jupiter	20, 10:46 → 15:03	Transit of Callisto on top of Jupiter
2, 01:38	Conjunction Neptune-(8) Flora	20, 11:51 → 14:11	Transit of Io on top of Jupiter
2, 05:33	Conjunction Moon-Alp Leo	20, 19:12	Conjunction Moon-Uranus
2, 19:40 → 20:31	NGC3379 (M105) behind Moon	21, 06:11 → 09:00	Shadow transit of Europa on top of Jupiter
3, 04:44 → 08:05	Eclipse of Ganymede by Jupiter	21, 06:59 → 10:29	Transit of Ganymede on top of Jupiter
3, 06:21 → 10:07	Shadow transit of Callisto on top of Jupiter	21, 07:59 → 10:19	Eclipse of Io by Jupiter
3, 09:48 → 13:17	Occultation of Ganymede by Jupiter	21, 08:21 → 11:12	Transit of Europa on top of Jupiter
3, 11:47 → 14:36	Shadow transit of Europa on top of Jupiter	21, 09:05 → 11:25	Occultation of Io by Jupiter
3, 14:16 → 17:08	Transit of Europa on top of Jupiter	21, 17:06	Conjunction (4) Vesta-NGC1952 (M1)
3, 15:16 → 17:35	Eclipse of Io by Jupiter	22, 09:42	Conjunction Mercury-Venus
3, 16:32 → 18:51	Occultation of Io by Jupiter	22, 17:39	New Moon
3, 18:09 → 22:23	Transit of Callisto on top of Jupiter	23, 00:42 → 03:34	Eclipse of Europa by Jupiter
4, 05:11	Conjunction Mars-Del Cap	23, 02:28 → 04:47	Eclipse of Io by Jupiter
5, 06:11 → 09:03	Eclipse of Europa by Jupiter	23, 02:54 → 05:49	Occultation of Europa by Jupiter
5, 08:44 → 11:39	Occultation of Europa by Jupiter	23, 03:32 → 05:52	Occultation of Io by Jupiter
5, 09:45 → 12:04	Eclipse of Io by Jupiter	23, 05:04 → 05:55	Eps Tau behind Moon
5, 10:59 → 13:19	Occultation of Io by Jupiter	23, 06:47	Conjunction Moon-Alp Tau
5, 20:09	Maximum of ?-Aquariids	23, 15:23	Conjunction (7) Iris-Xi Sgr
6, 03:03	Moon's perigee (parallax = 1° 0' 57.648")	24, 03:35	Conjunction Moon-Venus
6, 23:35 → 7, 03:04	Transit of Ganymede on top of Jupiter	24, 12:28	Conjunction Moon-Mercury
7, 01:04 → 03:53	Shadow transit of Europa on top of Jupiter	24, 16:38 → 20:02	Eclipse of Ganymede by Jupiter
7, 03:30 → 06:22	Transit of Europa on top of Jupiter	24, 19:27 → 22:17	Shadow transit of Europa on top of Jupiter
7, 04:13 → 06:32	Eclipse of Io by Jupiter	24, 20:53 → 25, 00:23	Occultation of Ganymede by Jupiter
7, 05:27 → 07:47	Occultation of Io by Jupiter	24, 20:56 → 23:15	Eclipse of Io by Jupiter
7, 10:45	Full Moon	24, 21:32 → 25, 00:23	Transit of Europa on top of Jupiter
8, 10:11	Maximum of ?-Lyrids	24, 21:59 → 25, 00:19	Occultation of Io by Jupiter
8, 12:56	Conjunction Moon-Bet1 Sco	25, 05:03	Conjunction Moon-Eta Gem
8, 19:30 → 22:21	Eclipse of Europa by Jupiter	25, 07:56	Conjunction Moon-Mu Gem
8, 22:00 → 9, 00:54	Occultation of Europa by Jupiter	25, 21:16	Moon's maximum declination (24.055°)
8, 22:41 → 9, 01:00	Eclipse of Io by Jupiter	26, 05:07	Conjunction Mercury-(4) Vesta
8, 22:52	Conjunction (7) Iris-Omi Sgr	26, 14:00 → 16:52	Eclipse of Europa by Jupiter
8, 23:55 → 9, 02:14	Occultation of Io by Jupiter	26, 15:24 → 17:44	Eclipse of Io by Jupiter
9, 18:23	Conjunction (7) Iris-Omi Sgr	26, 16:06 → 19:01	Occultation of Europa by Jupiter
10, 00:39 → 01:48	NGC6401 behind Moon	26, 16:26 → 18:46	Occultation of Io by Jupiter
10, 13:34 → 17:04	Occultation of Ganymede by Jupiter	26, 18:56	Conjunction Moon-Bet Gem
10, 14:03 → 14:44	Cr367 behind Moon	28, 06:30 → 09:54	Shadow transit of Ganymede on top of Jupiter
10, 14:21 → 17:09	Shadow transit of Europa on top of Jupiter	28, 08:44 → 11:33	Shadow transit of Europa on top of Jupiter
10, 16:44 → 19:35	Transit of Europa on top of Jupiter	28, 09:53 → 12:12	Eclipse of Io by Jupiter
10, 17:10 → 19:29	Eclipse of Io by Jupiter	28, 10:33 → 14:04	Transit of Ganymede on top of Jupiter
10, 18:22 → 20:42	Occultation of Io by Jupiter	28, 10:43 → 13:34	Transit of Europa on top of Jupiter
11, 06:13	Moon's minimum declination (-23.998°)	28, 10:53 → 13:12	Occultation of Io by Jupiter
11, 14:21 → 16:41	Shadow transit of Io on top of Jupiter	28, 11:05 → 15:04	Eclipse of Callisto by Jupiter
11, 15:34 → 17:54	Transit of Io on top of Jupiter	29, 09:28	Conjunction Moon-Alp Leo
11, 17:05 → 20:57	Eclipse of Callisto by Jupiter	29, 15:28	Lunar Transient Phenomena Lunar-X
12, 08:47 → 11:39	Eclipse of Europa by Jupiter	30, 03:18 → 06:11	Eclipse of Europa by Jupiter
12, 11:14 → 14:08	Occultation of Europa by Jupiter	30, 03:30	Moon's first quarter
12, 11:38 → 13:57	Eclipse of Io by Jupiter	30, 04:21 → 06:40	Eclipse of Io by Jupiter
12, 12:02	Conjunction Moon-Jupiter	30, 05:18 → 08:13	Occultation of Europa by Jupiter
12, 12:49 → 15:09	Occultation of Io by Jupiter	30, 05:19 → 07:39	Occultation of Io by Jupiter
12, 18:15	Conjunction Moon-Saturn	30, 23:59	Pentecost date
14, 03:19 → 06:49	Transit of Ganymede on top of Jupiter	31, 20:37 → 1, 00:02	Eclipse of Ganymede by Jupiter

Sky on May 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
31, 22:01 → 1, 00:50	Shadow transit of Europa on top of Jupiter	18, 17:37 → 20:28	Transit of Europa on top of Jupiter
31, 22:49 → 1, 01:09	Eclipse of Io by Jupiter	18, 18:27 → 21:53	Shadow transit of Ganymede on top of Jupiter
31, 23:46 → 1, 02:06	Occultation of Io by Jupiter	18, 20:55 → 19, 00:25	Transit of Ganymede on top of Jupiter
31, 23:53 → 1, 02:44	Transit of Europa on top of Jupiter	19, 07:25 → 08:11	Venus behind Moon
1, 00:26 → 03:56	Occultation of Ganymede by Jupiter	19, 15:15	Conjunction Moon-Eps Tau
1, 16:36 → 19:29	Eclipse of Europa by Jupiter	19, 18:08	Conjunction Moon-Alp Tau
2, 17:18 → 19:37	Eclipse of Io by Jupiter	20, 10:01 → 12:21	Eclipse of Io by Jupiter
2, 18:13 → 20:33	Occultation of Io by Jupiter	20, 10:36 → 12:56	Occultation of Io by Jupiter
2, 18:29 → 21:24	Occultation of Europa by Jupiter	20, 11:08 → 14:02	Eclipse of Europa by Jupiter
3, 03:36	Moon's perigee (parallax = 1° 0' 12.041")	20, 12:19 → 15:13	Occultation of Europa by Jupiter
3, 17:03	Minimum distance of Venus (0.289 AU)	20, 20:21 → 20:52	NGC1952 (M1) behind Moon
3, 18:50	Minimum elongation of Venus (0.481°)	20, 21:44	Summer solstice
4, 10:28 → 13:53	Shadow transit of Ganymede on top of Jupiter	21, 06:40	Solar eclipse (central, annular)
4, 11:17 → 14:07	Shadow transit of Europa on top of Jupiter	21, 06:41	New Moon
4, 11:46 → 14:05	Eclipse of Io by Jupiter	21, 17:41	Conjunction Moon-Mu Gem
4, 12:39 → 14:59	Occultation of Io by Jupiter	21, 19:48 → 20:06	Neomenia
4, 13:02 → 15:54	Transit of Europa on top of Jupiter	22, 00:43	Conjunction (8) Flora-IC1613
4, 13:05	Maximum elongation of Mercury (23.605° E)	22, 03:56	Moon's maximum declination (24.069°)
4, 14:04 → 17:34	Transit of Ganymede on top of Jupiter	22, 04:30 → 06:49	Eclipse of Io by Jupiter
4, 22:43	Conjunction Moon-Bet1 Sco	22, 05:02 → 07:22	Occultation of Io by Jupiter
5, 05:19	Conjunction (4) Vesta-NGC2129	22, 05:31	Conjunction Moon-Mercury
5, 19:12	Full Moon	22, 05:41 → 08:32	Shadow transit of Europa on top of Jupiter
5, 19:25	Lunar eclipse (penumbral, mag 0.56)	22, 06:45 → 09:36	Transit of Europa on top of Jupiter
5, 21:30 → 22:21	NGC6287 behind Moon	22, 08:33 → 12:00	Eclipse of Ganymede by Jupiter
6, 02:26 → 06:45	Transit of Callisto on top of Jupiter	22, 10:41 → 14:11	Occultation of Ganymede by Jupiter
6, 05:55 → 08:48	Eclipse of Europa by Jupiter	22, 12:22 → 16:29	Shadow transit of Callisto on top of Jupiter
6, 06:14 → 08:34	Eclipse of Io by Jupiter	23, 22:58 → 24, 01:18	Eclipse of Io by Jupiter
6, 07:06 → 09:26	Occultation of Io by Jupiter	23, 23:28 → 24, 01:48	Occultation of Io by Jupiter
6, 07:40 → 10:35	Occultation of Europa by Jupiter	24, 00:26 → 03:20	Eclipse of Europa by Jupiter
6, 20:07 → 20:58	NGC6523 (M8) behind Moon	24, 01:27 → 04:22	Occultation of Europa by Jupiter
6, 20:23 → 21:22	NGC6530 behind Moon	25, 12:47	Conjunction Moon-Eta Leo
6, 21:51	Conjunction Mercury-Eps Gem	25, 17:27 → 19:46	Eclipse of Io by Jupiter
7, 04:06	Maximum of Dayt. Arietids	25, 17:54 → 20:14	Occultation of Io by Jupiter
7, 08:25	Conjunction Moon-Lam Sgr	25, 18:30	Conjunction Moon-Alp Leo
7, 16:22	Moon's minimum declination (-24.068°)	25, 18:58 → 21:49	Shadow transit of Europa on top of Jupiter
8, 00:34 → 03:24	Shadow transit of Europa on top of Jupiter	25, 19:52 → 22:43	Transit of Europa on top of Jupiter
8, 00:36 → 04:01	Eclipse of Ganymede by Jupiter	25, 20:27	Minimum distance from Sun of 2P/Encke MPC105240 (0.337 AU)
8, 00:43 → 03:02	Eclipse of Io by Jupiter	25, 22:26 → 26, 01:53	Shadow transit of Ganymede on top of Jupiter
8, 01:32 → 03:52	Occultation of Io by Jupiter	26, 00:15 → 03:46	Transit of Ganymede on top of Jupiter
8, 02:12 → 05:03	Transit of Europa on top of Jupiter	26, 06:52 → 07:27	NGC3379 (M105) behind Moon
8, 03:55 → 07:26	Occultation of Ganymede by Jupiter	26, 07:07 → 07:28	NGC3371 behind Moon
8, 09:32	Conjunction (192) Nausikaa-NGC2632 (M44)	26, 07:07 → 07:28	NGC3384 behind Moon
8, 16:52	Conjunction Moon-Jupiter	26, 23:59	Comet 2P/Encke MPC105240 with maximum magnitude
9, 04:12	Conjunction Moon-Saturn	27, 04:06	Maximum of June Bootids
9, 19:11 → 21:31	Eclipse of Io by Jupiter	27, 11:55 → 14:15	Eclipse of Io by Jupiter
9, 19:13 → 22:06	Eclipse of Europa by Jupiter	27, 12:20 → 14:40	Occultation of Io by Jupiter
9, 19:59 → 22:18	Occultation of Io by Jupiter	27, 13:45 → 16:39	Eclipse of Europa by Jupiter
9, 20:50 → 23:45	Occultation of Europa by Jupiter	27, 14:36 → 17:30	Occultation of Europa by Jupiter
11, 13:40 → 15:59	Eclipse of Io by Jupiter	28, 03:14	Lunar Transient Phenomena Lunar-X
11, 13:51 → 16:41	Shadow transit of Europa on top of Jupiter	28, 08:16	Moon's first quarter
11, 14:25 → 16:45	Occultation of Io by Jupiter	28, 08:54	Conjunction Mercury-(4) Vesta
11, 14:27 → 17:53	Shadow transit of Ganymede on top of Jupiter	29, 06:24 → 08:43	Eclipse of Io by Jupiter
11, 15:21 → 18:12	Transit of Europa on top of Jupiter	29, 06:46 → 09:06	Occultation of Io by Jupiter
11, 17:31 → 21:01	Transit of Ganymede on top of Jupiter	29, 08:15 → 11:06	Shadow transit of Europa on top of Jupiter
12, 10:28	Conjunction Venus-Alp Tau	29, 08:59 → 11:50	Transit of Europa on top of Jupiter
12, 11:35	Conjunction (4) Vesta-Eta Gem	30, 02:09	Moon's perigee (parallax = 59' 24.963")

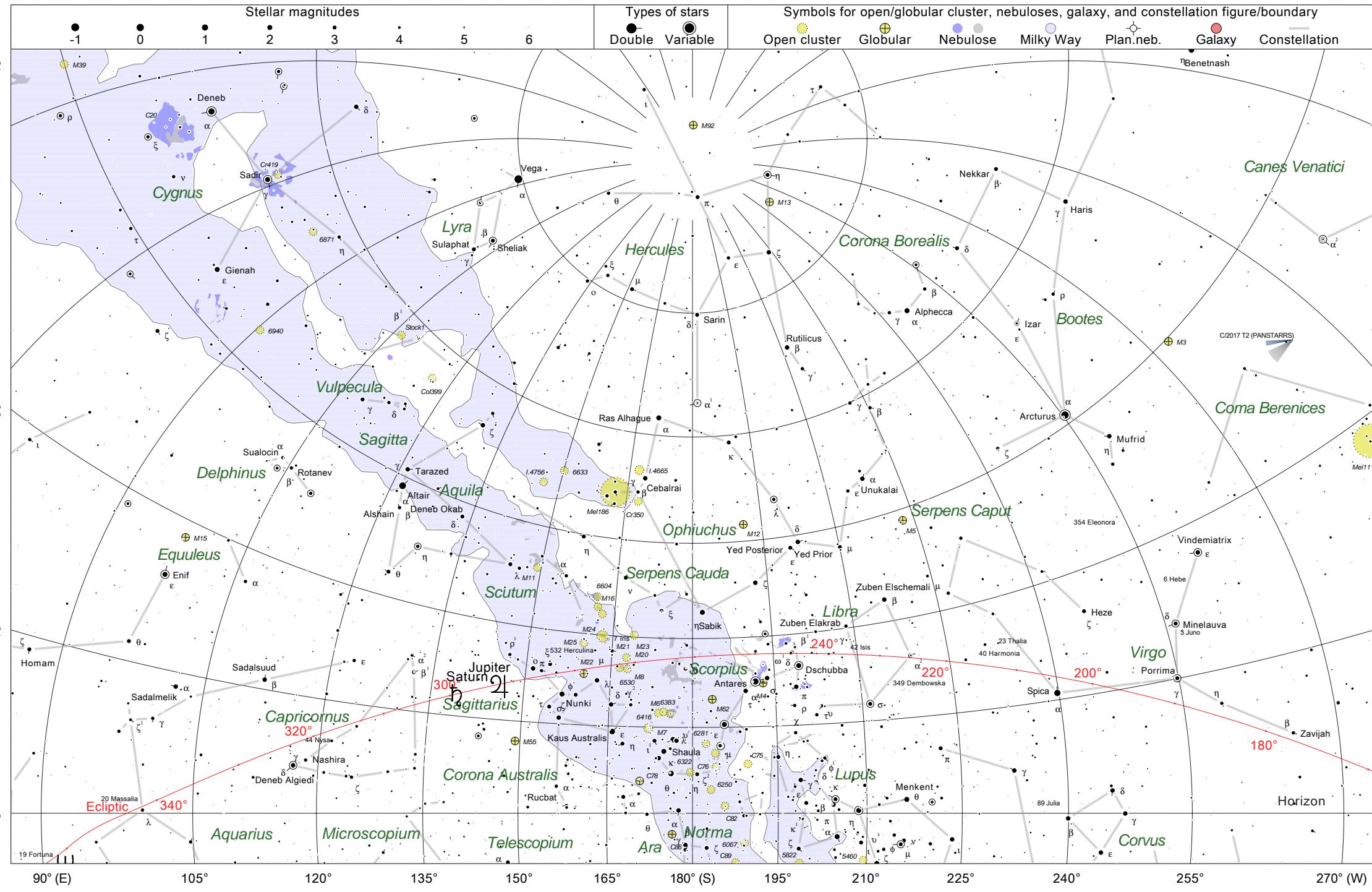
Sky on June 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
30, 23:09 → 1, 03:20	Eclipse of Callisto by Jupiter	15, 08:51	Conjunction (15) Eunomia-Bet Tau
1, 00:52 → 03:12	Eclipse of Io by Jupiter	16, 08:49	Conjunction (3) Juno-Del Vir
1, 01:12 → 03:32	Occultation of Io by Jupiter	16, 21:48 → 22:30	Eps Tau behind Moon
1, 02:14 → 06:33	Occultation of Callisto by Jupiter	16, 23:42	Conjunction Moon-Alp Tau
1, 03:03 → 05:57	Eclipse of Europa by Jupiter	17, 00:31	Conjunction (4) Vesta-Del Gem
1, 03:44 → 06:38	Occultation of Europa by Jupiter	17, 04:16	Conjunction Moon-Venus
1, 07:10	Conjunction (7) Iris-Tr33	17, 16:26 → 20:45	Occultation of Callisto by Jupiter
2, 07:42	Conjunction Moon-Bet1 Sco	17, 17:13 → 21:29	Eclipse of Callisto by Jupiter
2, 19:21 → 21:40	Eclipse of Io by Jupiter	17, 20:21 → 22:42	Transit of Io on top of Jupiter
2, 19:38 → 21:58	Occultation of Io by Jupiter	17, 20:26 → 22:47	Shadow transit of Io on top of Jupiter
2, 21:32 → 3, 00:23	Shadow transit of Europa on top of Jupiter	18, 02:21 → 03:05	NGC1952 (M1) behind Moon
2, 22:06 → 3, 00:57	Transit of Europa on top of Jupiter	18, 16:41	NGC2129 behind Moon
3, 03:29 → 04:15	NGC6235 behind Moon	18, 21:33	Conjunction Moon-Eta Gem
3, 19:32 → 20:16	NGC6401 behind Moon	19, 00:03	Conjunction Moon-Mu Gem
4, 06:49	Conjunction (18) Melpomene-NGC1807	19, 02:14	Conjunction Moon-Mercury
4, 09:31 → 10:12	Cr367 behind Moon	19, 11:51	Moon's maximum declination (24.066°)
4, 11:33	Maximum distance of Sun (1.017 AU)	20, 09:18	Conjunction Moon-Bet Gem
4, 13:49 → 16:09	Eclipse of Io by Jupiter	20, 17:33	New Moon
4, 14:04 → 16:24	Occultation of Io by Jupiter	20, 22:28	Opposition of Saturn (elongation 179.768°)
4, 16:22 → 19:16	Eclipse of Europa by Jupiter	22, 15:15	Maximum elongation of Mercury (20.133° W)
4, 16:52 → 19:46	Occultation of Europa by Jupiter	22, 23:47	Conjunction Moon-Alp Leo
4, 23:57	Conjunction (18) Melpomene-NGC1817	22, 23:59	New Armenian year
5, 01:37	Moon's minimum declination (-24.062°)	23, 13:19 → 14:35	NGC3379 (M105) behind Moon
5, 04:30	Lunar eclipse (penumbral, mag 0.35)	23, 13:35 → 14:40	NGC3371 behind Moon
5, 04:44	Full Moon	23, 13:35 → 14:40	NGC3384 behind Moon
5, 05:19	Conjunction Venus-Del1 Tau	25, 04:54	Moon's perigee (parallax = 59' 31.361")
5, 20:10	Conjunction Moon-Jupiter	25, 19:15 → 21:35	Occultation of Io by Jupiter
6, 08:17 → 10:37	Eclipse of Io by Jupiter	25, 19:31 → 21:51	Eclipse of Io by Jupiter
6, 08:30 → 10:49	Occultation of Io by Jupiter	25, 21:47 → 26, 02:04	Transit of Callisto on top of Jupiter
6, 10:28	Conjunction Moon-Saturn	25, 23:39 → 26, 02:32	Occultation of Europa by Jupiter
6, 10:49 → 13:40	Shadow transit of Europa on top of Jupiter	26, 00:13 → 03:08	Eclipse of Europa by Jupiter
6, 11:13 → 14:04	Transit of Europa on top of Jupiter	26, 00:29 → 04:46	Shadow transit of Callisto on top of Jupiter
9, 17:59	Comet 2P/Encke MPC105240 ends to be visible to naked eye	26, 17:28	Conjunction (4) Vesta-NGC2420
10, 12:18	Conjunction Moon-Neptune	27, 12:32	Moon's first quarter
11, 00:53	Conjunction (7) Iris-Mu Sgr	27, 14:51	Lunar Transient Phenomena Lunar-X
11, 20:23	Conjunction Moon-Mars	27, 21:13	Maximum of Piscis Austr.
12, 00:47	Conjunction Venus-Alp Tau	29, 12:19	Conjunction Moon-Bet1 Sco
12, 19:27	Moon's apogee (parallax = 54' 14.928")	29, 15:52	Conjunction Mercury-Del Gem
12, 22:36	Lunar Transient Phenomena Lunar-X	29, 23:26	Maximum of S. ?Aquariids
12, 23:29	Moon's last quarter	29, 23:26	Maximum of ?Capricornids
14, 07:58	Opposition of Jupiter (elongation 179.672°)	30, 11:59	Minimum distance of 2P/Encke MPC105240 (0.622 AU)
14, 15:24	Conjunction Moon-Uranus	31, 15:02 → 15:20	Cr367 behind Moon

Astronomical events for July

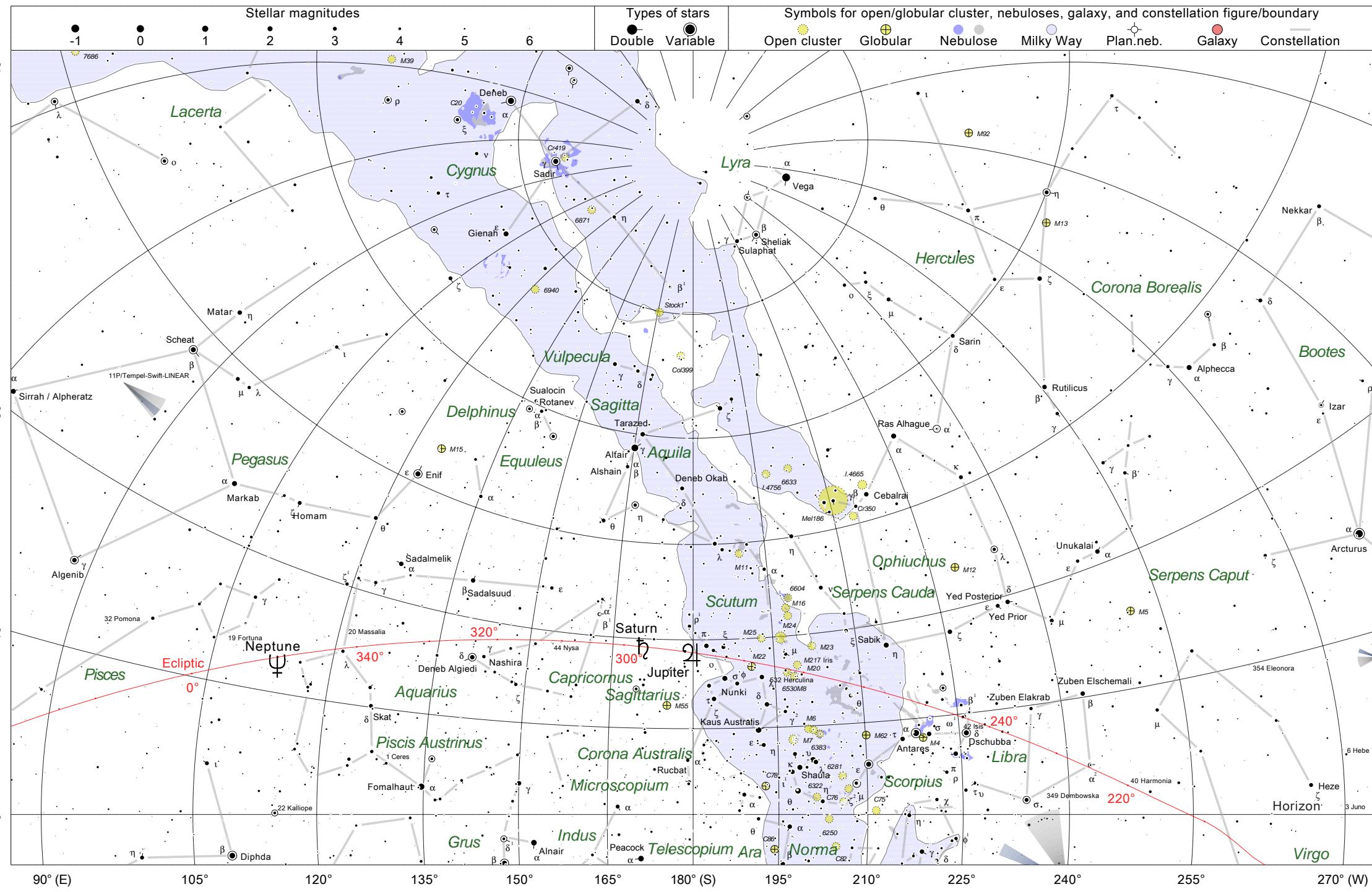
Sky on July 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
31, 22:01 → 23:25	NGC6626 (M28) behind Moon	18, 23:07	Conjunction (7) Iris-NGC6440
1, 00:37	Conjunction Moon-Lam Sgr	19, 02:42	New Moon
1, 08:47	Moon's minimum declination (-24.083°)	19, 03:28	Conjunction Moon-Mercury
2, 01:02	Conjunction Moon-Jupiter	19, 04:11	Conjunction Moon-Eta Leo
2, 05:48	Conjunction (7) Iris-NGC6494 (M23)	19, 06:09	Conjunction Moon-Alp Leo
2, 12:56	Conjunction Moon-Saturn	19, 19:06 → 19:41	Neomenia
3, 03:44	Conjunction Mercury-(4) Vesta	19, 19:42 → 22:36	Occultation of Europa by Jupiter
3, 09:04	Minimum distance from Sun of Mars (1.381 AU)	19, 21:23 → 20, 00:18	Eclipse of Europa by Jupiter
3, 11:18 → 15:39	Eclipse of Callisto by Jupiter	19, 21:35 → 20, 01:52	Occultation of Callisto by Jupiter
3, 15:25 → 17:45	Occultation of Io by Jupiter	19, 22:48 → 23:19	NGC3368 (M96) behind Moon
3, 15:54 → 18:15	Eclipse of Io by Jupiter	20, 03:13	Conjunction Mercury-Alp Leo
3, 15:59	Full Moon	21, 10:59	Moon's perigee (parallax = 1° 0' 20.448")
6, 00:58	Conjunction (192) Nausikaa-Alp Leo	21, 23:59	New Islamic
6, 12:11	Conjunction (1) Ceres-star #23090074	22, 02:54 → 06:23	Transit of Ganymede on top of Jupiter
6, 16:47	Conjunction Moon-Neptune	22, 05:08 → 07:29	Transit of Io on top of Jupiter
7, 20:02 → 23:32	Transit of Ganymede on top of Jupiter	22, 06:01 → 08:22	Shadow transit of Io on top of Jupiter
7, 22:25 → 8, 01:56	Shadow transit of Ganymede on top of Jupiter	22, 06:26 → 09:59	Shadow transit of Ganymede on top of Jupiter
8, 01:35 → 03:56	Transit of Io on top of Jupiter	22, 20:09	Conjunction (192) Nausikaa-Rho Leo
8, 02:11 → 04:32	Shadow transit of Io on top of Jupiter	23, 06:33	Conjunction Venus-(18) Melpomene
9, 10:24	Conjunction Moon-Mars	23, 17:16	Conjunction Mercury-(192) Nausikaa
9, 13:51	Moon's apogee (parallax = 54' 11.248")	25, 16:43 → 20:12	Occultation of Ganymede by Jupiter
10, 18:45	Conjunction (18) Melpomene-Gam Gem	25, 17:58	Moon's first quarter
10, 22:55	Conjunction Moon-Uranus	25, 18:02 → 20:23	Transit of Io on top of Jupiter
11, 09:06	Lunar Transient Phenomena Lunar-X	25, 18:18 → 19:24	Bet1 Sco behind Moon
11, 09:49 → 13:18	Occultation of Ganymede by Jupiter	25, 18:59 → 21:20	Shadow transit of Io on top of Jupiter
11, 12:17 → 16:33	Transit of Callisto on top of Jupiter	25, 20:12	Conjunction Moon-Ome1 Sco
11, 12:29 → 16:01	Eclipse of Ganymede by Jupiter	25, 20:29 → 26, 00:02	Eclipse of Ganymede by Jupiter
11, 14:28 → 16:49	Transit of Io on top of Jupiter	26, 02:33	Lunar Transient Phenomena Lunar-X
11, 15:08 → 17:29	Shadow transit of Io on top of Jupiter	26, 13:08 → 13:45	NGC6235 behind Moon
11, 16:45	Moon's last quarter	26, 19:09 → 20:08	NGC6287 behind Moon
12, 13:13	Maximum of Perseids	26, 20:02	Conjunction (3) Juno-Zet Vir
13, 06:34	Conjunction Moon-Eps Tau	27, 21:36 → 21:55	NGC6544 behind Moon
13, 10:13	Conjunction Moon-Alp Tau	28, 06:16	Conjunction Moon-Lam Sgr
14, 23:26 → 15, 02:56	Transit of Ganymede on top of Jupiter	28, 09:38 → 11:58	Occultation of Io by Jupiter
15, 02:25 → 05:57	Shadow transit of Ganymede on top of Jupiter	28, 10:36 → 12:57	Eclipse of Io by Jupiter
15, 03:21 → 05:42	Transit of Io on top of Jupiter	28, 12:40 → 17:08	Shadow transit of Callisto on top of Jupiter
15, 04:06 → 06:27	Shadow transit of Io on top of Jupiter	28, 14:06	Moon's minimum declination (-24.216°)
15, 04:53	Conjunction Moon-Eta Gem	28, 16:15 → 19:06	Transit of Europa on top of Jupiter
15, 15:12	Conjunction Moon-Venus	28, 18:12 → 21:05	Shadow transit of Europa on top of Jupiter
15, 20:40	Moon's maximum declination (24.148°)	29, 03:32	Conjunction Moon-Jupiter
17, 18:05	Maximum of ?-Cygnids	29, 05:35	Conjunction (4) Vesta-NGC2632 (M44)
18, 02:45	Conjunction (7) Iris-NGC6440	29, 06:25 → 09:55	Transit of Ganymede on top of Jupiter
18, 13:14 → 16:43	Occultation of Ganymede by Jupiter	29, 06:57 → 09:17	Transit of Io on top of Jupiter
18, 16:15 → 18:35	Transit of Io on top of Jupiter	29, 07:56 → 10:17	Shadow transit of Io on top of Jupiter
18, 16:29 → 20:01	Eclipse of Ganymede by Jupiter	29, 15:04	Conjunction Moon-Saturn
18, 17:04 → 19:24	Shadow transit of Io on top of Jupiter	31, 20:28	Maximum of Aurigids

Astronomical events for August

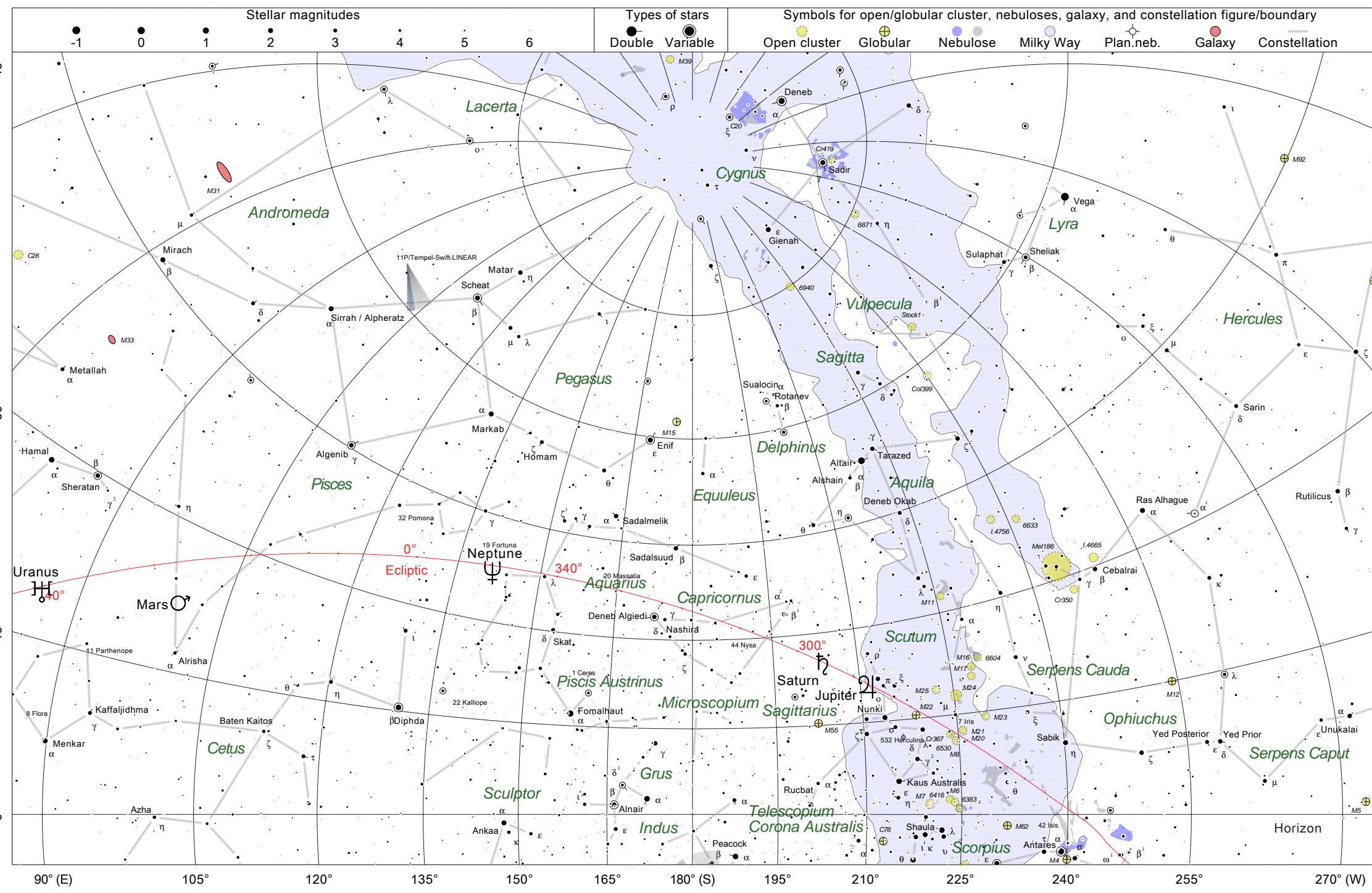
Sky on August 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
1, 11:33		13, 19:36 → 23:53	Transit of Callisto on top of Jupiter
1, 19:51 → 22:12	Conjunction (15) Eunomia-NGC2331	14, 03:50	Conjunction Moon-Venus
1, 20:17 → 23:47	Transit of Io on top of Jupiter	14, 05:04 → 07:25	Transit of Io on top of Jupiter
1, 20:54 → 23:15	Occultation of Ganymede by Jupiter	14, 06:16 → 08:37	Shadow transit of Io on top of Jupiter
2, 05:22	Shadow transit of Io on top of Jupiter	14, 06:48 → 11:21	Shadow transit of Callisto on top of Jupiter
3, 02:58	Full Moon	14, 12:49	Conjunction Venus-Del Cnc
3, 05:57	Conjunction Moon-Neptune	15, 19:10	Conjunction Moon-Alp Leo
4, 05:56	Conjunction (324) Bamberga-NGC4594 (M104)	16, 07:19 → 08:25	NGC3379 (M105) behind Moon
5, 08:46 → 11:06	Conjunction Mercury-Bet Vir	16, 07:31 → 08:32	NGC3371 behind Moon
5, 09:52 → 12:13	Transit of Io on top of Jupiter	16, 07:31 → 08:32	NGC3384 behind Moon
5, 10:01 → 13:31	Shadow transit of Io on top of Jupiter	17, 11:00	New Moon
5, 13:13 → 17:31	Transit of Ganymede on top of Jupiter	18, 13:44	Moon's perigee (parallax = $1^{\circ} 1' 2.913''$)
5, 14:26 → 18:00	Occultation of Callisto by Jupiter	19, 23:59	New Hebrew year
6, 06:09	Shadow transit of Ganymede on top of Jupiter	22, 01:56	Bet1 Sco behind Moon
6, 06:31	Conjunction Moon-Mars	22, 04:04 → 06:24	Occultation of Io by Jupiter
6, 10:12	Moon's apogee (parallax = $54' 3.648''$)	22, 05:19 → 07:40	Eclipse of Io by Jupiter
7, 07:55	Conjunction (7) Iris-NGC6494 (M23)	22, 05:50 → 10:09	Occultation of Callisto by Jupiter
8, 21:41 → 9, 00:01	Conjunction Moon-Uranus	22, 11:28	Conjunction Mercury-Alp Vir
8, 22:49 → 9, 01:10	Transit of Io on top of Jupiter	22, 12:48 → 15:40	Transit of Europa on top of Jupiter
8, 23:55 → 9, 03:25	Shadow transit of Io on top of Jupiter	22, 13:30	Conjunction Venus-(4) Vesta
9, 05:03	Occultation of Ganymede by Jupiter	22, 13:31	Autumn equinox
9, 15:46	Maximum of Sep. ?-Perseids	22, 15:19 → 18:13	Shadow transit of Europa on top of Jupiter
9, 17:36	Conjunction Moon-Eps Tau	22, 17:39 → 22:14	Eclipse of Callisto by Jupiter
9, 20:23	Conjunction Moon-Alp Tau	23, 02:02 → 02:45	NGC6287 behind Moon
10, 09:26	Lunar Transient Phenomena Lunar-X	23, 13:35 → 14:11	NGC6401 behind Moon
11, 10:26 → 10:36	Moon's last quarter	24, 01:55	Moon's first quarter
11, 16:19	NGC2129 behind Moon	24, 02:02 → 02:42	NGC6523 (M8) behind Moon
11, 18:54	Conjunction Moon-Eta Gem	24, 02:20 → 02:58	NGC6530 behind Moon
11, 20:29	Conjunction Moon-Mu Gem	24, 08:46 → 09:14	NGC6626 (M28) behind Moon
11, 23:59	Opposition of Neptune (elongation 178.885°)	24, 10:14	Conjunction Moon-Lam Sgr
11, 23:59	New Coptic year	24, 14:36	Lunar Transient Phenomena Lunar-X
12, 05:25	New Ethiopic year	24, 19:11	Moon's minimum declination (-24.456°)
12, 10:36 → 12:57	Moon's maximum declination (24.350°)	25, 07:01	Conjunction Moon-Jupiter
12, 11:47 → 14:08	Transit of Io on top of Jupiter	25, 23:17	Conjunction Moon-Saturn
12, 13:41 → 17:11	Shadow transit of Io on top of Jupiter	27, 05:40	Maximum of Dayt. Sextantids
13, 04:21	Transit of Ganymede on top of Jupiter	30, 06:32	Conjunction Moon-Neptune
13, 16:10 → 19:04	Conjunction Moon-Bet Gem	30, 11:18 → 14:49	Occultation of Ganymede by Jupiter
13, 18:34 → 21:29	Occultation of Europa by Jupiter	30, 12:42 → 17:02	Transit of Callisto on top of Jupiter
	Eclipse of Europa by Jupiter	30, 16:32 → 20:09	Eclipse of Ganymede by Jupiter

Astronomical events for September

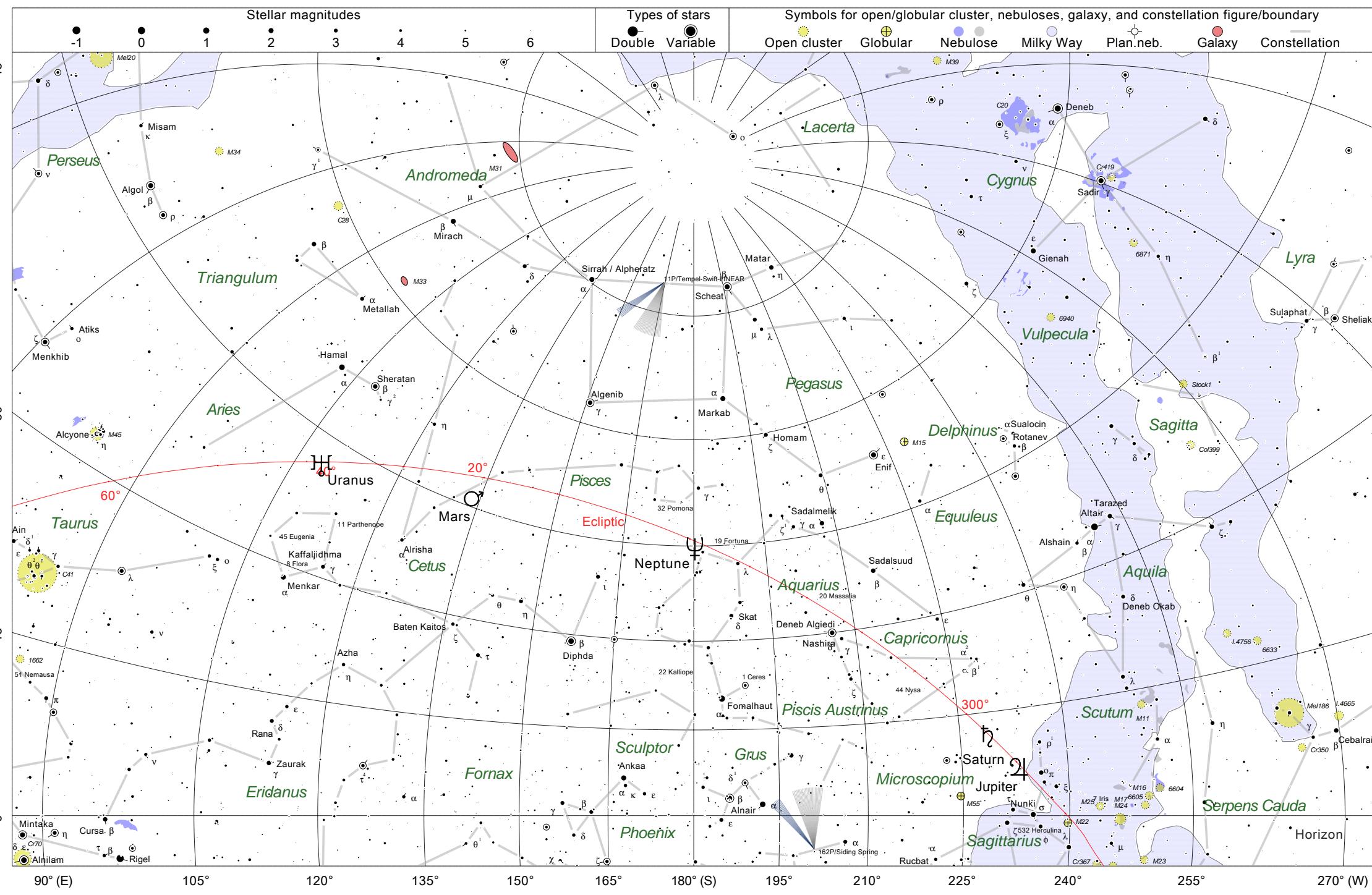
Sky on September 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
1, 00:25 → 02:46	Occultation of Io by Jupiter	18, 05:03	Maximum of ?-Geminids
1, 00:57 → 05:34	Shadow transit of Callisto on top of Jupiter	18, 14:32 → 18:10	Shadow transit of Ganymede on top of Jupiter
1, 01:43 → 04:05	Eclipse of Io by Jupiter	18, 17:13 → 19:34	Occultation of Io by Jupiter
1, 16:09	Maximum elongation of Mercury (25.824° E)	18, 18:32 → 20:54	Eclipse of Io by Jupiter
1, 21:05	Full Moon	19, 08:37 → 09:22	Bet1 Sco behind Moon
2, 23:08	Conjunction Venus-Alp Leo	19, 10:05	Conjunction Moon-Ome1 Sco
3, 05:39	Conjunction Moon-Mars	19, 21:52	Conjunction Moon-Alp Sco
3, 17:22	Moon's apogee (parallax = 53' 57.944")	20, 04:17 → 04:58	NGC6235 behind Moon
4, 11:45	Conjunction Moon-Uranus	20, 08:06 → 08:42	NGC6287 behind Moon
5, 15:48	Maximum of Oct. Camelopard.	20, 17:00	Conjunction Moon-The Oph
6, 14:12	Minimum distance of Mars (0.415 AU)	21, 05:29	Maximum of Orionids
6, 20:23	Conjunction Moon-Eps Tau	21, 07:37	NGC6523 (M8) behind Moon
6, 21:38	Conjunction Moon-Alp Tau	21, 08:44 → 09:13	NGC6544 behind Moon
7, 15:11	Conjunction (7) Iris-Tr33	21, 18:22 → 19:37	Lam Sgr behind Moon
8, 12:25	Maximum of Draconids	21, 19:57 → 21:02	NGC6638 behind Moon
8, 12:56	Conjunction Venus-Rho Leo	22, 02:00	Moon's minimum declination (-24.708°)
8, 16:31 → 17:15	NGC2129 behind Moon	22, 04:35 → 08:13	Eclipse of Ganymede by Jupiter
8, 23:25 → 9, 03:48	Occultation of Callisto by Jupiter	22, 06:12 → 08:33	Occultation of Io by Jupiter
8, 23:41 → 9, 02:01	Transit of Io on top of Jupiter	22, 07:30 → 09:51	Eclipse of Io by Jupiter
9, 01:00 → 03:21	Shadow transit of Io on top of Jupiter	22, 18:03	Conjunction Moon-Jupiter
9, 08:55	Lunar Transient Phenomena Lunar-X	23, 04:45	Conjunction Moon-Saturn
9, 13:07	Moon's maximum declination (24.612°)	23, 13:23	Moon's first quarter
10, 00:40	Moon's last quarter	24, 03:09	Lunar Transient Phenomena Lunar-X
10, 03:17	Maximum of S. Taurids	24, 05:48	Maximum of Leonis Minorids
10, 13:10	Conjunction Moon-Bet Gem	25, 17:53 → 22:20	Occultation of Callisto by Jupiter
11, 03:34	Maximum of ?-Aurigids	25, 18:32 → 22:11	Shadow transit of Ganymede on top of Jupiter
11, 15:09	Conjunction (8) Flora-Alp Cet	25, 19:10 → 21:31	Occultation of Io by Jupiter
12, 11:47	Conjunction (3) Juno-NGC5634	25, 20:28 → 22:49	Eclipse of Io by Jupiter
13, 00:38	Conjunction Moon-Eta Leo	25, 22:33	Conjunction Venus-Bet Vir
13, 02:43	Conjunction Moon-Alp Leo	26, 05:56 → 10:39	Eclipse of Callisto by Jupiter
13, 07:49	Conjunction (7) Iris-IC4725 (M25)	26, 07:41 → 10:35	Occultation of Europa by Jupiter
14, 00:43	Conjunction Moon-Venus	26, 10:14 → 13:10	Eclipse of Europa by Jupiter
14, 02:05	Opposition of Mars (elongation 177.008°)	27, 09:07	Conjunction Moon-Neptune
16, 19:31	New Moon	29, 02:26	Conjunction (7) Iris-NGC6716
16, 23:46	Moon's perigee (parallax = 1° 1' 26.219")	29, 08:09 → 10:30	Occultation of Io by Jupiter
17, 06:45 → 11:08	Transit of Callisto on top of Jupiter	29, 08:36 → 12:15	Eclipse of Ganymede by Jupiter
17, 09:51 → 12:44	Transit of Europa on top of Jupiter	29, 09:26 → 11:47	Eclipse of Io by Jupiter
17, 12:29 → 15:25	Shadow transit of Europa on top of Jupiter	29, 18:45	Conjunction Moon-Mars
17, 17:31 → 18:10	Neomenia	29, 19:40	Conjunction Venus-(192) Nausikaa
17, 19:06 → 23:47	Shadow transit of Callisto on top of Jupiter	30, 18:46	Moon's apogee (parallax = 53' 57.366")
17, 20:06 → 22:26	Transit of Io on top of Jupiter	31, 14:37	Conjunction Moon-Uranus
17, 21:24 → 23:45	Shadow transit of Io on top of Jupiter	31, 14:49	Full Moon
		31, 15:53	Opposition of Uranus (elongation 179.528°)

Astronomical events for October

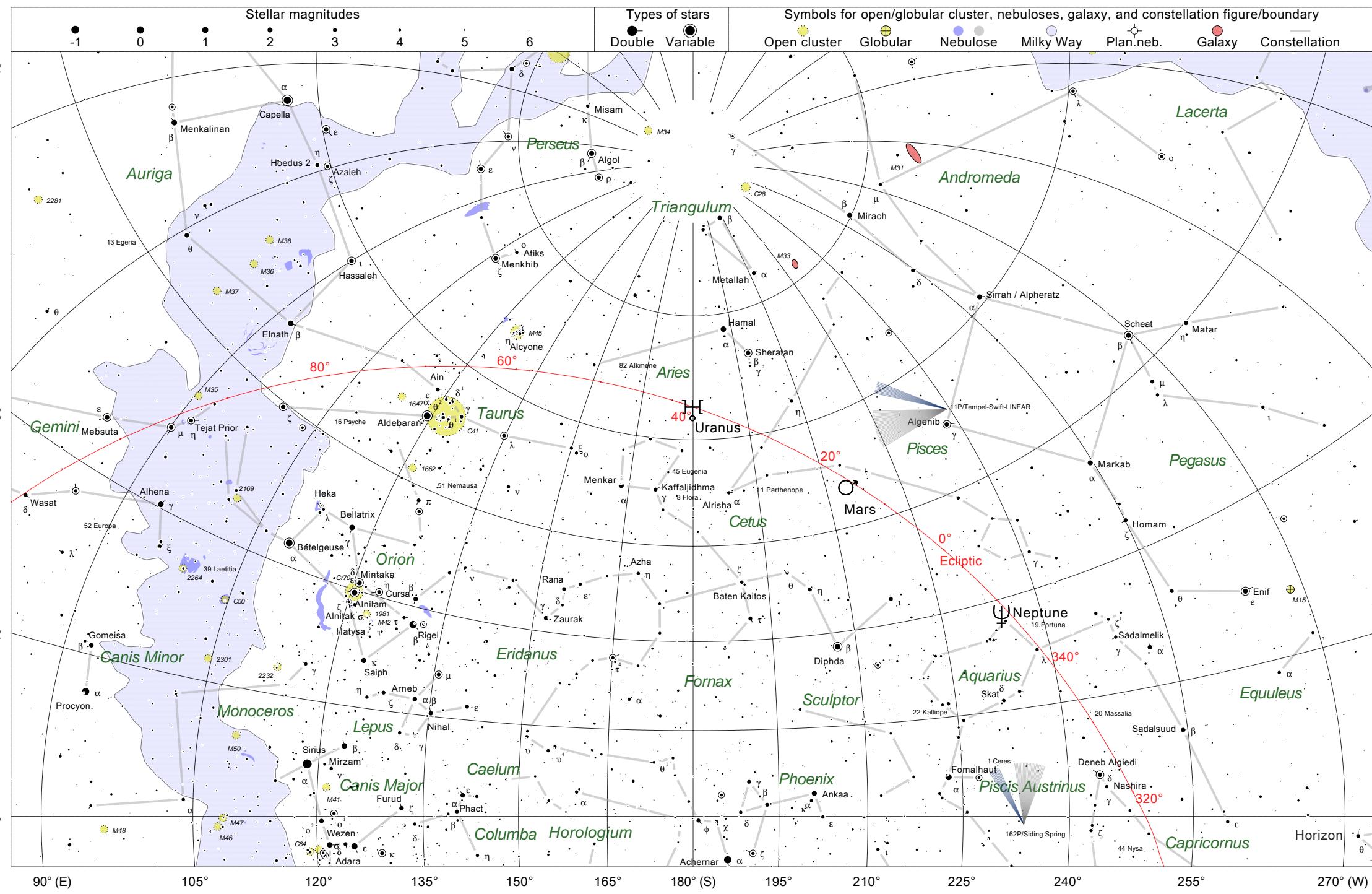
Sky on October 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
1, 06:42	Conjunction Venus-Eta Vir	16, 01:06 → 03:28	Occultation of Io by Jupiter
1, 17:57	Conjunction Mercury-Alp Vir	16, 02:02 → 05:37	Transit of Ganymede on top of Jupiter
1, 20:05	Conjunction (8) Flora-Gam Cet	16, 02:14 → 04:36	Eclipse of Io by Jupiter
1, 21:10 → 23:29	Occultation of Io by Jupiter	16, 12:46	Conjunction (4) Vesta-NGC3368 (M96)
1, 22:23 → 2, 00:45	Eclipse of Io by Jupiter	16, 17:18	Conjunction (4) Vesta-NGC3379 (M105)
1, 22:33 → 2, 02:12	Shadow transit of Ganymede on top of Jupiter	16, 18:40	Conjunction Venus-Alp Vir
3, 08:07	Conjunction Moon-Alp Tau	17, 00:20	Conjunction (4) Vesta-NGC3371
3, 13:16 → 18:01	Shadow transit of Callisto on top of Jupiter	17, 00:20	Conjunction (4) Vesta-NGC3384
3, 15:38 → 17:59	Occultation of Io by Jupiter	17, 10:50	Maximum of Leonids
3, 16:52 → 19:14	Eclipse of Io by Jupiter	17, 18:04	Conjunction (3) Juno-Bet Lib
4, 22:47 → 23:53	IC2157 behind Moon	17, 20:42 → 21:31	NGC6544 behind Moon
5, 00:07 → 01:25	NGC2158 behind Moon	18, 02:13 → 02:49	NGC6626 (M28) behind Moon
5, 01:16 → 02:26	NGC2168 (M35) behind Moon	18, 03:33	Conjunction Moon-Lam Sgr
5, 07:43 → 11:17	Occultation of Ganymede by Jupiter	18, 11:27	Moon's minimum declination (-24.856°)
5, 10:08 → 12:29	Occultation of Io by Jupiter	18, 13:50	Conjunction Moon-Sig Sgr
5, 11:21 → 13:43	Eclipse of Io by Jupiter	19, 07:45	Conjunction Moon-Jupiter
5, 12:37 → 16:17	Eclipse of Ganymede by Jupiter	19, 14:06 → 16:28	Occultation of Io by Jupiter
5, 19:30	Moon's maximum declination (24.813°)	19, 15:12 → 17:34	Eclipse of Io by Jupiter
6, 19:13	Conjunction Moon-Kap Gem	19, 15:40	Conjunction Moon-Saturn
6, 19:27	Conjunction Moon-Bet Gem	19, 16:16 → 19:51	Occultation of Ganymede by Jupiter
7, 22:42	Lunar Transient Phenomena Lunar-X	19, 20:38 → 20, 00:19	Eclipse of Ganymede by Jupiter
8, 13:46	Moon's last quarter	19, 21:12 → 20, 01:46	Transit of Callisto on top of Jupiter
8, 21:45 → 9, 01:19	Transit of Ganymede on top of Jupiter	20, 05:12 → 08:06	Occultation of Europa by Jupiter
8, 23:07 → 9, 01:28	Occultation of Io by Jupiter	20, 07:21 → 10:16	Eclipse of Europa by Jupiter
9, 00:19 → 02:41	Eclipse of Io by Jupiter	20, 07:26 → 12:15	Shadow transit of Callisto on top of Jupiter
9, 02:33 → 06:13	Shadow transit of Ganymede on top of Jupiter	20, 11:27 → 13:47	Transit of Io on top of Jupiter
9, 10:54	Conjunction Moon-Eta Leo	20, 12:32 → 14:52	Shadow transit of Io on top of Jupiter
9, 14:28	Conjunction Moon-Alp Leo	21, 05:18	Conjunction (1) Ceres-NGC7293
10, 03:10 → 03:55	NGC3371 behind Moon	21, 11:08	Maximum of ?-Monocerotids
10, 03:10 → 03:55	NGC3384 behind Moon	22, 04:45	Moon's first quarter
10, 17:10	Maximum elongation of Mercury (19.098° W)	22, 16:16	Lunar Transient Phenomena Lunar-X
11, 13:07 → 17:39	Occultation of Callisto by Jupiter	23, 03:06 → 05:28	Occultation of Io by Jupiter
11, 14:58 → 17:18	Transit of Io on top of Jupiter	23, 04:10 → 06:32	Eclipse of Io by Jupiter
11, 16:08 → 18:28	Shadow transit of Io on top of Jupiter	23, 06:22 → 09:58	Transit of Ganymede on top of Jupiter
12, 05:18	Maximum of N. Taurids	23, 14:34	Conjunction Moon-Neptune
12, 11:58 → 15:32	Occultation of Ganymede by Jupiter	26, 02:02	Conjunction Moon-Mars
12, 12:07 → 14:28	Occultation of Io by Jupiter	27, 00:29	Moon's apogee (parallax = 54' 1.369")
12, 13:17 → 15:38	Eclipse of Io by Jupiter	27, 21:08	Conjunction Moon-Uranus
12, 22:40	Conjunction Moon-Venus	28, 01:40	Maximum of Nov. Orionids
13, 14:29	Conjunction (15) Eunomia-NGC2632 (M44)	28, 08:58 → 13:35	Occultation of Callisto by Jupiter
13, 21:42	Conjunction Moon-Mercury	28, 10:37 → 12:58	Occultation of Io by Jupiter
14, 11:48	Moon's perigee (parallax = 1° 1' 17.727")	28, 11:37 → 13:58	Eclipse of Io by Jupiter
14, 15:13	Conjunction (4) Vesta-NGC3351 (M95)	29, 07:13	Conjunction Jupiter-(7) Iris
15, 03:13	Conjunction (7) Iris-Rho1 Sgr	30, 09:30	Full Moon
15, 05:07	New Moon	30, 09:43	Lunar eclipse (penumbral, mag 0.82)
15, 21:37 → 22:20	Bet1 Sco behind Moon	30, 10:32	Conjunction Moon-Eps Tau
15, 22:35	Conjunction Moon-Ome1 Sco	30, 12:19	Conjunction Moon-Alp Tau

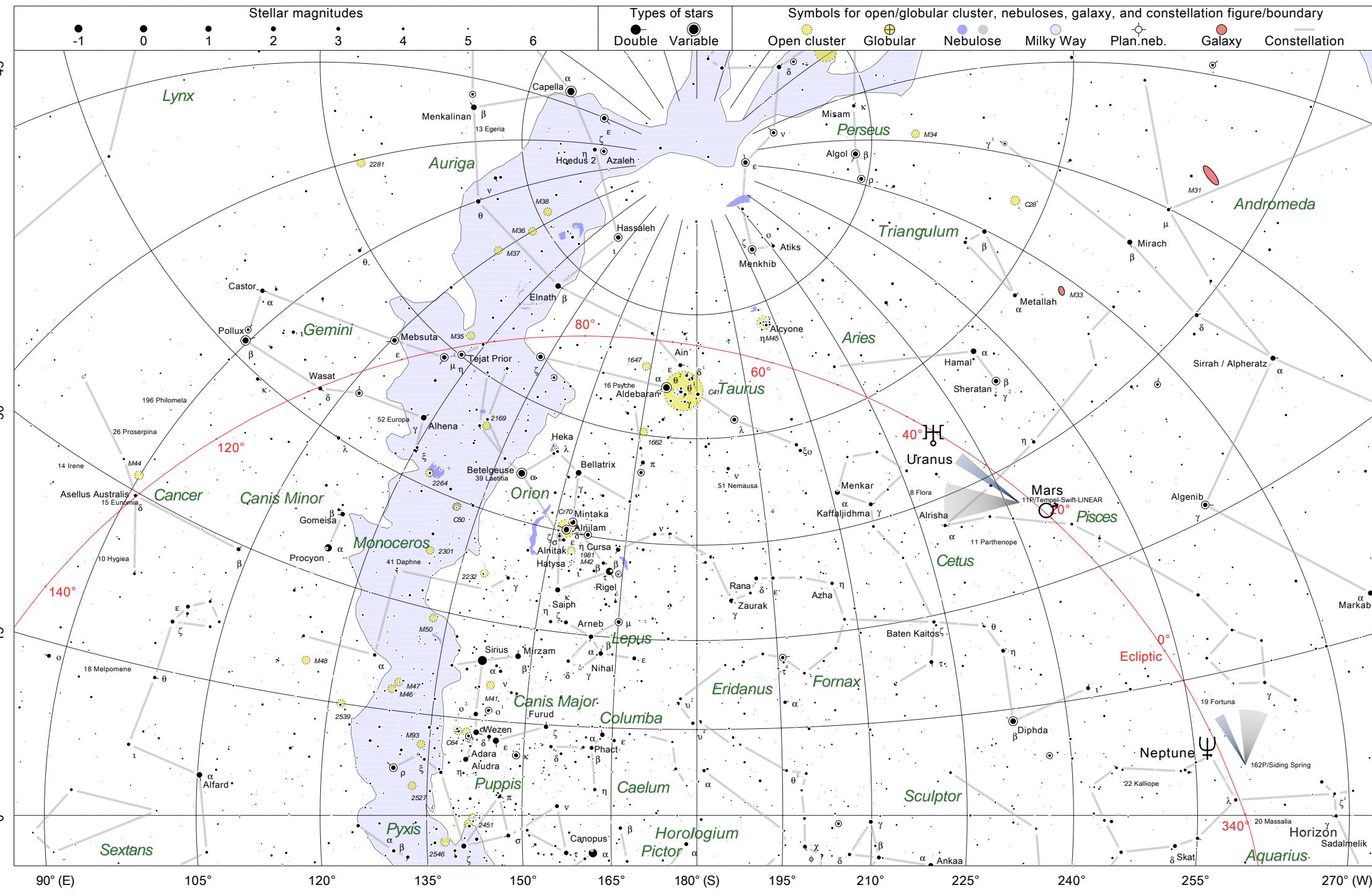
Astronomical events for November

Sky on November 15, 2020, 00:00 h



Date (UT)	Event description	Date (UT)	Event description
2, 00:27	Maximum of Phoenicids	18, 19:29 → 21:50	Transit of Io on top of Jupiter
2, 07:08 → 08:04	IC2157 behind Moon	18, 20:11 → 22:32	Shadow transit of Io on top of Jupiter
2, 08:19 → 09:04	NGC2158 behind Moon	18, 20:45	Conjunction Venus-Ome1 Sco
2, 22:27	Conjunction Moon-Eps Gem	19, 17:29	Maximum of Dic. L. Minorids
3, 01:22	Moon's maximum declination (24.883°)	20, 05:07	Conjunction (4) Vesta-Iot Leo
3, 22:35	Conjunction (192) Nausikaa-NGC4697	20, 10:47 → 13:45	Transit of Europa on top of Jupiter
4, 00:19	Conjunction Mercury-Bet1 Sco	20, 12:10 → 15:09	Shadow transit of Europa on top of Jupiter
4, 00:45	Conjunction Moon-Kap Gem	20, 14:00 → 16:20	Transit of Io on top of Jupiter
4, 00:56	Conjunction Moon-Bet Gem	20, 14:40 → 17:01	Shadow transit of Io on top of Jupiter
4, 08:31	Conjunction Mercury-Ome1 Sco	21, 01:07	Conjunction Moon-Neptune
4, 10:44 → 13:38	Occultation of Europa by Jupiter	21, 10:02	Winter solstice
4, 12:32 → 15:27	Eclipse of Europa by Jupiter	21, 18:27	Conjunction Jupiter-Saturn
4, 15:27 → 17:48	Transit of Io on top of Jupiter	21, 23:41	Moon's first quarter
4, 16:22 → 18:42	Shadow transit of Io on top of Jupiter	21, 23:59 → 22, 03:39	Transit of Ganymede on top of Jupiter
5, 23:13	Conjunction Saturn-(7) Iris	22, 02:37 → 06:20	Shadow transit of Ganymede on top of Jupiter
6, 16:27	Conjunction Moon-Eta Leo	22, 05:43 → 08:38	Occultation of Europa by Jupiter
6, 18:18	Conjunction Moon-Alp Leo	22, 05:52	Lunar Transient Phenomena Lunar-X
6, 22:45	Maximum of Puppis-Velids	22, 07:00 → 09:56	Eclipse of Europa by Jupiter
7, 12:01 → 12:31	NGC3379 (M105) behind Moon	22, 08:30 → 10:50	Transit of Io on top of Jupiter
7, 13:36	Lunar Transient Phenomena Lunar-X	22, 09:06	Maximum of Ursids
7, 20:55 → 21:40	(4) Vesta behind Moon	22, 09:09 → 11:29	Shadow transit of Io on top of Jupiter
8, 00:08 → 03:02	Occultation of Europa by Jupiter	23, 19:47 → 24, 00:42	Shadow transit of Callisto on top of Jupiter
8, 00:37	Moon's last quarter	24, 00:13 → 03:10	Transit of Europa on top of Jupiter
8, 01:50 → 04:45	Eclipse of Europa by Jupiter	24, 01:29 → 04:27	Shadow transit of Europa on top of Jupiter
8, 04:28 → 06:48	Transit of Io on top of Jupiter	24, 03:00 → 05:21	Transit of Io on top of Jupiter
8, 05:19 → 07:40	Shadow transit of Io on top of Jupiter	24, 03:37 → 05:58	Shadow transit of Io on top of Jupiter
8, 10:35	Conjunction Mercury-Alp Sco	24, 16:32	Moon's apogee (parallax = 54° 8.424")
8, 22:00	Maximum of Monocerotids	25, 02:37	Conjunction Moon-Uranus
8, 22:00	Maximum of ?-Hydrids	25, 02:51	Conjunction Mercury-Lam Sgr
9, 18:30 → 21:27	Transit of Europa on top of Jupiter	25, 14:19 → 17:59	Occultation of Ganymede by Jupiter
9, 20:13 → 23:11	Shadow transit of Europa on top of Jupiter	25, 16:43 → 20:26	Eclipse of Ganymede by Jupiter
9, 22:58 → 10, 01:19	Transit of Io on top of Jupiter	25, 19:08 → 22:03	Occultation of Europa by Jupiter
9, 23:48 → 10, 02:09	Shadow transit of Io on top of Jupiter	25, 20:18 → 23:13	Eclipse of Europa by Jupiter
11, 13:31 → 16:26	Occultation of Europa by Jupiter	25, 21:31 → 23:51	Transit of Io on top of Jupiter
11, 15:07 → 18:03	Eclipse of Europa by Jupiter	25, 22:06 → 26, 00:27	Shadow transit of Io on top of Jupiter
11, 17:28 → 19:49	Transit of Io on top of Jupiter	27, 13:39 → 16:37	Transit of Europa on top of Jupiter
11, 18:16 → 20:37	Shadow transit of Io on top of Jupiter	27, 14:48 → 17:47	Shadow transit of Europa on top of Jupiter
12, 20:42	Moon's perigee (parallax = 1° 0' 35.495")	27, 15:33	Conjunction Moon-Eps Tau
12, 21:14	Conjunction Moon-Venus	27, 16:01 → 18:22	Transit of Io on top of Jupiter
13, 06:30 → 07:30	Bet1 Sco behind Moon	27, 16:34 → 18:55	Shadow transit of Io on top of Jupiter
13, 07:56 → 10:53	Transit of Europa on top of Jupiter	27, 16:42	Conjunction Moon-Alp Tau
13, 08:17	Conjunction Moon-Ome1 Sco	29, 04:28 → 08:08	Transit of Ganymede on top of Jupiter
13, 09:32 → 12:30	Shadow transit of Europa on top of Jupiter	29, 06:38 → 10:21	Shadow transit of Ganymede on top of Jupiter
13, 11:58 → 14:19	Transit of Io on top of Jupiter	29, 08:32 → 11:27	Occultation of Europa by Jupiter
13, 12:45 → 15:06	Shadow transit of Io on top of Jupiter	29, 09:35 → 12:31	Eclipse of Europa by Jupiter
13, 19:36	Conjunction Moon-Alp Sco	29, 10:31 → 12:52	Transit of Io on top of Jupiter
14, 00:44	Maximum of Geminids	29, 11:03 → 13:24	Shadow transit of Io on top of Jupiter
14, 01:43 → 02:16	NGC6235 behind Moon	30, 03:28	Full Moon
14, 09:26 → 10:32	Mercury behind Moon	30, 07:10	Conjunction Moon-Eps Gem
14, 14:37	Conjunction Moon-The Oph	30, 07:53	Moon's maximum declination (24.867°)
14, 16:14	Solar eclipse (central, total)	31, 03:05 → 06:03	Transit of Europa on top of Jupiter
14, 16:17	New Moon	31, 04:07 → 07:05	Shadow transit of Europa on top of Jupiter
15, 02:55 → 05:50	Occultation of Europa by Jupiter	31, 05:02 → 07:22	Transit of Io on top of Jupiter
15, 04:25 → 07:20	Eclipse of Europa by Jupiter	31, 05:32 → 07:53	Shadow transit of Io on top of Jupiter
15, 05:13 → 06:01	NGC6544 behind Moon	31, 07:37	Conjunction Moon-Bet Gem
15, 05:16 → 10:00	Occultation of Callisto by Jupiter	31, 08:45	Conjunction Moon-Kap Gem

Sky on December 15, 2020, 00:00 h



Sky Atlas, J2020 epoch

Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Sh2-155 CALDWELL 9 - Cave nebula	22h 58m 05.6s	+62° 44' 59"		Nebula	50.4 x 30.0	STF 60 AB (Achird)	00h 50m 16.7s	57° 55' 26"	3.52 / 7.36	13.40 / 326
NGC7635 CALDWELL 11 - Bubble nebula	23h 21m 38.3s	+61° 19' 17"		Nebula	15.0 x 8.0	STF 60 AH	00h 50m 16.7s	57° 55' 26"	3.52 / 8.41	694.70 / 355
Me120 - Alpha Persei cluster	03h 23m 25.3s	+49° 04' 14"	1.2	Open cluster	3.08°	S 459 AB (β Cam)	05h 05m 12.3s	60° 28' 08"	4.12 / 7.44	84.20 / 209
Stock2	02h 15m 50.5s	+59° 21' 33"	4.4	Open cluster	60.0	STF 262 AD	02h 30m 44.6s	67° 29' 27"	4.63 / 8.48	210.90 / 60
NGC869 CALDWELL 14 - Double cluster	02h 20m 29.2s	+57° 13' 35"	5.3	Open cluster	18.0	H 3 23 AC	23h 30m 57.9s	58° 39' 34"	4.87 / 7.23	74.90 / 269
NGC884	02h 23m 30.7s	+57° 13' 14"	6.1	Open cluster	18.0	STFA 13 AB (11 Cam)	01h 21m 21.4s	58° 20' 10"	5.07 / 7.04	132.80 / 235
NGC7160	21h 54m 14.7s	+62° 41' 54"	6.1	Open cluster	5.0	STF 331	05h 07m 52.8s	58° 59' 53"	5.20 / 6.21	177.70 / 10
NGC1545	04h 22m 26.9s	+50° 18' 06"	6.2	Open cluster	12.0	S 514 AC	03h 02m 18.2s	52° 25' 47"	5.21 / 6.17	11.90 / 84
NGC457 CALDWELL 13 - Owl cluster	01h 20m 49.4s	+58° 23' 59"	6.4	Open cluster	20.0	WEB 2 AD	03h 44m 22.8s	60° 01' 55"	5.72 / 8.45	94.90 / 272
NGC1528	04h 16m 50.4s	+51° 15' 38"	6.4	Open cluster	18.0	S 823 AC	23h 10m 35.8s	59° 26' 29"	5.72 / 8.16	167.20 / 163
NGC129	00h 31m 05.7s	+60° 19' 19"	6.5	Open cluster	12.0	STF 1062 AB (19 Lyn)	07h 24m 29.5s	55° 14' 30"	5.76 / 6.71	14.80 / 316
NGC654	01h 45m 23.0s	+61° 58' 58"	6.5	Open cluster	6.0	STF 1062 AD	07h 24m 29.5s	55° 14' 30"	5.76 / 7.57	215.30 / 6
IC1805	02h 34m 20.1s	+61° 32' 56"	6.5	Open cluster	20.0	ARN 32 AE	01h 44m 42.3s	60° 39' 05"	5.78 / 7.12	316.80 / 268
IC1848	02h 52m 51.7s	+60° 29' 23"	6.5	Open cluster	18.0	STF 550 AB (1 Cam)	04h 33m 37.6s	53° 57' 08"	5.78 / 6.82	10.20 / 307
NGC1444	03h 50m 56.1s	+52° 42' 53"	6.6	Open cluster	4.0	S 838 AD	00h 05m 16.6s	62° 23' 57"	5.92 / 8.24	244.0 / 197
NGC1027	02h 44m 09.9s	+61° 40' 45"	6.7	Open cluster	15.0	BUP 91 AC	06h 39m 31.0s	61° 27' 45"	6.04 / 6.99	397.20 / 92
NGC7789	23h 58m 29.7s	+56° 49' 33"	6.7	Open cluster	25.0	SHJ 86 AB	08h 04m 17.6s	63° 01' 59"	6.15 / 7.53	50.70 / 80
NGC1502	04h 09m 35.8s	+62° 23' 01"	6.9	Open cluster	20.0	STF 2893	22h 13m 14.3s	73° 24' 24"	6.19 / 7.91	29.20 / 347
NGC3031 M81 - Bode's nebulae	09h 57m 10.8s	+68° 58' 18"	6.9	Galaxy	24.9 x 11.5	STF 396 AB	03h 35m 09.0s	58° 49' 53"	6.43 / 7.68	20.70 / 246
NGC7654 M52	23h 25m 42.0s	+61° 42' 36"	6.9	Open cluster	16.0	S 436	03h 50m 56.4s	57° 10' 41"	6.46 / 7.17	58.30 / 76
NGC225	00h 44m 47.1s	+61° 52' 33"	7.0	Open cluster	15.0	S 405 AB	02h 15m 13.0s	79° 47' 03"	6.47 / 7.15	55.60 / 277
NGC663 CALDWELL 10	01h 47m 40.4s	+61° 19' 04"	7.1	Open cluster	15.0	STTA 25 (V551 Per)	02h 18m 16.8s	57° 08' 50"	6.52 / 7.41	102.80 / 205
T3	03h 13m 28.9s	+63° 15' 27"	7.2	Open cluster	23.0	STTA 28	02h 40m 32.6s	62° 40' 36"	6.65 / 7.56	67.80 / 147
NGC581 M103	01h 34m 43.5s	+60° 45' 38"	7.4	Open cluster	6.0	STT 565 AC	08h 18m 36.4s	59° 07' 35"	6.71 / 8.45	226.10 / 308
NGC957	02h 34m 48.7s	+57° 38' 50"	7.6	Open cluster	10.0					
NGC659	01h 45m 46.6s	+60° 46' 11"	7.9	Open cluster	6.0					
NGC744	01h 59m 53.8s	+55° 34' 12"	7.9	Open cluster	5.0					
NGC7510	23h 11m 55.7s	+60° 40' 40"	7.9	Open cluster	7.0					
NGC188 CALDWELL 1	00h 49m 40.1s	+85° 22' 02"	8.1	Open cluster	15.0					
NGC637	01h 44m 28.6s	+64° 08' 12"	8.2	Open cluster	3.0					
NGC1513	04h 11m 26.3s	+49° 33' 58"	8.4	Open cluster	12.0					
NGC3034 M82	09h 57m 32.4s	+69° 35' 15"	8.4	Galaxy	11.2 x 4.3					
IC342 CALDWELL 5	03h 48m 45.7s	+68° 09' 23"	8.4	Galaxy	21.4 x 20.9					
NGC2403 CALDWELL 7	07h 38m 45.7s	+65° 33' 20"	8.5	Galaxy	23.4 x 11.8					
NGC7790	23h 59m 25.5s	+61° 19' 11"	8.5	Open cluster	5.0					
King14	00h 33m 03.0s	+63° 16' 37"	8.5	Open cluster	7.0					
Stock4	01h 54m 21.2s	+57° 09' 53"	8.6	Open cluster	20.0					
NGC189	00h 40m 45.6s	+61° 12' 17"	8.8	Open cluster	5.0					
NGC436	01h 17m 14.0s	+58° 55' 01"	8.8	Open cluster	5.0					
Tr1	01h 37m 03.5s	+61° 23' 06"	8.9	Open cluster	4.5					
NGC433	01h 16m 25.8s	+60° 13' 52"	9.0	Open cluster	4.0					
NGC146	00h 34m 12.3s	+63° 24' 43"	9.1	Open cluster	5.0					
NGC185 CALDWELL 18	00h 40m 04.3s	+48° 26' 49"	9.2	Galaxy	8.0 x 7.0					
King19	23h 09m 09.0s	+60° 37' 31"	9.2	Open cluster	7.0					
NGC381	01h 09m 36.2s	+61° 41' 23"	9.3	Open cluster	7.0					
King12	23h 54m 00.1s	+62° 04' 41"	9.3	Open cluster	2.0					
NGC133	00h 32m 26.9s	+63° 27' 43"	9.4	Open cluster	3.0					
NGC7788	23h 57m 46.9s	+61° 30' 41"	9.4	Open cluster	4.0					
NGC559 CALDWELL 8	01h 30m 52.9s	+63° 24' 16"	9.5	Open cluster	7.0					
NGC1496	04h 06m 04.1s	+52° 42' 53"	9.6	Open cluster	3.0					
NGC103	00h 26m 24.3s	+61° 25' 57"	9.8	Open cluster	5.0					
Stock19	00h 05m 26.4s	+56° 08' 41"	9.8	Open cluster	3.0 x 1.0					
Stock24	00h 40m 52.3s	+62° 03' 35"	9.8	Open cluster	6.0					
NGC2768	09h 13m 09.8s	+59° 57' 13"	9.9	Galaxy	6.4 x 3.0					
NGC3077	10h 04m 55.0s	+68° 38' 15"	9.9	Galaxy	5.2 x 4.7					
NGC7762	23h 50m 58.7s	+68° 08' 58"	10.0	Open cluster	15.0					
NGC110	00h 28m 36.6s	+71° 30' 04"	10.0	Open cluster	19.0					
NGC366	01h 07m 42.1s	+62° 20' 08"	10.0	Open cluster	4.0					
NGC657	01h 44m 48.6s	+55° 58' 30"	10.0	Open cluster	7.0					
NGC743	02h 00m 01.7s	+60° 15' 48"	10.0	Open cluster	7.0					
NGC650 M76 - Little Dumbbell	01h 43m 34.2s	+51° 40' 18"	10.1	Planetary nebula	3.1					
NGC2655	08h 58m 10.7s	+78° 08' 45"	10.1	Galaxy	4.9 x 4.1					
King16	00h 44m 54.1s	+64° 17' 33"	10.1	Open cluster	3.0					
King21	23h 50m 53.3s	+62° 49' 40"	10.1	Open cluster	2.5					
NGC2126	06h 04m 06.1s	+49° 51' 51"	10.2	Open cluster	6.0					
NGC2976	09h 48m 52.0s	+67° 49' 27"	10.2	Galaxy	5.9 x 2.7					
NGC2336	07h 30m 27.7s	+80° 08' 09"	10.4	Galaxy	7.1 x 3.9					
NGC2985	09h 52m 07.3s	+72° 11' 04"	10.4	Galaxy	4.6 x 3.4					
IC10	00h 21m 30.1s	+59° 24' 12"	10.4	Galaxy	6.4 x 5.3					
NGC2146	06h 21m 48.9s	+78° 20' 46"	10.6	Galaxy	5.4 x 2.9					

Main objects visible on chart 1



Chart legend

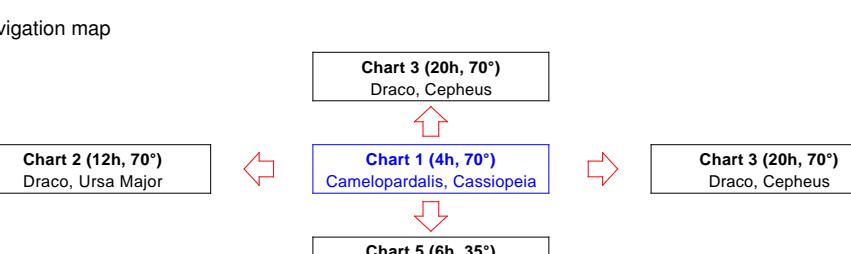
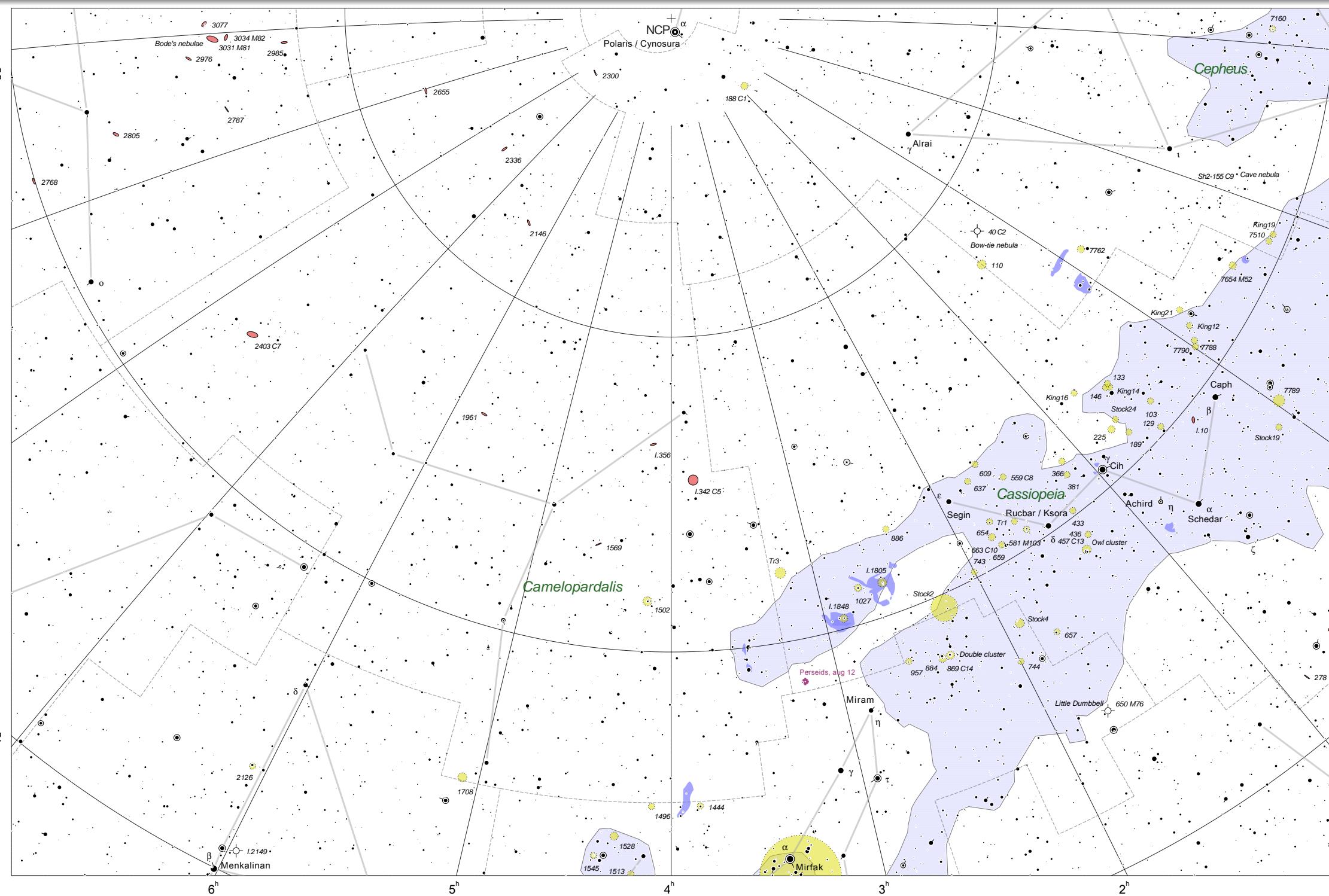


Chart 1, 30° around 4.0h, 70.0° (Camelopardalis, Cassiopeia, Cepheus, Ursa Major)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars						
						<th>Name</th> <th>RA (J2020.0)</th> <th>DEC</th> <th>Magnitude</th> <th>Sep ("') / PA (°)</th>	Name	RA (J2020.0)	DEC	Magnitude	Sep ("') / PA (°)	
NGC3031 M81 - Bode's nebulae	09h 57m 10.8s	+68° 58' 18"	6.9	Galaxy	24.9 x 11.5	<td>BU 1077 AC</td> <td>11h 04m 57.4s</td> <td>61° 38' 35"</td> <td>2.02 / 7.19</td> <td>380.60 / 204</td>	BU 1077 AC	11h 04m 57.4s	61° 38' 35"	2.02 / 7.19	380.60 / 204	
NGC5457 M101 - Pinwheel galaxy	14h 03m 54.8s	+54° 15' 14"	7.9	Galaxy	28.8 x 26.9	<td>STF 1744 AB (Mizar, Alcor)</td> <td>13h 24m 42.8s</td> <td>54° 49' 18"</td> <td>2.23 / 3.88</td> <td>14.60 / 153</td>	STF 1744 AB (Mizar, Alcor)	13h 24m 42.8s	54° 49' 18"	2.23 / 3.88	14.60 / 153	
NGC6543 CALDWELL 6 - Cat eye nebula	17h 58m 33.1s	+66° 37' 58"	8.1	Planetary nebula	19.8"	<td>STF 1744 AC</td> <td>13h 24m 42.8s</td> <td>54° 49' 18"</td> <td>2.23 / 4.01</td> <td>706.90 / 70</td>	STF 1744 AC	13h 24m 42.8s	54° 49' 18"	2.23 / 4.01	706.90 / 70	
NGC3034 M82	09h 57m 32.4s	+69° 35' 15"	8.4	Galaxy	11.2 x 4.3	<td>SMR 4 AD</td> <td>13h 24m 42.8s</td> <td>54° 49' 18"</td> <td>2.23 / 7.62</td> <td>493.20 / 100</td>	SMR 4 AD	13h 24m 42.8s	54° 49' 18"	2.23 / 7.62	493.20 / 100	
NGC5194 M51 - Whirlpool galaxy	13h 30m 43.0s	+47° 05' 34"	8.4	Galaxy	11.2 x 6.9	<td>STT 312 AB,C</td> <td>16h 24m 16.5s</td> <td>61° 28' 08"</td> <td>2.80 / 8.10</td> <td>565.80 / 240</td>	STT 312 AB,C	16h 24m 16.5s	61° 28' 08"	2.80 / 8.10	565.80 / 240	
NGC2403 CALDWELL 7	07h 38m 45.7s	+65° 33' 20"	8.5	Galaxy	23.4 x 11.8	<td>STF 1821 AB (κ_2 Boo)</td> <td>14h 14m 11.8s</td> <td>51° 41' 50"</td> <td>4.53 / 6.62</td> <td>13.70 / 236</td>	STF 1821 AB (κ_2 Boo)	14h 14m 11.8s	51° 41' 50"	4.53 / 6.62	13.70 / 236	
NGC2841	09h 23m 24.7s	+50° 53' 25"	9.2	Galaxy	8.1 x 3.5	<td>STF 2241 AB (Dziban)</td> <td>17h 41m 34.8s</td> <td>72° 08' 24"</td> <td>4.60 / 5.59</td> <td>30.10 / 14</td>	STF 2241 AB (Dziban)	17h 41m 34.8s	72° 08' 24"	4.60 / 5.59	30.10 / 14	
NGC4236-1 CALDWELL 3	12h 17m 39.5s	+69° 21' 09"	9.6	Galaxy	21.9 x 7.2	<td>STFA 26 AB (Asellus secondus)</td> <td>14h 16m 52.8s</td> <td>51° 16' 29"</td> <td>4.76 / 7.39</td> <td>38.90 / 33</td>	STFA 26 AB (Asellus secondus)	14h 16m 52.8s	51° 16' 29"	4.76 / 7.39	38.90 / 33	
NGC5195	13h 30m 49.6s	+47° 09' 53"	9.6	Galaxy	5.9 x 4.6	<td>STF 1694 AB</td> <td>12h 49m 26.5s</td> <td>83° 18' 14"</td> <td>5.29 / 5.74</td> <td>21.80 / 324</td>	STF 1694 AB	12h 49m 26.5s	83° 18' 14"	5.29 / 5.74	21.80 / 324	
NGC4125	12h 09m 04.8s	+65° 03' 47"	9.7	Galaxy	5.8 x 3.2	<td>S 649 CA</td> <td>13h 29m 11.1s</td> <td>59° 50' 34"</td> <td>5.46 / 8.19</td> <td>182.20 / 111</td>	S 649 CA	13h 29m 11.1s	59° 50' 34"	5.46 / 8.19	182.20 / 111	
NGC3992 M109	11h 58m 37.2s	+53° 15' 44"	9.8	Galaxy	7.5 x 4.4	<td>STF 2308 AB (41 Dra)</td> <td>17h 58m 38.9s</td> <td>80° 00' 13"</td> <td>5.70 / 6.00</td> <td>18.80 / 232</td>	STF 2308 AB (41 Dra)	17h 58m 38.9s	80° 00' 13"	5.70 / 6.00	18.80 / 232	
NGC2768	09h 13m 09.8s	+59° 57' 13"	9.9	Galaxy	6.4 x 3.0	<td>STF 2308 AC</td> <td>17h 58m 38.9s</td> <td>80° 00' 13"</td> <td>5.70 / 8.34</td> <td>224.80 / 129</td>	STF 2308 AC	17h 58m 38.9s	80° 00' 13"	5.70 / 8.34	224.80 / 129	
NGC3077	10h 04m 55.0s	+68° 38' 15"	9.9	Galaxy	5.2 x 4.7	<td>SHJ 86 AB</td> <td>08h 04m 17.6s</td> <td>63° 01' 59"</td> <td>6.15 / 7.53</td> <td>50.70 / 80</td>	SHJ 86 AB	08h 04m 17.6s	63° 01' 59"	6.15 / 7.53	50.70 / 80	
NGC3587 M97 - Owl nebula	11h 15m 56.6s	+54° 54' 37"	9.9	Planetary nebula	2.8	<td>SHJ 136</td> <td>12h 11m 52.4s</td> <td>81° 35' 55"</td> <td>6.15 / 8.25</td> <td>71.90 / 74</td>	SHJ 136	12h 11m 52.4s	81° 35' 55"	6.15 / 8.25	71.90 / 74	
NGC5866 M102	15h 07m 02.4s	+55° 41' 14"	9.9	Galaxy	6.5 x 3.1	<td>ARN 71 AD</td> <td>09h 22m 06.7s</td> <td>51° 10' 49"</td> <td>6.19 / 7.89</td> <td>230.40 / 51</td>	ARN 71 AD	09h 22m 06.7s	51° 10' 49"	6.19 / 7.89	230.40 / 51	
NGC3556 M108	11h 12m 39.0s	+55° 33' 50"	10.0	Galaxy	8.6 x 2.4	<td>BUP 143 AC</td> <td>12h 31m 00.0s</td> <td>51° 25' 31"</td> <td>6.21 / 8.45</td> <td>217.50 / 333</td>	BUP 143 AC	12h 31m 00.0s	51° 25' 31"	6.21 / 8.45	217.50 / 333	
NGC2655	08h 58m 10.7s	+78° 08' 45"	10.1	Galaxy	4.9 x 4.1	<td>STTA 127 AB</td> <td>13h 51m 29.2s</td> <td>68° 13' 01"</td> <td>6.53 / 8.32</td> <td>87.40 / 62</td>	STTA 127 AB	13h 51m 29.2s	68° 13' 01"	6.53 / 8.32	87.40 / 62	
NGC3953	11h 54m 50.8s	+52° 12' 49"	10.1	Galaxy	6.9 x 3.6	<td>STF 1520</td> <td>11h 17m 12.1s</td> <td>52° 39' 49"</td> <td>6.54 / 7.81</td> <td>12.40 / 344</td>	STF 1520	11h 17m 12.1s	52° 39' 49"	6.54 / 7.81	12.40 / 344	
NGC2976	09h 48m 52.0s	+67° 49' 27"	10.2	Galaxy	5.9 x 2.7	<td>STFA 25 AB</td> <td>13h 14m 09.3s</td> <td>67° 10' 57"</td> <td>6.64 / 7.08</td> <td>179.20 / 296</td>	STFA 25 AB	13h 14m 09.3s	67° 10' 57"	6.64 / 7.08	179.20 / 296	
NGC5322	13h 49m 55.0s	+60° 05' 29"	10.2	Galaxy	6.0 x 4.1	<td>STF 1972 AB (π_1 UMi)</td> <td>15h 28m 07.5s</td> <td>80° 22' 49"</td> <td>6.64 / 7.30</td> <td>31.80 / 80</td>	STF 1972 AB (π_1 UMi)	15h 28m 07.5s	80° 22' 49"	6.64 / 7.30	31.80 / 80	
NGC6503	17h 49m 15.1s	+70° 08' 18"	10.2	Galaxy	7.0 x 2.5	<td>STF 1415 AB</td> <td>10h 19m 25.7s</td> <td>70° 57' 37"</td> <td>6.65 / 7.27</td> <td>16.60 / 168</td>	STF 1415 AB	10h 19m 25.7s	70° 57' 37"	6.65 / 7.27	16.60 / 168	
NGC2681	08h 54m 58.1s	+51° 14' 11"	10.3	Galaxy	3.6 x 3.3	<td>STTA 123 AB</td> <td>13h 27m 45.5s</td> <td>64° 37' 56"</td> <td>6.65 / 7.03</td> <td>69.20 / 145</td>	STTA 123 AB	13h 27m 45.5s	64° 37' 56"	6.65 / 7.03	69.20 / 145	
NGC4605	12h 40m 52.1s	+61° 29' 55"	10.3	Galaxy	5.9 x 2.4	<td>STT 565 AC</td> <td>08h 18m 36.4s</td> <td>59° 07' 35"</td> <td>6.71 / 8.45</td> <td>226.10 / 308</td>	STT 565 AC	08h 18m 36.4s	59° 07' 35"	6.71 / 8.45	226.10 / 308	
NGC5907	15h 16m 25.1s	+56° 15' 26"	10.3	Galaxy	12.6 x 1.4	<td>HJL 1046 AB (17 Lyn)</td> <td>07h 11m 25.0s</td> <td>60° 45' 31"</td> <td>6.76 / 7.95</td> <td>184.0 / 164</td>	HJL 1046 AB (17 Lyn)	07h 11m 25.0s	60° 45' 31"	6.76 / 7.95	184.0 / 164	
NGC2336	07h 30m 27.7s	+80° 08' 09"	10.4	Galaxy	7.1 x 3.9	<td>SHJ 191</td> <td>15h 00m 10.7s</td> <td>53° 46' 53"</td> <td>6.86 / 7.57</td> <td>40.40 / 342</td>	SHJ 191	15h 00m 10.7s	53° 46' 53"	6.86 / 7.57	40.40 / 342	
NGC2985	09h 52m 07.3s	+72° 11' 04"	10.4	Galaxy	4.6 x 3.4							
NGC3631	11h 22m 10.1s	+53° 03' 36"	10.4	Galaxy	5.0 x 3.7							
IC2574 - Coddington nebula	10h 29m 49.9s	+68° 18' 50"	10.4	Galaxy	13.2 x 5.4							
NGC2146	06h 21m 48.9s	+78° 20' 46"	10.6	Galaxy	5.4 x 2.9	Main variable stars						
NGC3147	10h 18m 33.3s	+73° 17' 59"	10.6	Galaxy	3.9 x 3.5							
NGC3359	10h 47m 54.3s	+63° 07' 03"	10.6	Galaxy	7.2 x 4.4	<th>Name</th> <th>RA (J2020.0)</th> <th>DEC</th> <th>Magnitude</th>	Name	RA (J2020.0)	DEC	Magnitude		
NGC4088	12h 06m 35.2s	+50° 25' 45"	10.6	Galaxy	5.6 x 2.1	<td>Sky2000Master 12560064</td> <td>12h 57m 12.8s</td> <td>65° 53' 11"</td> <td>6.4</td>	Sky2000Master 12560064	12h 57m 12.8s	65° 53' 11"	6.4		
IC3568	12h 33m 38.9s	+82° 27' 14"	10.6	Planetary nebula	10.2"	<td>Sky2000Master 10440112</td> <td>10h 46m 01.8s</td> <td>68° 40' 13"</td> <td>7.0</td>	Sky2000Master 10440112	10h 46m 01.8s	68° 40' 13"	7.0		
NGC2787	09h 21m 05.0s	+69° 07' 06"	10.7	Galaxy	3.1 x 1.8	<td>Sky2000Master 10580141</td> <td>11h 00m 22.4s</td> <td>69° 52' 53"</td> <td>7.2</td>	Sky2000Master 10580141	11h 00m 22.4s	69° 52' 53"	7.2		
NGC3898	11h 50m 18.6s	+55° 58' 25"	10.7	Galaxy	4.4 x 2.6	<td>Sky2000Master 12200063</td> <td>12h 21m 24.3s</td> <td>61° 11' 55"</td> <td>7.3</td>	Sky2000Master 12200063	12h 21m 24.3s	61° 11' 55"	7.3		
NGC3998	11h 58m 57.7s	+55° 20' 33"	10.7	Galaxy	2.7 x 2.3	<td>Sky2000Master 7140215</td> <td>07h 16m 58.7s</td> <td>68° 46' 05"</td> <td>7.8</td>	Sky2000Master 7140215	07h 16m 58.7s	68° 46' 05"	7.8		
NGC4036	12h 02m 28.1s	+61° 47' 05"	10.7	Galaxy	4.3 x 1.7	<td>Sky2000Master 12360064</td> <td>12h 37m 17.7s</td> <td>59° 22' 37"</td> <td>8.1</td>	Sky2000Master 12360064	12h 37m 17.7s	59° 22' 37"	8.1		
NGC4589	12h 38m 10.7s	+74° 04' 56"	10.7	Galaxy	3.4 x 2.8							
NGC5585	14h 20m 25.9s	+56° 38' 16"	10.7	Galaxy	5.8 x 3.6							
NGC3310	10h 39m 59.5s	+53° 23' 56"	10.8	Galaxy	3.1 x 2.4							
NGC3610	11h 19m 34.2s	+58° 40' 38"	10.8	Galaxy	2.7 x 2.3							
NGC3718	11h 33m 40.3s	+52° 57' 24"	10.8	Galaxy	8.1 x 4.0	Navigation map						
NGC4026	12h 00m 26.5s	+50° 51' 02"	10.8	Galaxy	5.2 x 1.3	<div style="border: 1px solid black; padding: 5px; text-align: center;">Chart 1 (4h, 70°) Camelopardalis, Cassiopeia</div>						
NGC5474	14h 05m 44.0s	+53° 34' 04"	10.8	Galaxy	4.7	<div style="border: 1px solid black; padding: 5px; text-align: center;">Chart 3 (20h, 70°) Draco, Cepheus</div>						
NGC2950	09h 44m 01.1s	+58° 45' 33"	10.9	Galaxy	2.7 x 1.8	<div style="border: 1px solid black; padding: 5px; text-align: center;">Chart 2 (12h, 70°) Draco, Ursa Major</div>						
NGC3079	10h 03m 18.3s	+55° 35' 04"	10.9	Galaxy	8.1 x 1.3	<div style="border: 1px solid black; padding: 5px; text-align: center;">Chart 7 (14h, 35°) Canes Venatici, Bootes</div>						
NGC3613	11h 19m 45.0s	+57° 53' 28"	10.9	Galaxy	3.9 x 1.9							
NGC3690B	11h 29m 40.0s	+58° 27' 15"	10.9	Galaxy	2.0 x 1.4							
NGC3945	11h 54m 16.2s	+60° 33' 50"	10.9	Galaxy	5.2 x 3.5							
NGC2300	07h 38m 45.7s	+85° 39' 51"	11.0	Galaxy	2.8 x 2.0							

Main objects visible on chart 2

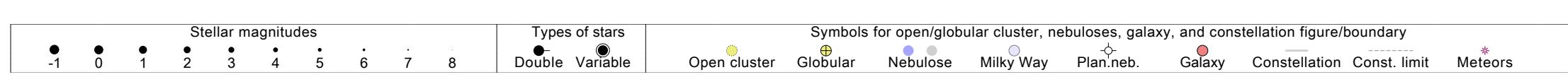
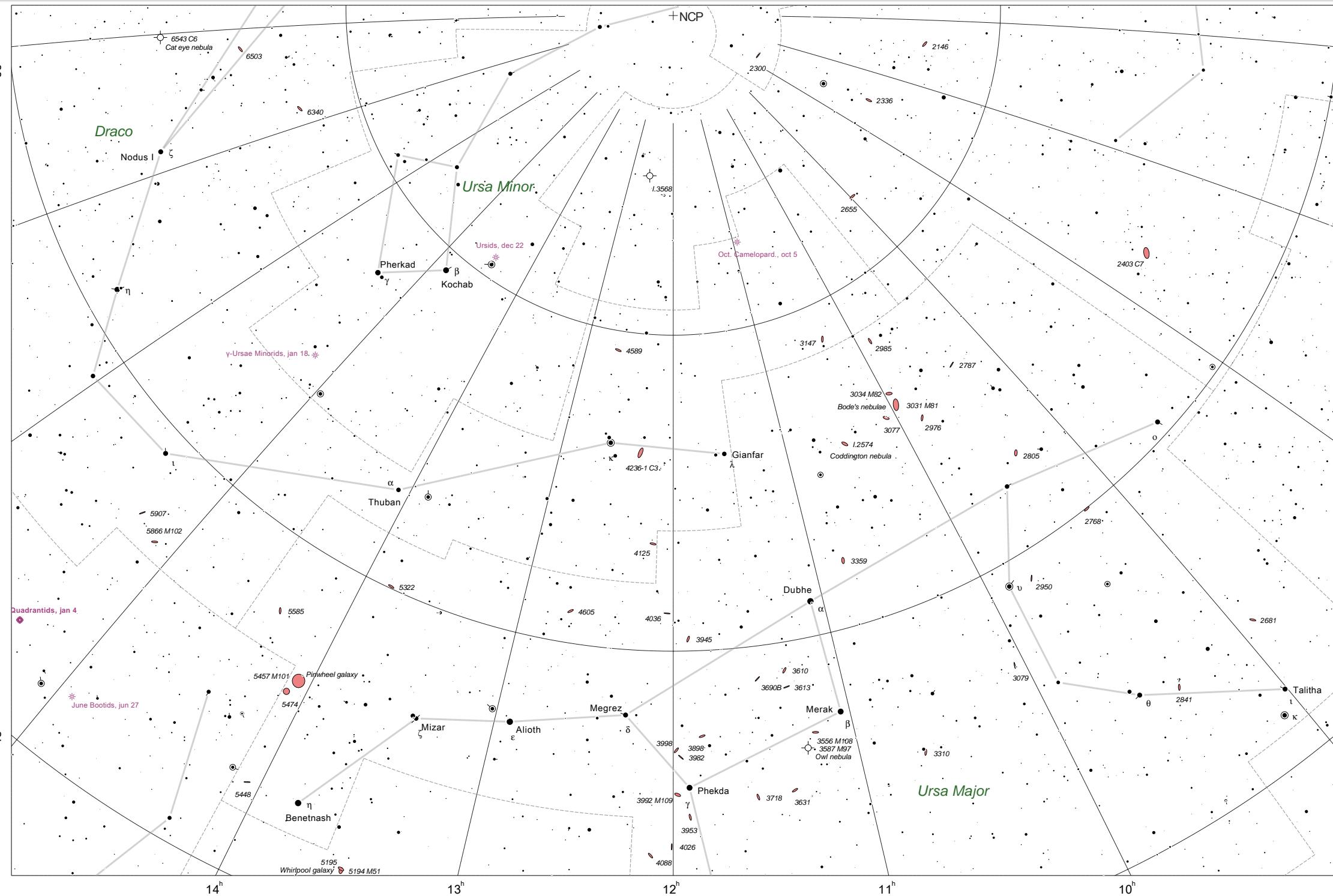


Chart legend

Chart 2, 30° around 12.0h, 70.0° (Draco, Ursa Major, Ursa Minor, Camelopardalis)



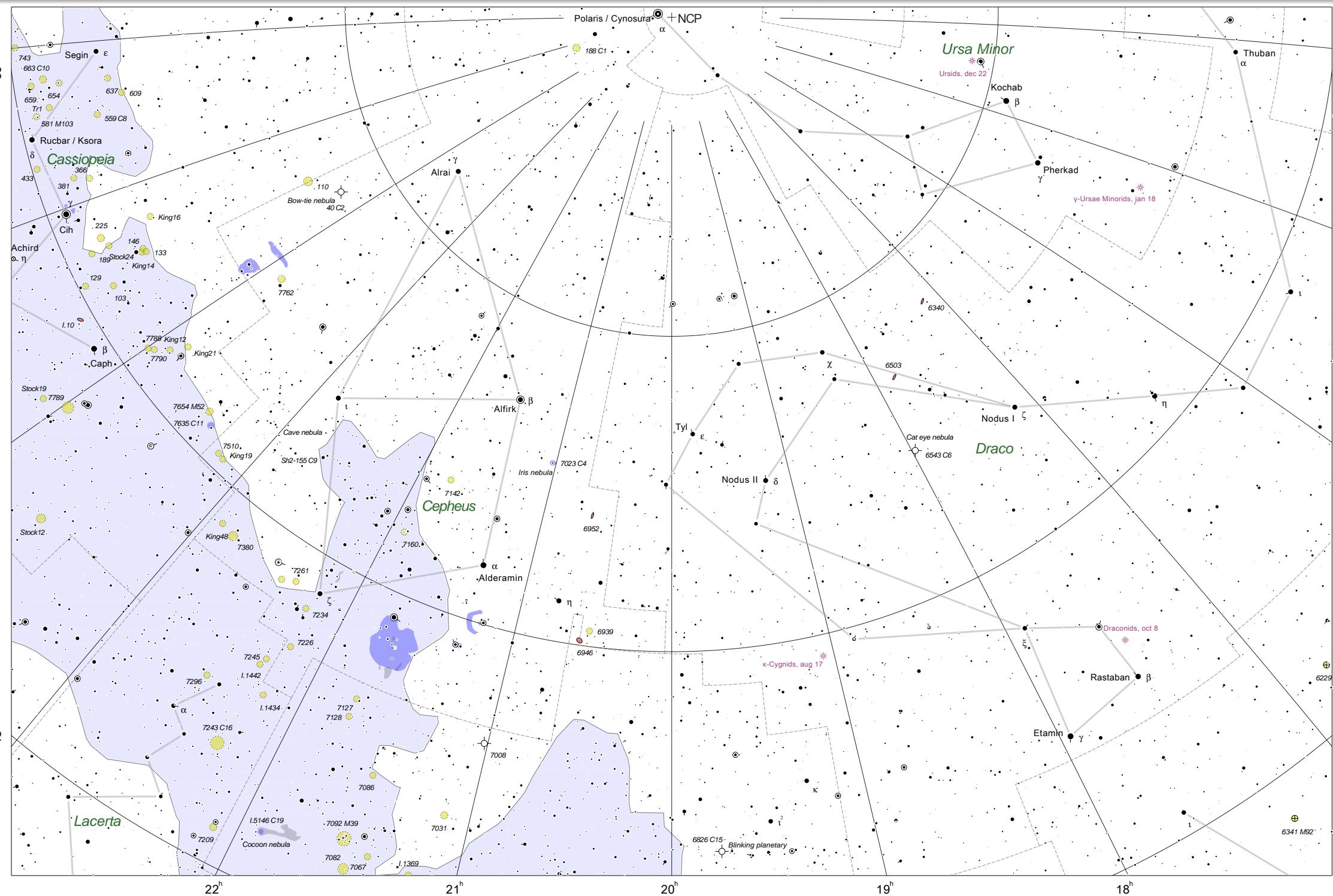
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Sh2-155 CALDWELL 9 - Cave nebula	22h 58m 05.6s	+62° 44' 59"		Nebula	50.4 x 30.0	STT 312 AB,C	16h 24m 16.5s	61° 28' 08"	2.80 / 8.10	565.80 / 240
IC5146 CALDWELL 19 - Cocoon nebula	21h 54m 10.3s	+47° 21' 42"		Nebula	10.0	STFA 58 AC	22h 29m 54.8s	58° 31' 05"	4.21 / 6.11	40.60 / 191
NGC7635 CALDWELL 11 - Bubble nebula	23h 21m 38.3s	+61° 19' 17"		Nebula	15.0 x 8.0	STF 2241 AB (Dziban)	17h 41m 34.8s	72° 08' 24"	4.60 / 5.59	30.10 / 14
NGC7023 CALDWELL 4 - Iris nebula	21h 01m 50.1s	+68° 14' 56"		Nebula	10.0 x 8.0	STF 2420 AB (o Dra)	18h 51m 29.4s	59° 24' 47"	4.77 / 8.26	37.50 / 317
NGC7092 M39	21h 32m 35.4s	+48° 30' 50"	4.6	Open cluster	31.0	STFA 35 (v2 Dra)	17h 32m 39.4s	55° 09' 34"	4.87 / 4.90	62.10 / 311
NGC7160	21h 54m 14.7s	+62° 41' 54"	6.1	Open cluster	5.0	SHJ 355 AC	23h 30m 57.9s	58° 39' 34"	4.87 / 7.23	74.90 / 269
NGC7243 CALDWELL 16	22h 15m 56.0s	+49° 59' 51"	6.4	Open cluster	30.0	H 6 37 AC	18h 43m 01.2s	55° 33' 36"	5.01 / 8.24	331.20 / 340
NGC129	00h 31m 05.7s	+60° 19' 19"	6.5	Open cluster	12.0	STF 2323 AC	18h 24m 12.6s	58° 48' 44"	5.06 / 7.95	89.10 / 19
NGC654	01h 45m 23.0s	+61° 58' 58"	6.5	Open cluster	6.0	STFA 30 AC	16h 36m 42.5s	52° 53' 05"	5.38 / 5.50	90.0 / 193
NGC6341 M92	17h 17m 44.2s	+43° 06' 59"	6.5	Globular cluster	14.0	STH 7 AC	20h 26m 53.2s	81° 29' 23"	5.48 / 6.66	196.60 / 282
NGC7789	23h 58m 29.7s	+56° 49' 33"	6.7	Open cluster	25.0	STF 2840 AB	21h 52m 41.7s	55° 53' 28"	5.64 / 6.42	18.0 / 196
NGC7654 M52	23h 25m 42.0s	+61° 42' 36"	6.9	Open cluster	16.0	STF 2308 AB (41 Dra)	17h 58m 38.9s	80° 00' 13"	5.70 / 6.00	18.80 / 232
NGC225	00h 44m 47.1s	+61° 52' 33"	7.0	Open cluster	15.0	STF 2308 AC	17h 58m 38.9s	80° 00' 13"	5.70 / 8.34	224.80 / 129
NGC663 CALDWELL 10	01h 47m 40.4s	+61° 19' 04"	7.1	Open cluster	15.0	S 823 AC	23h 10m 35.8s	59° 26' 29"	5.72 / 8.16	167.20 / 163
NGC7082	21h 30m 00.9s	+47° 12' 54"	7.2	Open cluster	24.0	STF 2816 AC	21h 39m 35.3s	57° 34' 48"	5.73 / 7.48	11.80 / 121
NGC7380	22h 48m 09.1s	+58° 14' 15"	7.2	Open cluster	20.0	STF 2816 AD	21h 39m 35.3s	57° 34' 48"	5.73 / 7.53	20.40 / 339
NGC581 M103	01h 34m 43.5s	+60° 45' 38"	7.4	Open cluster	6.0	S 838 AD	00h 05m 16.6s	62° 23' 57"	5.92 / 8.24	244.0 / 197
NGC7209	22h 05m 56.0s	+46° 34' 52"	7.7	Open cluster	15.0	STFA 46 AB (16 Cyg)	19h 42m 21.2s	50° 34' 25"	6.00 / 6.23	39.80 / 134
NGC7234	22h 13m 06.7s	+57° 22' 22"	7.7	Open cluster	6.0	BEI 2 AC	22h 19m 56.9s	63° 24' 48"	6.14 / 8.46	10.90 / 78
NGC6939	20h 31m 53.9s	+60° 43' 48"	7.8	Open cluster	10.0	STF 2893	22h 13m 14.3s	73° 24' 24"	6.19 / 7.91	29.20 / 347
NGC659	01h 45m 46.6s	+60° 46' 11"	7.9	Open cluster	6.0	STTA 200 AB (65 Dra)	20h 02m 32.9s	64° 41' 28"	6.36 / 8.06	99.30 / 332
NGC7510	23h 11m 55.7s	+60° 40' 40"	7.9	Open cluster	7.0	STF 2687	20h 26m 51.9s	56° 42' 18"	6.37 / 8.31	26.20 / 118
NGC188 CALDWELL 1	00h 49m 40.1s	+85° 22' 02"	8.1	Open cluster	15.0	ARY 43	21h 57m 41.6s	66° 15' 07"	6.38 / 6.75	100.40 / 128
NGC6543 CALDWELL 6 - Cat eye nebula	17h 58m 33.1s	+66° 37' 58"	8.1	Planetary nebula	19.8"	STFA 30 BC	16h 36m 42.5s	52° 53' 04"	6.42 / 5.50	90.10 / 194
Stock12	23h 36m 33.8s	+52° 47' 39"	8.1	Open cluster	20.0	S 405 AB	02h 15m 13.0s	79° 47' 03"	6.47 / 7.15	55.60 / 277
NGC637	01h 44m 28.6s	+64° 08' 12"	8.2	Open cluster	3.0					
NGC7086	21h 31m 08.5s	+51° 41' 21"	8.4	Open cluster	12.0					
NGC7261	22h 20m 53.4s	+58° 12' 40"	8.4	Open cluster	6.0					
NGC7790	23h 59m 25.5s	+61° 19' 11"	8.5	Open cluster	5.0					
King14	00h 33m 03.0s	+63° 16' 37"	8.5	Open cluster	7.0					
NGC189	00h 40m 45.6s	+61° 12' 17"	8.8	Open cluster	5.0					
NGC6826 CALDWELL 15 - Blinking planetary	19h 45m 20.6s	+50° 34' 29"	8.8	Planetary nebula	36.0"					
NGC6946	20h 35m 17.2s	+60° 13' 23"	8.8	Galaxy	11.5 x 9.8					
IC1369	21h 12m 50.8s	+47° 50' 58"	8.8	Open cluster	5.0	Cih (γ Cas)	00h 57m 55.9s	60° 49' 29"	2.2	
Tr1	01h 37m 03.5s	+61° 23' 06"	8.9	Open cluster	4.5	Mu Cep	21h 44m 07.2s	58° 52' 20"	4.0	
IC1434	22h 11m 15.3s	+52° 55' 56"	9.0	Open cluster	7.0	Del Cep	22h 29m 55.1s	58° 31' 05"	4.1	
NGC433	01h 16m 25.8s	+60° 13' 52"	9.0	Open cluster	4.0	Sky2000Master 19240136	19h 25m 04.6s	50° 16' 54"	6.2	
NGC7296	22h 28m 50.0s	+52° 23' 27"	9.0	Open cluster	4.0	Sky2000Master 1020046	01h 04m 11.5s	81° 58' 58"	6.9	
NGC146	00h 34m 12.3s	+63° 24' 43"	9.1	Open cluster	5.0	Sky2000Master 21400110	21h 41m 19.3s	54° 24' 58"	7.3	
NGC7031	21h 07m 31.0s	+50° 55' 28"	9.1	Open cluster	15.0					
IC1442	22h 16m 51.4s	+54° 05' 31"	9.1	Open cluster	5.0					
NGC7245	22h 15m 57.1s	+54° 26' 36"	9.2	Open cluster	5.0					
King19	23h 09m 09.0s	+60° 37' 31"	9.2	Open cluster	7.0					
NGC381	01h 09m 36.2s	+61° 41' 23"	9.3	Open cluster	7.0					
NGC7142	21h 45m 37.9s	+65° 52' 02"	9.3	Open cluster	12.0					
King12	23h 54m 00.1s	+62° 04' 41"	9.3	Open cluster	2.0	Chart 1 (4h, 70°) Camelopardalis, Cassiopeia	00h 57m 55.9s	60° 49' 29"	2.2	
NGC133	00h 32m 26.9s	+63° 27' 43"	9.4	Open cluster	3.0	Chart 3 (20h, 70°) Draco, Cepheus	21h 44m 07.2s	58° 52' 20"	4.0	
NGC6229	16h 47m 32.7s	+47° 29' 37"	9.4	Globular cluster	4.5	Chart 2 (12h, 70°) Draco, Ursa Major	22h 29m 55.1s	58° 31' 05"	4.1	
NGC7788	23h 57m 46.9s	+61° 30' 41"	9.4	Open cluster	4.0					
NGC559 CALDWELL 8	01h 30m 52.9s	+63° 24' 16"	9.5	Open cluster	7.0	Chart 9 (22h, 35°) Pegasus, Lacerta	19h 25m 04.6s	50° 16' 54"	6.2	

Main objects visible on chart 3



Chart legend

Chart 3, 30° around 20.0h , 70.0° (Draco, Cepheus, Cygnus, Cassiopeia)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')
Mel20 - Alpha Persei cluster	03h 23m 25.3s	+49° 04' 14"	1.2	Open cluster	3.08°
Mel22 M45 - Pleiades Cluster	03h 48m 35.5s	+24° 10' 38"	1.2	Open cluster	1.83°
NGC224 M31 - Andromeda nebula	00h 43m 50.2s	+41° 22' 42"	3.4	Galaxy	3.15° x 1.03°
NGC1039 M34	02h 43m 22.6s	+42° 50' 46"	5.2	Open cluster	25.0
NGC7686	23h 31m 04.8s	+49° 14' 41"	5.6	Open cluster	15.0
NGC598 M33 - Triangulum galaxy	01h 34m 59.8s	+30° 45' 36"	5.7	Galaxy	68.7 x 41.6
NGC752 CALDWELL 28	01h 58m 46.8s	+37° 55' 49"	5.7	Open cluster	75.0
NGC1545	04h 22m 26.9s	+50° 18' 06"	6.2	Open cluster	12.0
NGC1342	03h 32m 55.8s	+37° 26' 37"	6.7	Open cluster	17.0
NGC1582	04h 33m 04.2s	+43° 47' 06"	7.0	Open cluster	24.0
IC348	03h 45m 49.6s	+32° 13' 29"	7.3	Open cluster	10.0
NGC1664	04h 52m 31.3s	+43° 42' 32"	7.6	Open cluster	18.0
NGC205 M110	00h 41m 27.8s	+41° 47' 41"	8.1	Galaxy	19.5 x 11.5
NGC221 M32	00h 43m 47.6s	+40° 58' 31"	8.1	Galaxy	8.5 x 6.5
NGC7662 CALDWELL 22 - Blue snowball	23h 26m 51.8s	+42° 38' 45"	8.3	Planetary nebula	37.2"
NGC1245	03h 16m 04.7s	+47° 18' 43"	8.4	Open cluster	10.0
NGC1513	04h 11m 26.3s	+49° 33' 58"	8.4	Open cluster	12.0
NGC956	02h 33m 32.8s	+44° 44' 03"	9.0	Open cluster	9.0
NGC185 CALDWELL 18	00h 40m 04.3s	+48° 26' 49"	9.2	Galaxy	8.0 x 7.0
NGC628 M74	01h 37m 46.3s	+15° 53' 05"	9.4	Galaxy	10.5 x 9.5
NGC1023	02h 41m 39.6s	+39° 08' 54"	9.4	Galaxy	7.4 x 2.5
NGC147 CALDWELL 17	00h 34m 17.6s	+48° 37' 02"	9.5	Galaxy	13.2 x 7.8
NGC891 CALDWELL 23	02h 23m 48.8s	+42° 26' 15"	9.9	Galaxy	11.7 x 1.6
NGC650 M76 - Little Dumbbell	01h 43m 34.2s	+51° 40' 18"	10.1	Planetary nebula	3.1
NGC925	02h 28m 29.0s	+33° 40' 04"	10.1	Galaxy	10.5 x 5.9
NGC404 - Mirach's ghost	01h 10m 34.2s	+35° 49' 28"	10.3	Galaxy	3.5
NGC772	02h 00m 25.6s	+19° 06' 14"	10.3	Galaxy	7.2 x 4.3
NGC7814 CALDWELL 43	00h 04m 16.4s	+16° 15' 24"	10.6	Galaxy	5.5 x 2.3
NGC1605	04h 36m 18.9s	+45° 18' 41"	10.7	Open cluster	5.0
NGC278	00h 53m 12.7s	+47° 39' 33"	10.8	Galaxy	2.1 x 2.0
NGC672	01h 49m 01.8s	+27° 31' 55"	10.9	Galaxy	6.0 x 2.4
NGC1514	04h 10m 32.6s	+30° 49' 40"	10.9	Planetary nebula	2.2
NGC1161	03h 02m 34.6s	+44° 58' 32"	11.0	Galaxy	2.8 x 2.0
NGC1275 CALDWELL 24 - Perseus A	03h 21m 07.8s	+41° 34' 58"	11.9	Galaxy	2.3 x 1.6

Main double stars

Name	RA (J2020.0)	DEC	Magnitude	Sep (") / PA (°)
STFA 8 AB (Alcyone)	03h 48m 40.5s	24° 09' 57"	2.83 / 6.27	117.60 / 291
STFA 8 AC	03h 48m 40.5s	24° 09' 57"	2.83 / 8.22	182.0 / 313
H 5 17 AB (π And)	00h 37m 57.4s	33° 49' 45"	4.36 / 7.08	35.70 / 173
H 5 12 AB (λ Ari)	01h 59m 03.3s	23° 41' 34"	4.80 / 6.65	37.20 / 48
H 6 69 AB (14 Ari)	02h 10m 33.5s	26° 02' 02"	4.99 / 8.01	93.30 / 34
H 6 69 AC	02h 10m 33.5s	26° 02' 02"	5.02 / 7.97	104.0 / 277
STF 331	03h 02m 18.2s	52° 25' 47"	5.21 / 6.17	11.90 / 84
STF 88 AB (ψ_1 Psc)	01h 06m 45.5s	21° 34' 48"	5.27 / 5.45	29.80 / 159
AG 304 (15 Tri)	02h 37m 00.2s	34° 46' 26"	5.57 / 6.75	142.40 / 16
HJL 1026 AB (21 Tau)	03h 47m 05.7s	24° 36' 56"	5.75 / 6.42	149.60 / 130
STFA 4 AB (56 And)	01h 57m 20.4s	37° 20' 56"	5.79 / 6.07	202.50 / 298
BUP 30 AC	02h 24m 05.3s	41° 29' 12"	5.83 / 7.42	305.80 / 9
STT 559 AB (39 Tau)	04h 06m 31.0s	22° 03' 43"	5.97 / 8.09	176.60 / 357
STF 222 (59 And)	02h 12m 06.3s	39° 07' 59"	6.05 / 6.71	16.60 / 36
SHJ 44 AB (57 Per)	04h 34m 49.8s	43° 06' 17"	6.12 / 6.83	120.90 / 197
ARN 42 AE	04h 34m 49.8s	43° 06' 17"	6.12 / 7.42	442.10 / 79
STFA 8 BC	03h 48m 32.5s	24° 10' 36"	6.27 / 8.22	86.20 / 345
STFA 5 AB (30 Ari)	02h 38m 10.3s	24° 43' 60"	6.50 / 7.02	37.70 / 275
STF 401 AB	03h 32m 33.7s	27° 38' 19"	6.58 / 6.93	11.40 / 269
STTA 40 AB	03h 50m 33.7s	24° 26' 27"	6.58 / 7.53	87.40 / 309
STF 40 AB	00h 36m 14.6s	36° 56' 32"	6.72 / 8.48	11.80 / 313
STTA 252	23h 55m 57.2s	29° 35' 13"	6.77 / 8.37	111.10 / 145
STTA 38 AB	03h 45m 50.3s	27° 57' 34"	6.78 / 6.91	135.40 / 53

Main variable stars

Name	RA (J2020.0)	DEC	Magnitude
Algol (β Per)	03h 09m 28.7s	41° 01' 53"	2.1
Sky2000Master 4030136	04h 05m 08.3s	28° 10' 47"	8.2
Sky2000Master 351	00h 01m 08.1s	25° 59' 52"	8.2

Chart 5 (6h, 35°)
Auriqa, Gemini

Chart 1 (4h, 70°)
Camaleopardalis, Cassiopeia

Chart 4 (2h, 35°)
Triangulum, Andromeda

Chart 9 (22h, 35°)
Pegasus, Lacerta

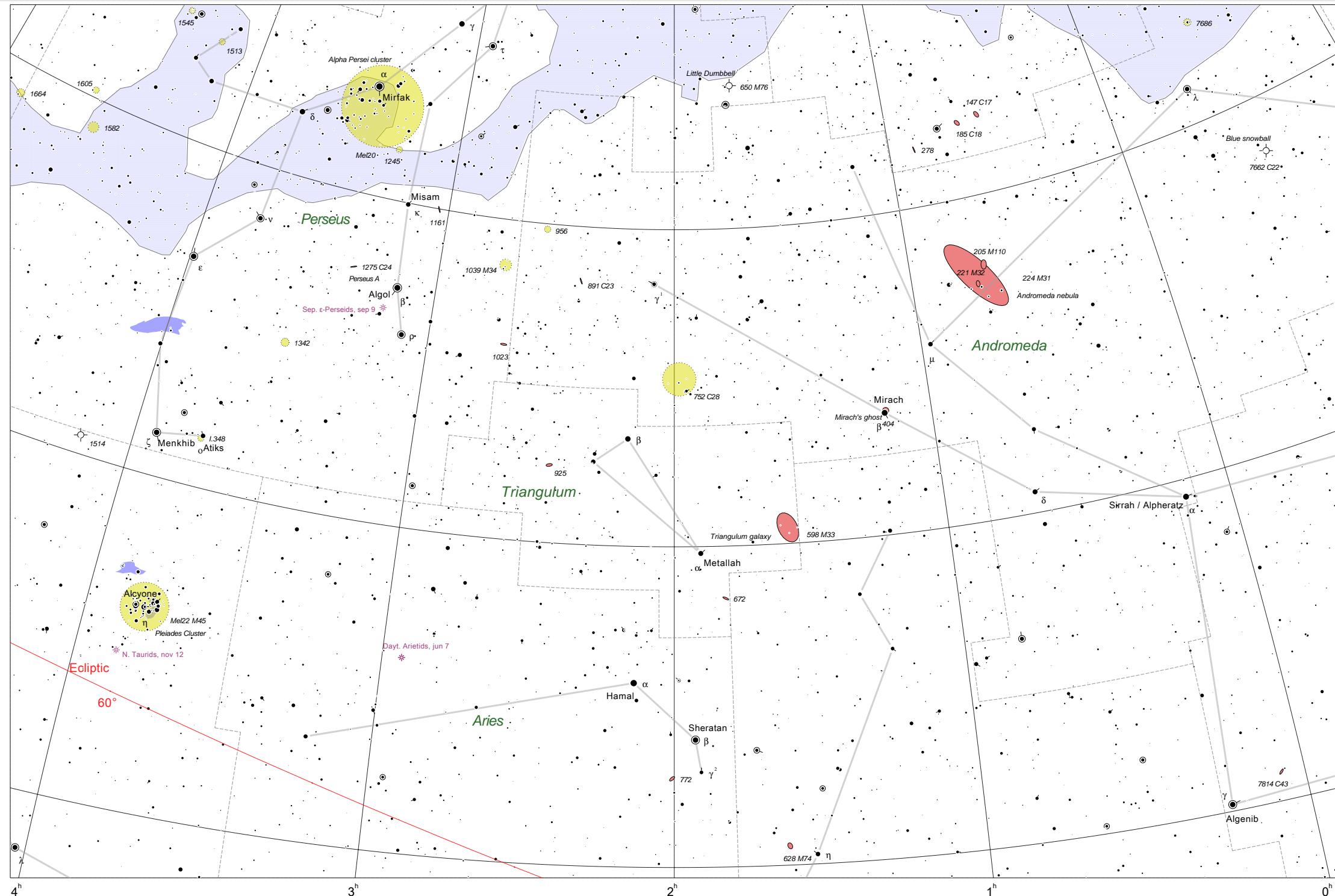
Chart 10 (2h, 0°)
Cetus, Pisces

Main objects visible on chart 4

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary									
• -1	• 0	• 1	• 2	• 3	• 4	• 5	• 6	• 7	• 8	Double Variable	Open cluster	Globular	Nebulose	Milky Way	Plan neb	Galaxy	Constellation	Const limit	Meteors

Chart legend

Chart 4, 30° around $2.0\text{h}, 35.0^{\circ}$ (Triangulum, Andromeda, Perseus, Pisces)



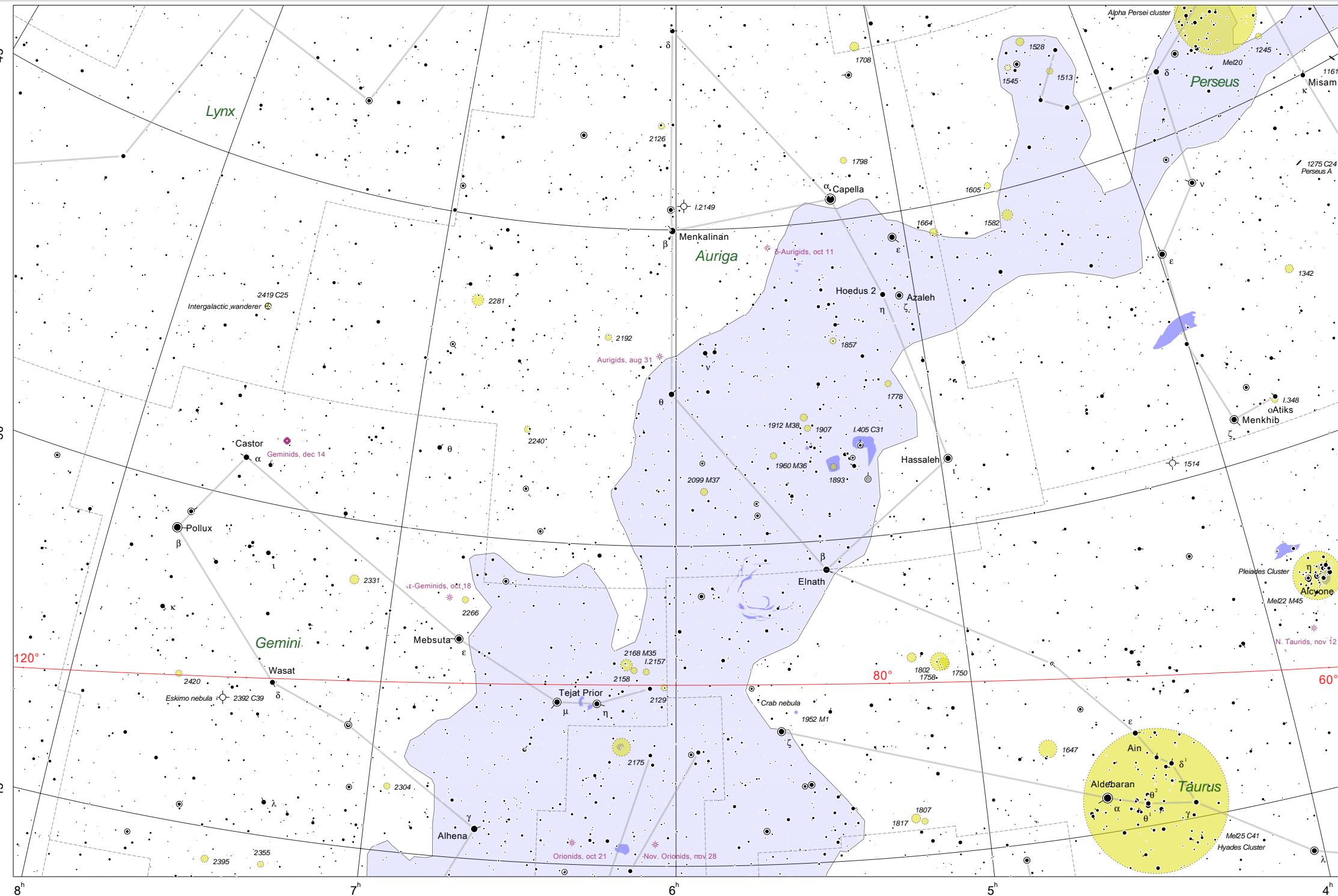
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ("") / PA (°)
IC405 CALDWELL 31 - Flaming Star nebula	05h 17m 48.9s	+34° 22' 36"		Nebula	30.0 x 20.0	SHJ 51 AG	05h 18m 09.7s	46° 01' 07"	0.08 / 8.10	522.40 / 349
Mel25 CALDWELL 41 - Hyades Cluster	04h 28m 08.6s	+16° 02' 37"	1.0	Open cluster	5.50°	STFA 8 AB (Alcyone)	03h 48m 40.5s	24° 09' 57"	2.83 / 6.27	117.60 / 291
Mel20 - Alpha Persei cluster	03h 23m 25.3s	+49° 04' 14"	1.2	Open cluster	3.08°	STFA 8 AC	03h 48m 40.5s	24° 09' 57"	2.83 / 8.22	182.0 / 313
Mel22 M45 - Pleiades Cluster	03h 48m 35.5s	+24° 10' 38"	1.2	Open cluster	1.83°	STFA 10 AB (θ_2 Tau)	04h 29m 48.5s	15° 54' 50"	3.41 / 3.94	347.90 / 339
NGC2168 M35	06h 10m 13.6s	+24° 20' 43"	5.1	Open cluster	25.0	SHJ 77 AC	07h 05m 18.1s	20° 32' 21"	4.05 / 7.66	100.20 / 347
NGC2281	06h 49m 42.1s	+41° 03' 19"	5.4	Open cluster	25.0	STTA 77 AB (ν Gem)	06h 30m 09.3s	20° 11' 52"	4.10 / 8.01	112.80 / 330
NGC2099 M37	05h 53m 36.9s	+32° 33' 23"	5.6	Open cluster	15.0	ALC 3 AE	07h 30m 23.8s	31° 44' 31"	4.16 / 7.82	755.40 / 355
NGC1960 M36	05h 37m 37.2s	+34° 09' 07"	6.0	Open cluster	10.0	STF 541 AB (κ Tau)	04h 26m 33.6s	22° 20' 18"	4.22 / 5.29	339.40 / 174
NGC1545	04h 22m 26.9s	+50° 18' 06"	6.2	Open cluster	12.0	S 455 AB (τ Tau)	04h 43m 27.2s	22° 59' 37"	4.24 / 7.02	62.50 / 214
NGC1528	04h 16m 50.4s	+51° 15' 38"	6.4	Open cluster	18.0	STFA 11 (σ_2 Tau)	04h 40m 24.7s	15° 57' 22"	4.69 / 5.09	444.0 / 194
NGC1647	04h 46m 52.5s	+19° 09' 16"	6.4	Open cluster	40.0	LDS 2246 AB	04h 31m 42.7s	16° 14' 10"	4.78 / 6.54	254.0 / 130
NGC1912 M38	05h 30m 03.6s	+35° 52' 11"	6.4	Open cluster	15.0	STF 653 AC	05h 16m 42.3s	32° 42' 31"	5.03 / 7.33	14.20 / 225
NGC1342	03h 32m 55.8s	+37° 26' 37"	6.7	Open cluster	17.0	WNO 52 AC	05h 25m 34.8s	17° 24' 02"	5.06 / 7.88	706.80 / 252
NGC2129	06h 02m 19.5s	+23° 19' 01"	6.7	Open cluster	6.0	SHJ 40 AB (ϕ Tau)	04h 21m 35.1s	27° 23' 51"	5.08 / 7.51	48.70 / 259
NGC2175	06h 10m 50.1s	+20° 29' 00"	6.8	Open cluster	40.0 x 30.0	BLL 15 AD	05h 28m 58.7s	34° 29' 29"	5.22 / 8.07	210.10 / 15
NGC1582	04h 33m 04.2s	+43° 47' 06"	7.0	Open cluster	24.0	STF 753 AB,C	05h 39m 55.2s	30° 30' 09"	5.46 / 8.41	12.0 / 269
NGC1807	05h 11m 55.2s	+16° 32' 12"	7.0	Open cluster	12.0	ARN 36 AC	04h 31m 47.5s	15° 44' 01"	5.48 / 5.70	484.50 / 246
NGC1857	05h 21m 28.1s	+39° 21' 44"	7.0	Open cluster	10.0	STT 559 AB (39 Tau)	04h 06m 31.0s	22° 03' 43"	5.97 / 8.09	176.60 / 357
IC348	03h 45m 49.6s	+32° 13' 29"	7.3	Open cluster	10.0	STTA 67 AB,C	05h 49m 33.7s	20° 52' 29"	6.01 / 8.29	75.50 / 162
NGC1893	05h 24m 04.5s	+33° 25' 56"	7.5	Open cluster	10.0	SHJ 49 AB	05h 00m 07.2s	14° 34' 20"	6.06 / 7.43	39.20 / 306
NGC1664	04h 52m 31.3s	+43° 42' 32"	7.6	Open cluster	18.0	SHJ 44 AB (57 Per)	04h 34m 49.8s	43° 06' 17"	6.12 / 6.83	120.90 / 197
NGC1778	05h 09m 26.2s	+37° 02' 53"	7.7	Open cluster	8.0	ARN 42 AE	04h 34m 49.8s	43° 06' 17"	6.12 / 7.42	442.10 / 79
NGC1817	05h 13m 36.3s	+16° 42' 22"	7.7	Open cluster	20.0	STF 8 BC	03h 48m 32.5s	24° 10' 36"	6.27 / 8.22	86.20 / 345
NGC2395	07h 28m 20.3s	+13° 34' 00"	8.0	Open cluster	15.0	STF 924 AB (20 Gem)	06h 33m 29.0s	17° 46' 06"	6.31 / 6.88	20.70 / 212
NGC1907	05h 29m 24.8s	+35° 20' 26"	8.2	Open cluster	5.0	STF 534 AB (62 Tau)	04h 25m 12.5s	24° 20' 46"	6.36 / 7.94	29.40 / 291
NGC2420	07h 39m 34.9s	+21° 31' 39"	8.3	Open cluster	6.0					
NGC1245	03h 16m 04.7s	+47° 18' 43"	8.4	Open cluster	10.0					
NGC1513	04h 11m 26.3s	+49° 33' 58"	8.4	Open cluster	12.0					
NGC1952 M1 - Crab nebula	05h 35m 44.1s	+22° 01' 35"	8.4	Nebula	6.0 x 4.0					
IC2157	06h 06m 03.2s	+24° 03' 11"	8.4	Open cluster	5.0					
NGC2331	07h 08m 14.5s	+27° 13' 45"	8.5	Open cluster	19.0					
NGC2158	06h 08m 39.0s	+24° 05' 32"	8.6	Open cluster	5.0					
NGC2392 CALDWELL 39 - Eskimo nebula	07h 30m 21.7s	+20° 52' 12"	9.1	Planetary nebula	0.9	Eps Aur	05h 03m 24.5s	43° 51' 03"	3.0	
NGC2266	06h 44m 34.0s	+26° 56' 54"	9.5	Open cluster	5.0	Tejat Prior (η Gem)	06h 16m 05.1s	22° 29' 57"	3.3	
NGC2355	07h 18m 06.9s	+13° 42' 47"	9.7	Open cluster	8.0	Mekbuda (ζ Gem)	07h 05m 17.6s	20° 32' 21"	4.0	
NGC1798	05h 13m 09.5s	+47° 43' 07"	10.0	Open cluster	5.0	Sky2000Master 6360116	06h 37m 55.3s	38° 25' 39"	5.4	
NGC2304	06h 56m 21.7s	+17° 57' 42"	10.0	Open cluster	3.0	Sky2000Master 6280136	06h 29m 51.2s	30° 28' 44"	5.8	
NGC2240	06h 34m 30.7s	+35° 14' 03"	10.0	Open cluster		Sky2000Master 5550156	05h 57m 00.5s	20° 10' 37"	6.0	
NGC2126	06h 04m 06.1s	+49° 51' 51"	10.2	Open cluster	6.0					
NGC2419 CALDWELL 25 - Intergalactic wanderer	07h 39m 29.6s	+38° 50' 09"	10.3	Globular cluster	4.6					
IC2149	05h 57m 53.2s	+46° 06' 24"	10.6	Planetary nebula	34.2"					
NGC1605	04h 36m 18.9s	+45° 18' 41"	10.7	Open cluster	5.0					
NGC1514	04h 10m 32.6s	+30° 49' 40"	10.9	Planetary nebula	2.2					
NGC2192	06h 16m 41.1s	+39° 50' 51"	10.9	Open cluster	5.0					
NGC1161	03h 02m 34.6s	+44° 58' 32"	11.0	Galaxy	2.8 x 2.0					
NGC1708	05h 05m 02.7s	+52° 51' 37"	11.0	Open cluster	20.0	Chart 6 (10h, 35°)	Leo Minor, Ursa Major			
NGC1750	05h 05m 06.9s	+23° 41' 06"	11.0	Open cluster	25.0 x 12.0					
NGC1758	05h 05m 49.0s	+23° 49' 29"	11.0	Open cluster	40.0	Chart 5 (6h, 35°)	Auriga, Gemini			
NGC1802	05h 11m 27.2s	+24° 08' 55"	11.0	Open cluster	20.0					
NGC1275 CALDWELL 24 - Perseus A	03h 21m 07.8s	+41° 34' 58"	11.9	Galaxy	2.3 x 1.6	Chart 11 (5h, 0°)	Orion, Eridanus			
Navigation map						Chart 1 (4h, 70°)	Camelopardalis, Cassiopeia			
						Chart 4 (2h, 35°)	Triangulum, Andromeda			
						Chart 5 (6h, 35°)	Auriga, Gemini			

Main objects visible on chart 5



Chart legend

Chart 5, 30° around $6.0\text{h}, 35.0^{\circ}$ (Auriga, Gemini, Taurus, Orion)



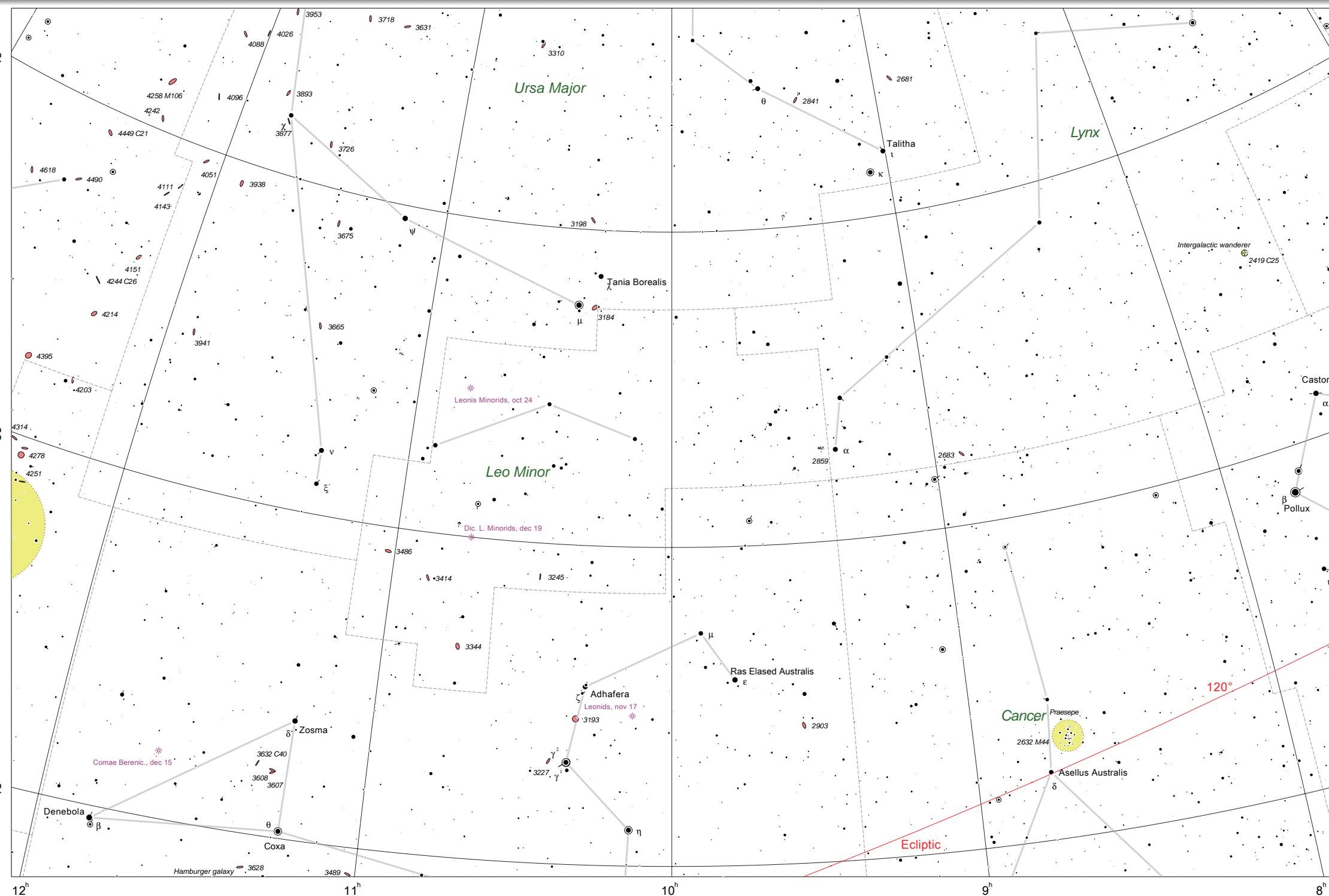
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Mel111 - Berenice Hair	12h 23m 30.2s	+25° 44' 21"	2.7	Open cluster	4.58°	STFA 18 (Adhafera)	10h 17m 47.5s	23° 19' 01"	3.46 / 6.03	334.80 / 338
NGC2632 M44 - Praesepe	08h 41m 32.8s	+19° 35' 53"	3.1	Open cluster	70.0	STF 1268 (<i>ι</i> Cnc)	08h 47m 54.4s	28° 41' 09"	4.13 / 5.99	31.30 / 308
NGC4258 M106	12h 19m 56.9s	+47° 11' 46"	8.4	Galaxy	18.6 x 7.2	DRS 47 AD	11h 20m 13.2s	38° 04' 34"	4.77 / 7.25	499.70 / 128
NGC2903	09h 33m 17.5s	+21° 24' 36"	9.0	Galaxy	12.6 x 6.0	SMA 75 AB	10h 44m 43.5s	46° 05' 55"	5.21 / 7.35	288.0 / 88
NGC2841	09h 23m 24.7s	+50° 53' 25"	9.2	Galaxy	8.1 x 3.5	SHY 204 (<i>ο₁</i> Cnc)	08h 58m 21.7s	15° 14' 41"	5.24 / 5.70	975.60 / 18
NGC3628 - Hamburger galaxy	11h 21m 19.3s	+13° 28' 49"	9.5	Galaxy	13.1 x 3.1	FOR 1 AB (67 UMa)	12h 03m 08.2s	42° 56' 03"	5.24 / 6.72	273.60 / 62
NGC4449 CALDWELL 21	12h 29m 09.6s	+43° 59' 04"	9.6	Galaxy	6.2 x 4.4	ARN 5 AC	12h 03m 08.2s	42° 56' 03"	5.24 / 8.47	375.30 / 25
NGC2683	08h 53m 55.6s	+33° 20' 37"	9.8	Galaxy	9.3 x 2.1	S 612 AB (42 LMi)	10h 46m 58.5s	30° 34' 37"	5.34 / 7.78	196.20 / 174
NGC3184	10h 19m 28.5s	+41° 19' 22"	9.8	Galaxy	7.4 x 6.9	ARN 3 AC	10h 46m 58.5s	30° 34' 37"	5.34 / 8.31	424.60 / 94
NGC4214	12h 16m 38.9s	+36° 12' 59"	9.8	Galaxy	8.0 x 6.6	STF 1543 AD	11h 30m 08.4s	39° 13' 36"	5.36 / 7.73	343.70 / 253
NGC4490	12h 31m 34.4s	+41° 31' 57"	9.8	Galaxy	6.4 x 3.2	S 598 AB (41 Lyn)	09h 29m 58.1s	45° 30' 49"	5.50 / 7.80	69.70 / 160
NGC3344	10h 44m 36.4s	+24° 49' 03"	9.9	Galaxy	7.1 x 6.5	HZG 8 AC	11h 05m 37.5s	38° 07' 60"	6.04 / 7.56	150.10 / 83
NGC3607	11h 17m 57.6s	+17° 56' 34"	9.9	Galaxy	4.6 x 4.0	TOK 530 (13 LMi)	09h 43m 55.0s	35° 00' 04"	6.16 / 8.31	336.70 / 205
NGC3953	11h 54m 50.8s	+52° 12' 49"	10.1	Galaxy	6.9 x 3.6	ARN 71 AD	09h 22m 06.7s	51° 10' 49"	6.19 / 7.89	230.40 / 51
NGC3675	11h 27m 13.3s	+43° 28' 34"	10.2	Galaxy	5.9 x 3.1	S 574 (<i>ε</i> Cnc)	08h 41m 35.7s	19° 28' 22"	6.28 / 7.48	134.0 / 250
NGC4051	12h 04m 10.7s	+44° 25' 14"	10.2	Galaxy	5.2 x 3.9	ENG 37 AB (39 Cnc)	08h 41m 14.9s	19° 56' 09"	6.47 / 6.58	151.80 / 150
NGC4278	12h 21m 06.9s	+29° 10' 10"	10.2	Galaxy	3.8	HJ 460 AC	08h 53m 40.9s	28° 10' 58"	6.47 / 6.04	276.80 / 20
NGC4395	12h 26m 48.3s	+33° 26' 10"	10.2	Galaxy	13.2 x 11.0	STTA 108 AB (MN UMa)	11h 13m 37.4s	35° 42' 19"	6.48 / 7.32	161.70 / 68
NGC2419 CALDWELL 25 - Intergalactic wanderer	07h 39m 29.6s	+38° 50' 09"	10.3	Globular cluster	4.6	STF 1254 AC	08h 41m 30.8s	19° 35' 53"	6.52 / 7.61	64.0 / 343
NGC2681	08h 54m 58.1s	+51° 14' 11"	10.3	Galaxy	3.6 x 3.3	STF 1561 AD	11h 39m 48.9s	44° 59' 51"	6.53 / 7.56	710.60 / 77
NGC3198	10h 21m 07.8s	+45° 26' 56"	10.3	Galaxy	8.5 x 3.3	STF 1520	11h 17m 12.1s	52° 39' 49"	6.54 / 7.81	12.40 / 344
NGC3227	10h 24m 35.8s	+19° 45' 49"	10.3	Galaxy	4.1 x 3.9	BU 584 DC	08h 40m 59.7s	19° 28' 09"	6.67 / 7.47	99.50 / 89
NGC3489	11h 01m 21.6s	+13° 47' 35"	10.3	Galaxy	3.6 x 2.2	STF 1579 AB,D	11h 56m 08.0s	46° 21' 56"	6.68 / 6.97	63.70 / 113
NGC3941	11h 53m 57.4s	+36° 52' 32"	10.3	Galaxy	3.5 x 2.5	FOR 1 BC	12h 03m 30.2s	42° 58' 22"	6.72 / 8.47	221.80 / 336
NGC3631	11h 22m 10.1s	+53° 03' 36"	10.4	Galaxy	5.0 x 3.7	STTA 89	07h 52m 16.0s	31° 33' 41"	6.83 / 7.69	76.80 / 84
NGC3726	11h 34m 25.6s	+46° 55' 02"	10.4	Galaxy	6.0 x 4.1	Main variable stars				
NGC3938	11h 53m 51.5s	+44° 00' 36"	10.4	Galaxy	5.4 x 4.9	Name	RA (J2020.0)	DEC	Magnitude	
NGC4244 CALDWELL 26	12h 18m 29.8s	+37° 41' 48"	10.4	Galaxy	16.6 x 1.9	Sky2000Master 8550066	08h 56m 30.3s	17° 09' 14"	6.2	
NGC4274	12h 20m 51.0s	+29° 30' 10"	10.4	Galaxy	6.8 x 2.4	Sky2000Master 11270120	11h 28m 55.6s	45° 04' 29"	6.8	
NGC3486	11h 01m 29.3s	+28° 52' 04"	10.5	Galaxy	7.1 x 5.2	Sky2000Master 10450058	10h 46m 30.7s	45° 27' 39"	7.0	
NGC3893	11h 49m 41.1s	+48° 36' 01"	10.5	Galaxy	4.5 x 2.8	Sky2000Master 7280051	07h 29m 38.7s	45° 56' 54"	7.4	
NGC4088	12h 06m 35.2s	+50° 25' 45"	10.6	Galaxy	5.6 x 2.1	Sky2000Master 7490071	07h 50m 30.0s	23° 40' 59"	8.2	
NGC4314	12h 23m 31.8s	+29° 47' 06"	10.6	Galaxy	4.2 x 3.7	Sky2000Master 9450092	09h 46m 45.9s	34° 25' 08"	8.4	
NGC4111	12h 08m 03.6s	+42° 57' 19"	10.7	Galaxy	4.6 x 1.0	Navigation map				
NGC4251	12h 19m 08.7s	+28° 03' 52"	10.7	Galaxy	3.6 x 1.5	Chart 2 (12h, 70°) Draco, Ursa Major				
NGC3245	10h 28m 25.4s	+28° 24' 19"	10.8	Galaxy	3.2 x 1.8	Chart 6 (10h, 35°) Leo Minor, Ursa Major				
NGC3310	10h 39m 59.5s	+53° 23' 56"	10.8	Galaxy	3.1 x 2.4	Chart 13 (11h, 0°) Leo, Sextans				
NGC3608	11h 18m 02.1s	+18° 02' 19"	10.8	Galaxy	3.2 x 2.6	Chart 5 (6h, 35°) Auriga, Gemini				
NGC3665	11h 25m 48.3s	+38° 39' 11"	10.8	Galaxy	4.3 x 3.3					
NGC3718	11h 33m 40.3s	+52° 57' 24"	10.8	Galaxy	8.1 x 4.0					
NGC4026	12h 00m 26.5s	+50° 51' 02"	10.8	Galaxy	5.2 x 1.3					
NGC4151	12h 11m 32.7s	+39° 17' 44"	10.8	Galaxy	6.3 x 4.5					
NGC4242	12h 18m 29.4s	+45° 30' 29"	10.8	Galaxy	5.2 x 4.0					
NGC4618	12h 42m 30.2s	+41° 02' 30"	10.8	Galaxy	4.2 x 3.4					
NGC2859	09h 25m 31.6s	+34° 25' 35"	10.9	Galaxy	4.6 x 4.1					
NGC3193	10h 19m 30.9s	+21° 47' 36"	10.9	Galaxy	2.0					
NGC4096	12h 07m 01.6s	+47° 21' 52"	10.9	Galaxy	6.5 x 1.8					
NGC4143	12h 10m 36.6s	+42° 25' 24"	10.9	Galaxy	2.3 x 1.4					
NGC4203	12h 16m 05.3s	+33° 05' 11"	10.9	Galaxy	3.5 x 3.2					
NGC3414	10h 52m 21.8s	+27° 52' 07"	11.0	Galaxy	3.5 x 2.6					

Main objects visible on chart 6



Chart legend

Chart 6, 30° around 10.0h , 35.0° (Leo Minor, Ursa Major, Lynx, Cancer)



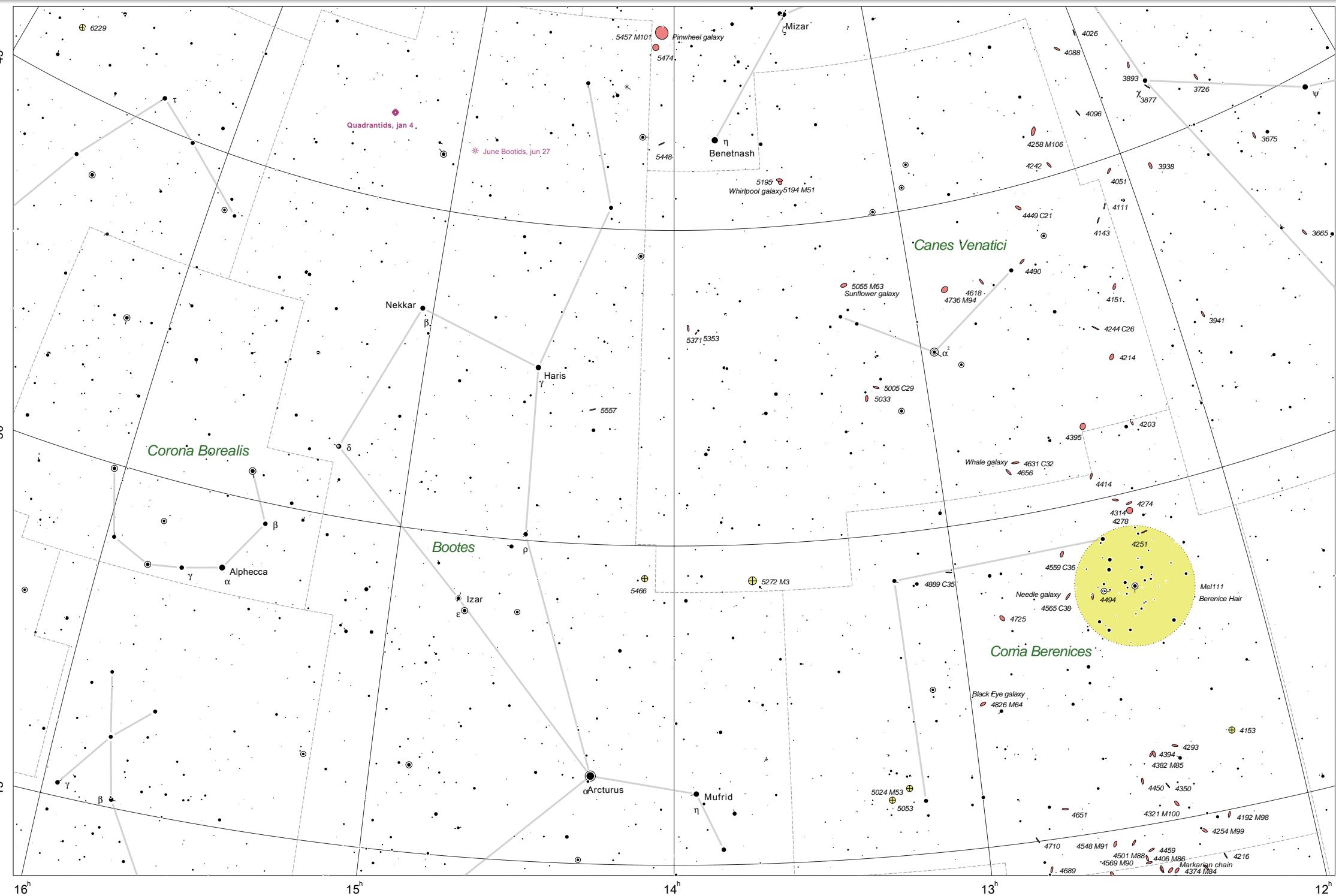
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Mel111 - Berenice Hair	12h 23m 30.2s	+25° 44' 21"	2.7	Open cluster	4.58°	STF 1744 AB (Mizar, Alcor)	13h 24m 42.8s	54° 49' 18"	2.23 / 3.88	14.60 / 153
NGC5272 M3	13h 43m 06.5s	+28° 16' 33"	6.3	Globular cluster	18.0	STF 1744 AC	13h 24m 42.8s	54° 49' 18"	2.23 / 4.01	706.90 / 70
NGC5024 M53	13h 13m 54.0s	+18° 03' 51"	7.7	Globular cluster	13.0	SMR 4 AD	13h 24m 42.8s	54° 49' 18"	2.23 / 7.62	493.20 / 100
NGC5457 M101 - Pinwheel galaxy	14h 03m 54.8s	+54° 15' 14"	7.9	Galaxy	28.8 x 26.9	STF 1692 AB (α_2 CVn)	12h 56m 58.4s	38° 12' 37"	2.85 / 5.52	19.30 / 229
NGC4736 M94	12h 51m 49.4s	+41° 00' 46"	8.2	Galaxy	14.4 x 12.1	STFA 27 AB (δ Boo)	15h 16m 18.3s	33° 14' 30"	3.56 / 7.89	105.0 / 78
NGC4258 M106	12h 19m 56.9s	+47° 11' 46"	8.4	Galaxy	18.6 x 7.2	STFA 28 AB (Alkalouros)	15h 25m 15.6s	37° 18' 26"	4.33 / 7.09	108.20 / 171
NGC5194 M51 - Whirlpool galaxy	13h 30m 43.0s	+47° 05' 34"	8.4	Galaxy	11.2 x 6.9	STF 1821 AB (κ_2 Boo)	14h 14m 11.8s	51° 41' 50"	4.53 / 6.62	13.70 / 236
NGC4826 M64 - Black Eye galaxy	12h 57m 42.7s	+21° 34' 31"	8.5	Galaxy	10.0 x 5.4	STFA 26 AB (Asellus secondus)	14h 16m 52.8s	51° 16' 29"	4.76 / 7.39	38.90 / 33
NGC5055 M63 - Sunflower galaxy	13h 16m 42.6s	+41° 55' 40"	8.6	Galaxy	12.6 x 7.2	STF 1657 (24 Com)	12h 36m 08.1s	18° 16' 01"	5.11 / 6.33	20.40 / 272
NGC4406 M86	12h 27m 12.3s	+12° 50' 09"	8.9	Galaxy	8.9 x 5.8	STFA 21 AB (17 Com)	12h 29m 54.8s	25° 48' 08"	5.23 / 6.64	144.90 / 250
NGC5053	13h 17m 25.7s	+17° 35' 37"	9.0	Globular cluster	10.0	FOR 1 AB (67 UMa)	12h 03m 08.2s	42° 56' 03"	5.24 / 6.72	273.60 / 62
NGC4374 M84 - Markarian chain	12h 26m 04.4s	+12° 46' 35"	9.1	Galaxy	6.5 x 5.6	ARN 5 AC	12h 03m 08.2s	42° 56' 03"	5.24 / 8.47	375.30 / 25
NGC4382 M85	12h 26m 24.4s	+18° 04' 49"	9.1	Galaxy	7.1 x 5.5	STF 1543 AD	11h 30m 08.4s	39° 13' 36"	5.36 / 7.73	343.70 / 253
NGC4631 CALDWELL 32 - Whale galaxy	12h 43m 06.0s	+32° 25' 56"	9.2	Galaxy	15.2 x 2.8	STFA 29 AB (ν_1 CrB)	16h 23m 06.2s	33° 45' 12"	5.39 / 5.58	354.70 / 164
NGC5466	14h 06m 21.2s	+28° 26' 24"	9.2	Globular cluster	9.0	HJL 1087 (22 Boo)	14h 27m 22.9s	19° 08' 16"	5.43 / 8.38	224.40 / 254
NGC4321 M100	12h 23m 55.6s	+15° 42' 43"	9.4	Galaxy	7.5 x 6.1	STF 1772 AD	13h 41m 37.4s	19° 51' 18"	5.76 / 7.38	208.40 / 1
NGC4725	12h 51m 25.2s	+25° 23' 29"	9.4	Galaxy	10.7 x 7.6	STFA 24 AB (17 CVn)	13h 10m 58.1s	38° 23' 34"	5.95 / 6.26	275.60 / 296
NGC6229	16h 47m 32.7s	+47° 29' 37"	9.4	Globular cluster	4.5	BUP 143 AC	12h 31m 00.0s	51° 25' 31"	6.21 / 8.45	217.50 / 333
NGC4569 M90	12h 37m 50.5s	+13° 03' 14"	9.5	Galaxy	9.5 x 4.4	BGH 46 AB	13h 17m 30.3s	19° 40' 49"	6.46 / 7.59	203.10 / 58
NGC4449 CALDWELL 21	12h 29m 09.6s	+43° 59' 04"	9.6	Galaxy	6.2 x 4.4	STFA 23 AB (32 Com)	12h 53m 11.6s	16° 57' 56"	6.50 / 6.99	196.30 / 51
NGC4501 M88	12h 32m 59.5s	+14° 18' 34"	9.6	Galaxy	6.8 x 3.7	STF 1561 AD	11h 39m 48.9s	44° 59' 51"	6.53 / 7.56	710.60 / 77
NGC4565 CALDWELL 38 - Needle galaxy	12h 37m 19.9s	+25° 52' 40"	9.6	Galaxy	15.8 x 2.1	STF 1579 AB,D	11h 56m 08.0s	46° 21' 56"	6.68 / 6.97	63.70 / 113
NGC5195	13h 30m 49.6s	+47° 09' 53"	9.6	Galaxy	5.9 x 4.6	STF 1919	15h 13m 37.5s	19° 12' 43"	6.71 / 7.38	23.40 / 11
NGC4214	12h 16m 38.9s	+36° 12' 59"	9.8	Galaxy	8.0 x 6.6	FOR 1 BC	12h 03m 30.2s	42° 58' 22"	6.72 / 8.47	221.80 / 336
NGC4490	12h 31m 34.4s	+41° 31' 57"	9.8	Galaxy	6.4 x 3.2	ARN 8 AB,D	13h 33m 45.1s	34° 48' 18"	6.81 / 8.40	351.60 / 259
NGC5005 CALDWELL 29	13h 11m 51.4s	+36° 57' 09"	9.8	Galaxy	5.8 x 2.9	Main variable stars				
NGC4254 M99	12h 19m 50.2s	+14° 18' 24"	9.9	Galaxy	5.3 x 4.6	Name	RA (J2020.0)	DEC	Magnitude	
NGC4216	12h 16m 55.1s	+13° 02' 12"	10.0	Galaxy	8.1 x 1.8	Sky2000Master 12450020	12h 46m 04.0s	45° 19' 52"	5.3	
NGC4559 CALDWELL 36	12h 36m 57.1s	+27° 50' 59"	10.0	Galaxy	10.7 x 4.4	Sky2000Master 12540134	12h 55m 51.1s	47° 05' 19"	5.8	
NGC4192 M98	12h 14m 48.9s	+14° 47' 18"	10.1	Galaxy	9.8 x 2.8	Sky2000Master 11270120	11h 28m 55.6s	45° 04' 29"	6.8	
NGC4414	12h 27m 26.7s	+31° 06' 47"	10.1	Galaxy	4.4 x 3.0	Sky2000Master 13560022	13h 57m 04.6s	25° 49' 17"	6.8	
NGC4450	12h 29m 29.8s	+16° 58' 25"	10.1	Galaxy	5.4 x 4.1	Sky2000Master 13190145	13h 20m 19.9s	45° 25' 21"	7.5	
NGC3675	11h 27m 13.3s	+43° 28' 34"	10.2	Galaxy	5.9 x 3.1	Sky2000Master 15180029	15h 19m 00.3s	31° 34' 30"	7.8	
NGC4051	12h 04m 10.7s	+44° 25' 14"	10.2	Galaxy	5.2 x 3.9	Navigation map				
NGC4278	12h 21m 06.9s	+29° 10' 10"	10.2	Galaxy	3.8	Chart 2 (12h, 70°) Draco, Ursa Major				
NGC4395	12h 26m 48.3s	+33° 26' 10"	10.2	Galaxy	13.2 x 11.0	Chart 7 (14h, 35°) Canes Venatici, Bootes				
NGC4438 - The Eyes	12h 28m 46.3s	+12° 53' 53"	10.2	Galaxy	8.5 x 3.0	Chart 14 (14h, 0°) Virgo, Bootes				
NGC4473	12h 30m 49.4s	+13° 19' 10"	10.2	Galaxy	4.5 x 2.5	Chart 6 (10h, 35°) Leo Minor, Ursa Major				
NGC4548 M91	12h 36m 26.8s	+14° 23' 11"	10.2	Galaxy	5.2 x 4.2					
NGC5033	13h 14m 23.2s	+36° 29' 16"	10.2	Galaxy	10.7 x 5.0					
NGC3941	11h 53m 57.4s	+36° 52' 32"	10.3	Galaxy	3.5 x 2.5					
NGC3726	11h 34m 25.6s	+46° 55' 02"	10.4	Galaxy	6.0 x 4.1					
NGC3938	11h 53m 51.5s	+44° 00' 36"	10.4	Galaxy	5.4 x 4.9					
NGC4153	12h 11m 07.3s	+18° 25' 53"	10.4	Globular cluster	4.4					
NGC4244 CALDWELL 26	12h 18m 29.8s	+37° 41' 48"	10.4	Galaxy	16.6 x 1.9					
NGC4274	12h 20m 51.0s	+29° 30' 10"	10.4	Galaxy	6.8 x 2.4					
NGC4293	12h 22m 13.6s	+18° 16' 19"	10.4	Galaxy	5.6 x 2.6					
NGC4459	12h 30m 00.6s	+13° 52' 05"	10.4	Galaxy	3.5 x 2.7					
NGC4477	12h 31m 02.6s	+13° 31' 36"	10.4	Galaxy	3.7 x 3.3					

Main objects visible on chart 7



Chart legend

Chart 7, 30° around 14.0h , 35.0° (Canes Venatici, Bootes, Ursa Major, Coma Berenices)



Main double stars

Name	RA (J2020.0)	DEC	Magnitude	Sep (") / PA (°)
NGC6888 CALDWELL 27 - Crescent nebula	20h 12m 50.3s	+38° 24' 57"		Nebula 18.0 x 13.0
Col399	19h 26m 16.3s	+20° 13' 27"	3.6	Open cluster 60.0
NGC7000 CALDWELL 20 - North America nebula	21h 00m 00.9s	+44° 35' 43"	5.0	Nebula 2.0° x 1.67°
NGC6871	20h 07m 12.1s	+35° 50' 55"	5.2	Open cluster 30.0
Stock1	19h 36m 38.0s	+25° 15' 43"	5.3	Open cluster 60.0
Cr419	20h 18m 42.7s	+40° 36' 48"	5.4	Open cluster 45.0
NGC6205 M13 - Hercules cluster	16h 42m 24.4s	+36° 25' 25"	5.8	Globular cluster 20.0
NGC6341 M92	17h 17m 44.2s	+43° 06' 59"	6.5	Globular cluster 14.0
NGC6913 M29	20h 24m 50.3s	+38° 33' 32"	6.6	Open cluster 10.0
NGC6811	19h 37m 45.5s	+46° 25' 17"	6.8	Open cluster 15.0
NGC6823	19h 44m 01.1s	+23° 20' 55"	7.1	Open cluster 7.0
NGC6819	19h 41m 59.1s	+40° 13' 52"	7.3	Open cluster 5.0
IC4996	20h 17m 16.1s	+37° 42' 20"	7.3	Open cluster 7.0
NGC6853 M27 - Dumbbell nebula	20h 00m 28.1s	+22° 46' 38"	7.4	Planetary nebula 6.7
NGC6910	20h 23m 54.8s	+40° 50' 38"	7.4	Open cluster 10.0
NGC6866	20h 04m 34.3s	+44° 12' 60"	7.6	Open cluster 7.0
NGC6834	19h 53m 00.7s	+29° 27' 38"	7.8	Open cluster 6.0
NGC6830	19h 51m 51.4s	+23° 09' 07"	7.9	Open cluster 6.0
NGC6883	20h 12m 03.3s	+35° 54' 38"	8.0	Open cluster 35.0
NGC6885 CALDWELL 37	20h 12m 48.3s	+26° 32' 39"	8.1	Open cluster 20.0
NGC6779 M56	19h 17m 22.3s	+30° 13' 19"	8.4	Globular cluster 8.8
NGC6838 M71	19h 54m 39.6s	+18° 49' 56"	8.4	Globular cluster 7.2
NGC6210	16h 45m 19.9s	+23° 45' 53"	8.8	Planetary nebula 21.0"
NGC6720 M57 - Ring nebula	18h 54m 19.7s	+33° 03' 20"	8.8	Planetary nebula 3.0 x 2.4
NGC6802	19h 31m 28.4s	+20° 18' 17"	8.8	Open cluster 5.0
NGC6826 CALDWELL 15 - Blinking planetary	19h 45m 20.6s	+50° 34' 29"	8.8	Planetary nebula 36.0"
NGC6229	16h 47m 32.7s	+47° 29' 37"	9.4	Globular cluster 4.5
NGC6791	19h 21m 34.8s	+37° 48' 46"	9.5	Open cluster 10.0
NGC6996	20h 57m 12.0s	+45° 33' 03"	10.0	Open cluster 5.0
NGC6997	20h 57m 12.6s	+44° 43' 40"	10.0	Open cluster 8.0
IC4593	16h 12m 40.9s	+12° 01' 17"	10.7	Planetary nebula 42.0"
NGC6766	20h 11m 01.5s	+46° 31' 18"	10.9	Planetary nebula 15.0"
NGC6793	19h 24m 03.9s	+22° 11' 50"	11.0	Open cluster 7.0
NGC6874	20h 08m 31.6s	+38° 17' 33"	11.0	Open cluster 7.0

Main variable stars

Name	RA (J2020.0)	DEC	Magnitude
Sheliak (β Lyr)	18h 50m 49.1s	33° 23' 13"	3.5
Sky2000Master 18550078	18h 55m 56.6s	43° 58' 24"	4.2
Sky2000Master 20170173	20h 18m 31.5s	38° 05' 46"	4.8
Sky2000Master 18380021	18h 38m 46.1s	39° 41' 13"	6.1
Sky2000Master 19240136	19h 25m 04.6s	50° 16' 54"	6.2
Sky2000Master 19180182	19h 19m 40.9s	19° 38' 54"	6.5

Navigation map

Chart 3 (20h, 70°)
Draco, Cepheus

Chart 8 (18h, 35°)
Hercules, Lyra

Chart 7 (14h, 35°)
Canes Venatici, Boötes

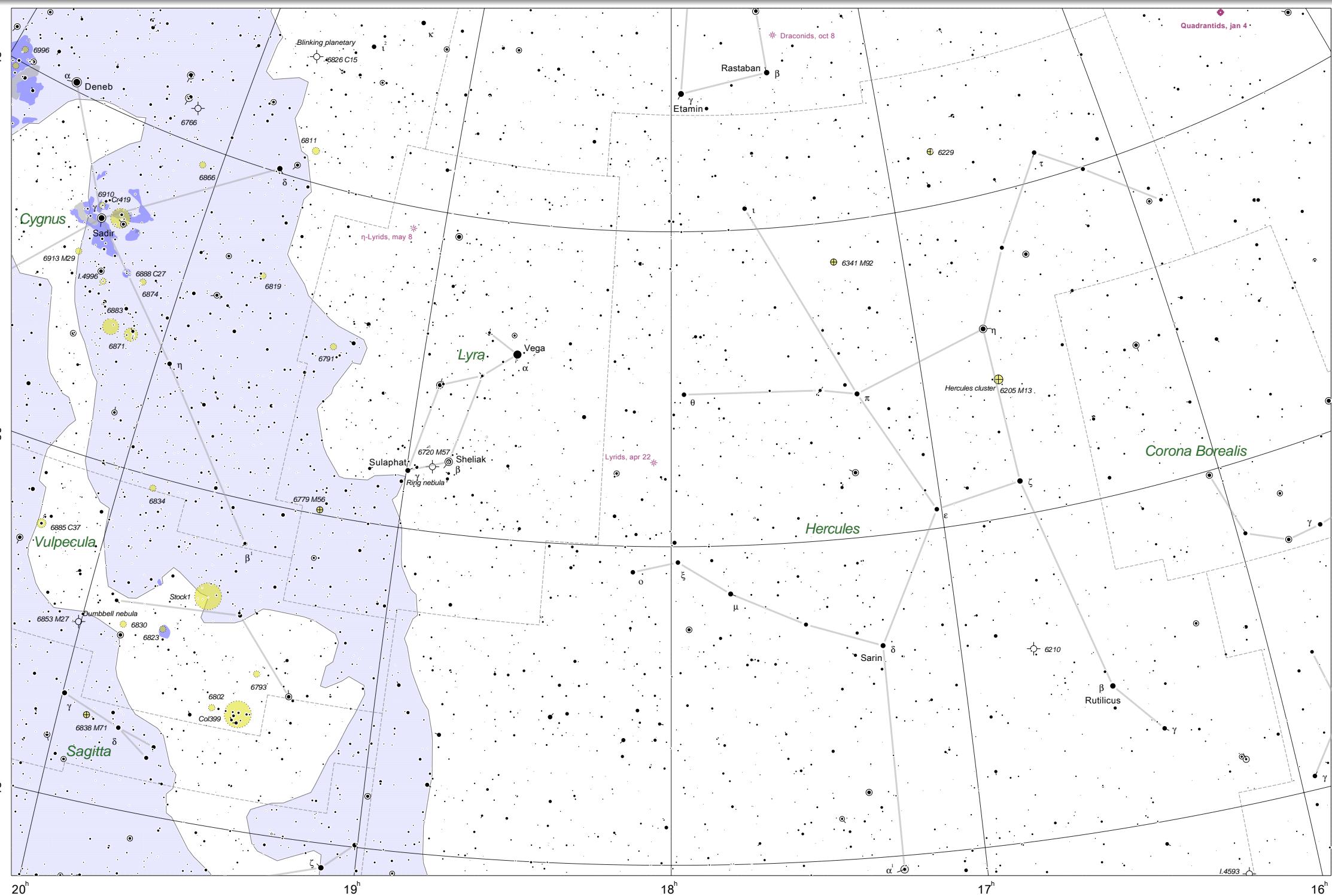
Chart 15 (17h, 0°)
Ophiuchus, Hercules

Main objects visible on chart 8

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary											
-1	0	1	2	3	4	5	6	.	.	8	Double	Variable	Open cluster	Globular	Nebulose	Milky Way	Plan.neb.	Galaxy	Constellation	Const. limit	Meteors

Chart leyend

Chart 8, 30° around 18.0h , 35.0° (Hercules, Lyra, Cygnus, Draco)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
IC5146 CALDWELL 19 - Cocoon nebula	21h 54m 10.3s	+47° 21' 42"		Nebula	10.0	STFA 50 AC	20h 14m 15.8s	46° 48' 10"	3.93 / 6.97	108.60 / 173
NGC6992 CALDWELL 33	20h 57m 07.6s	+31° 49' 09"		Nebula	60.0 x 8.0	STFA 50 AD	20h 14m 15.8s	46° 48' 10"	3.93 / 4.83	336.70 / 322
NGC6960 CALDWELL 34 - Veil nebula	20h 46m 31.6s	+30° 47' 26"		Nebula	70.0 x 6.0	S 743 (32 Cyg)	20h 16m 05.1s	47° 46' 35"	4.16 / 8.36	208.50 / 175
NGC6888 CALDWELL 27 - Crescent nebula	20h 12m 50.3s	+38° 24' 57"		Nebula	18.0 x 13.0	STF 2822 AD	21h 45m 02.3s	28° 50' 06"	4.75 / 6.94	196.90 / 44
NGC224 M31 - Andromeda nebula	00h 43m 50.2s	+41° 22' 42"	3.4	Galaxy	3.15° x 1.03°	GUI 30 DC	20h 13m 55.7s	46° 52' 37"	4.83 / 6.97	431.80 / 150
NGC7092 M39	21h 32m 35.4s	+48° 30' 50"	4.6	Open cluster	31.0	ENG 72 AB (29 Cyg)	20h 15m 16.9s	36° 52' 05"	4.96 / 6.71	215.30 / 155
NGC7000 CALDWELL 20 - North America nebula	21h 00m 00.9s	+44° 35' 43"	5.0	Nebula	2.0° x 1.67°	WNO 56 AF	19h 47m 11.5s	33° 46' 39"	5.06 / 8.48	792.0 / 235
NGC6871	20h 07m 12.1s	+35° 50' 55"	5.2	Open cluster	30.0	STF 2758 AB (61 Cyg)	21h 07m 40.8s	38° 49' 50"	5.20 / 6.05	31.80 / 153
Cr419	20h 18m 42.7s	+40° 36' 48"	5.4	Open cluster	45.0	STF 2922 AB (8 Lac)	22h 36m 45.6s	39° 44' 18"	5.66 / 6.29	22.30 / 185
NGC7686	23h 31m 04.8s	+49° 14' 41"	5.6	Open cluster	15.0	A 1469 AE	22h 36m 45.6s	39° 44' 18"	5.66 / 7.25	335.20 / 239
NGC6940	20h 35m 22.6s	+28° 20' 60"	6.3	Open cluster	25.0	S 799 AB (79 Cyg)	21h 44m 15.7s	38° 22' 33"	5.69 / 7.00	149.50 / 60
NGC7243 CALDWELL 16	22h 15m 56.0s	+49° 59' 51"	6.4	Open cluster	30.0	STFA 46 AB (16 Cyg)	19h 42m 21.2s	50° 34' 25"	6.00 / 6.23	39.80 / 134
NGC6913 M29	20h 24m 50.3s	+38° 33' 32"	6.6	Open cluster	10.0	STF 2822 BD	21h 45m 01.3s	28° 50' 08"	6.18 / 6.94	196.70 / 45
NGC6811	19h 37m 45.5s	+46° 25' 17"	6.8	Open cluster	15.0	H 5 137 AB	19h 46m 35.7s	35° 03' 45"	6.22 / 8.18	38.90 / 26
NGC7063	21h 25m 11.1s	+36° 34' 24"	7.0	Open cluster	9.0	BOT 3 AC	19h 46m 35.7s	35° 03' 45"	6.22 / 8.25	443.80 / 76
NGC7082	21h 30m 00.9s	+47° 12' 54"	7.2	Open cluster	24.0	STFA 53 AB (48 Cyg)	20h 38m 20.8s	31° 38' 36"	6.29 / 6.54	182.70 / 177
NGC6819	19h 41m 59.1s	+40° 13' 52"	7.3	Open cluster	5.0	A 1469 BE	22h 36m 45.6s	39° 43' 55"	6.29 / 7.25	324.0 / 242
IC4996	20h 17m 16.1s	+37° 42' 20"	7.3	Open cluster	7.0	STF 2578 AB	19h 46m 24.1s	36° 08' 27"	6.37 / 7.04	14.90 / 125
NGC6853 M27 - Dumbbell nebula	20h 00m 28.1s	+22° 46' 38"	7.4	Planetary nebula	6.7	STTA 207 AC	20h 23m 36.3s	43° 02' 55"	6.41 / 8.01	85.80 / 65
NGC6910	20h 23m 54.8s	+40° 50' 38"	7.4	Open cluster	10.0	STF 2841 A,BC	21h 55m 13.5s	19° 48' 47"	6.45 / 7.99	22.20 / 108
NGC6866	20h 04m 34.3s	+44° 12' 60"	7.6	Open cluster	7.0	BU 1138 AC	21h 03m 31.3s	45° 55' 43"	6.46 / 7.82	152.10 / 330
NGC7039	21h 11m 55.1s	+45° 43' 57"	7.6	Open cluster	15.0	STTA 215 AC	21h 11m 12.7s	47° 46' 29"	6.55 / 7.52	136.70 / 189
NGC7209	22h 05m 56.0s	+46° 34' 52"	7.7	Open cluster	15.0	STF 2637 AC	20h 10m 49.9s	20° 58' 29"	6.56 / 7.52	91.30 / 222
NGC6834	19h 53m 00.7s	+29° 27' 38"	7.8	Open cluster	6.0	STFA 55 AB	21h 24m 36.7s	37° 26' 17"	6.61 / 6.61	364.10 / 304
NGC6830	19h 51m 51.4s	+23° 09' 07"	7.9	Open cluster	6.0	STF 2769 AB	21h 11m 26.1s	22° 32' 14"	6.65 / 7.42	18.20 / 300
NGC205 M110	00h 41m 27.8s	+41° 47' 41"	8.1	Galaxy	19.5 x 11.5					
NGC221 M32	00h 43m 47.6s	+40° 58' 31"	8.1	Galaxy	8.5 x 6.5					
NGC6885 CALDWELL 37	20h 12m 48.3s	+26° 32' 39"	8.1	Open cluster	20.0					
Stock12	23h 36m 33.8s	+52° 47' 39"	8.1	Open cluster	20.0					
NGC7062	21h 24m 11.2s	+46° 27' 54"	8.3	Open cluster	5.0					
NGC7662 CALDWELL 22 - Blue snowball	23h 26m 51.8s	+42° 38' 45"	8.3	Planetary nebula	37.2"					
NGC6838 M71	19h 54m 39.6s	+18° 49' 56"	8.4	Globular cluster	7.2					
NGC7086	21h 31m 08.5s	+51° 41' 21"	8.4	Open cluster	12.0					
NGC7027	21h 07m 46.6s	+42° 19' 04"	8.5	Planetary nebula	18.0" x 12.0"					
NGC6826 CALDWELL 15 - Blinking planetary	19h 45m 20.6s	+50° 34' 29"	8.8	Planetary nebula	36.0"					
IC1369	21h 12m 50.8s	+47° 50' 58"	8.8	Open cluster	5.0					
IC1434	22h 11m 15.3s	+52° 55' 56"	9.0	Open cluster	7.0					
NGC7296	22h 28m 50.0s	+52° 23' 27"	9.0	Open cluster	4.0					
NGC7031	21h 07m 31.0s	+50° 55' 28"	9.1	Open cluster	15.0					
IC1442	22h 16m 51.4s	+54° 05' 31"	9.1	Open cluster	5.0					
NGC185 CALDWELL 18	00h 40m 04.3s	+48° 26' 49"	9.2	Galaxy	8.0 x 7.0					
NGC7245	22h 15m 57.1s	+54° 26' 36"	9.2	Open cluster	5.0					
NGC147 CALDWELL 17	00h 34m 17.6s	+48° 37' 02"	9.5	Galaxy	13.2 x 7.8					
NGC6791	19h 21m 34.8s	+37° 48' 46"	9.5	Open cluster	10.0					
NGC7331 CALDWELL 30	22h 38m 00.1s	+34° 31' 28"	9.5	Galaxy	10.2 x 4.2	Chart 4 (2h, 35°) Triangulum, Andromeda				
NGC7067	21h 24m 55.1s	+48° 05' 53"	9.7	Open cluster	3.0					
NGC7128	21h 44m 38.9s	+53° 48' 28"	9.7	Open cluster	4.0					
NGC6996	20h 57m 12.0s	+45° 33' 03"	10.0	Open cluster	5.0					
NGC6997	20h 57m 12.6s	+44° 43' 40"	10.0	Open cluster	8.0					

Main objects visible on chart 9



Chart legend

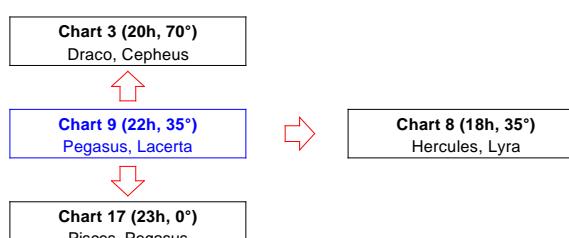
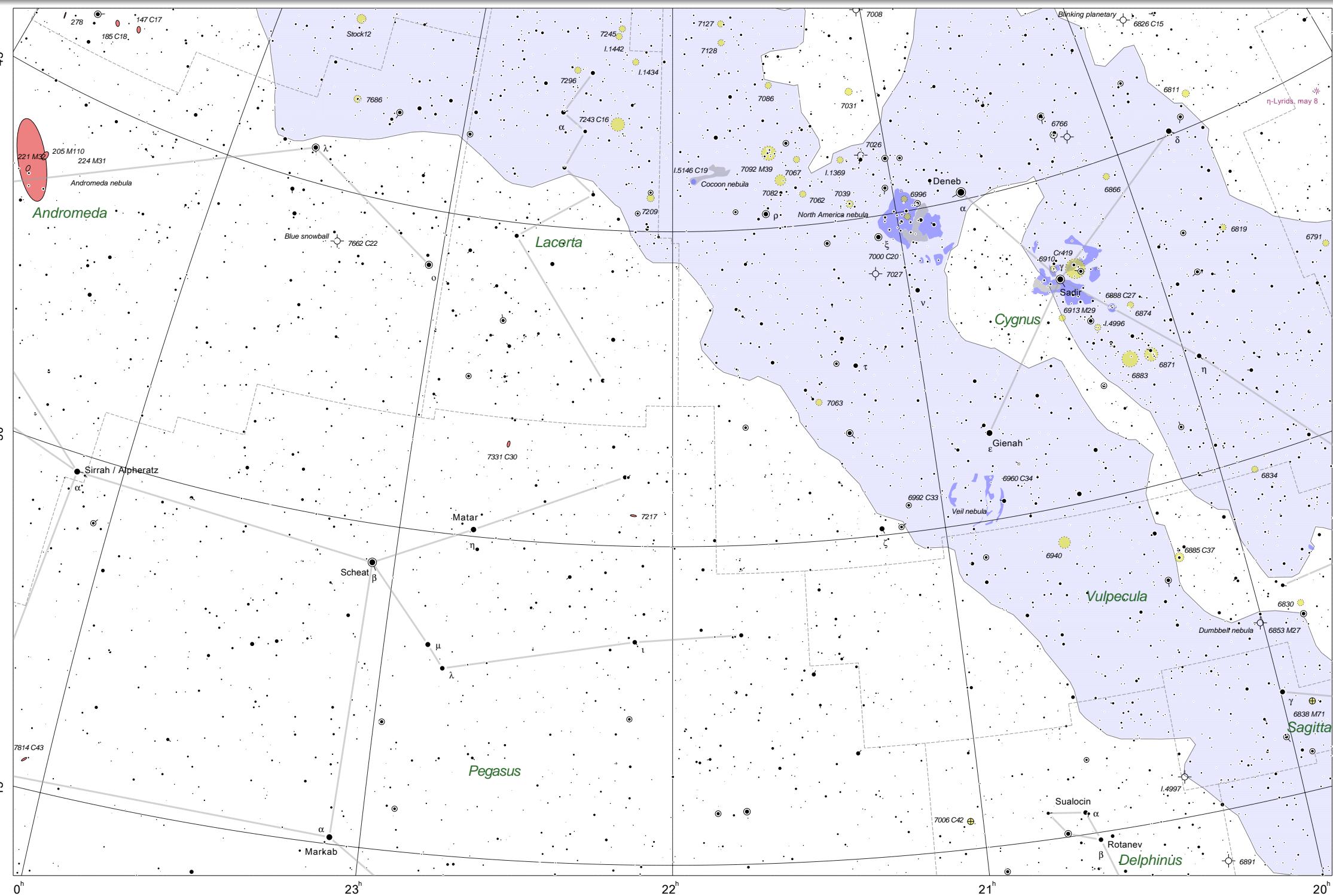


Chart 9, 30° around 22.0h , 35.0° (Pegasus, Lacerta, Cygnus, Vulpecula)



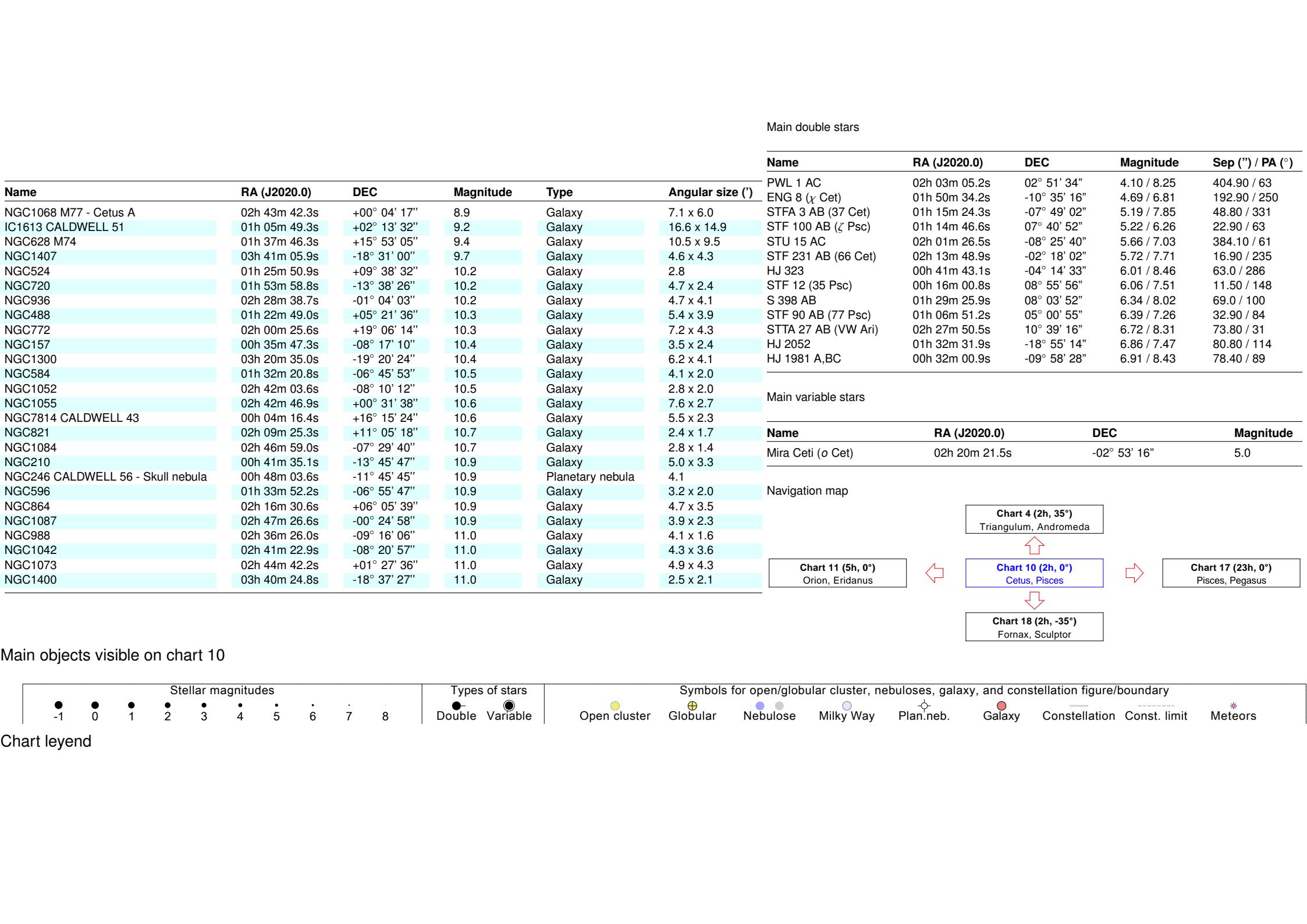
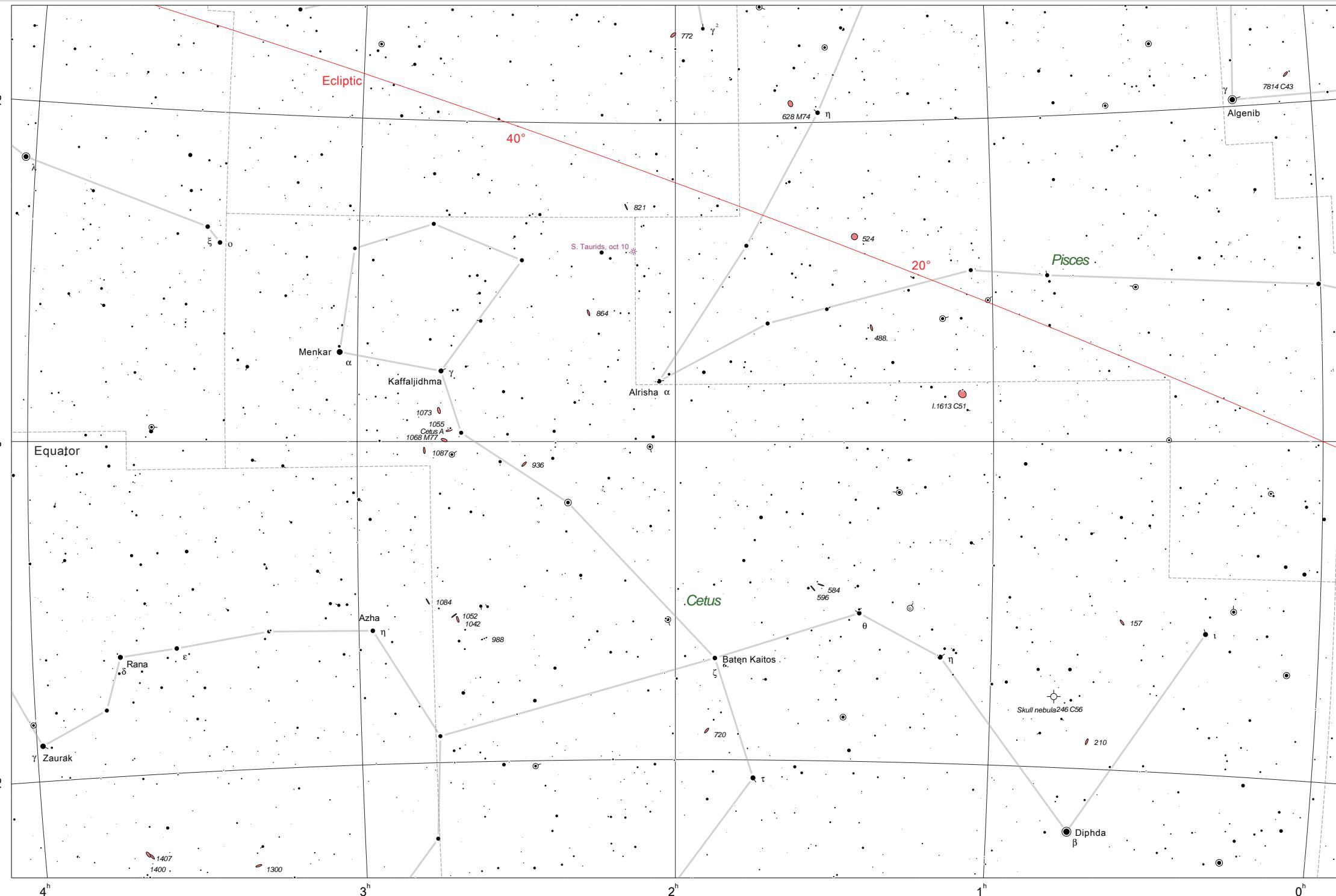


Chart 10, 30° around 2.0h, 0.0° (Cetus, Pisces, Aries, Taurus)



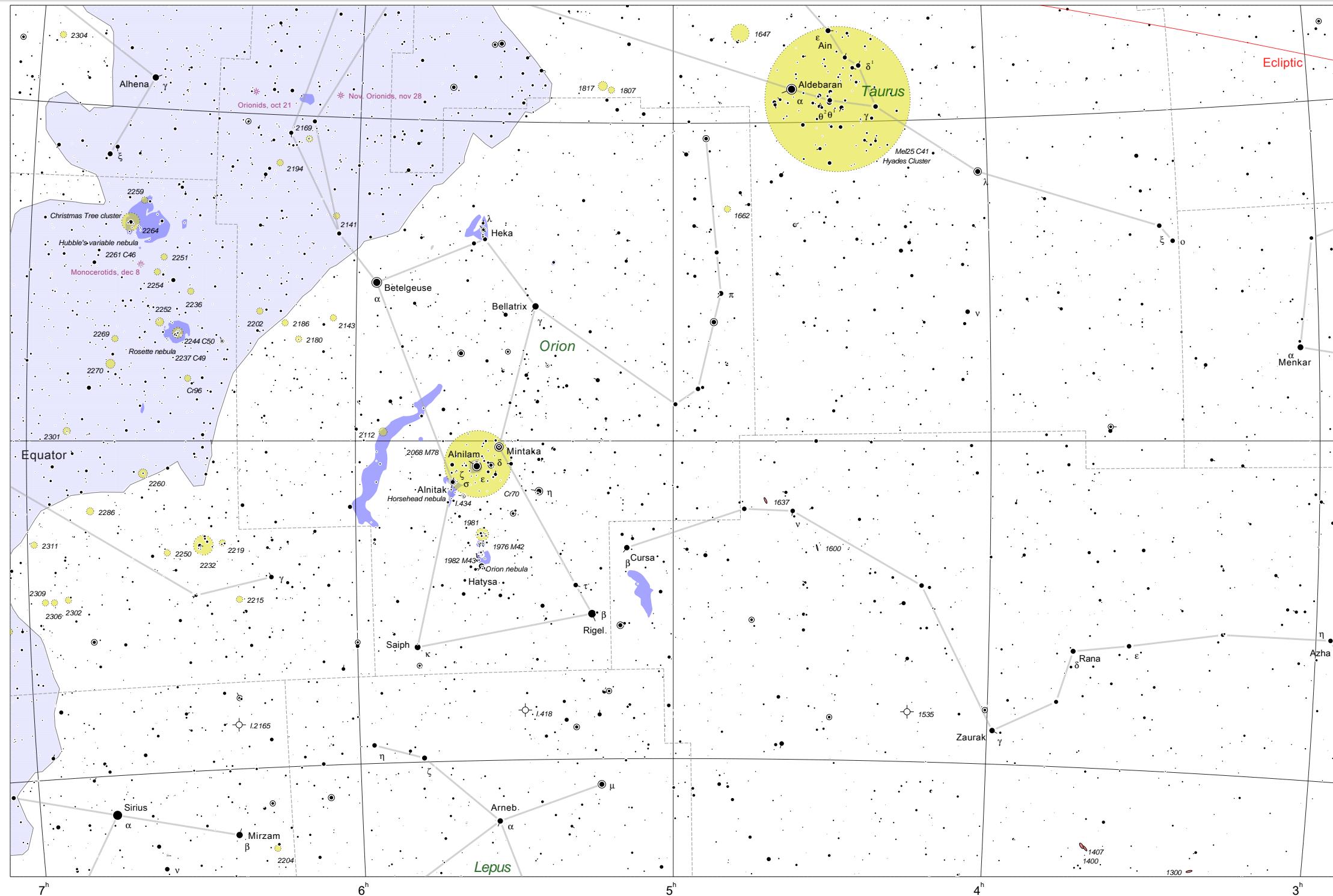
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ("") / PA (°)
IC434 - Horsehead nebula	05h 41m 59.4s	-02° 26' 58"		Nebula	16.0 x 12.0	STFA 14 AC	05h 33m 01.4s	-00° 17' 09"	2.41 / 6.83	56.20 / 4
NGC2261 CALDWELL 46 - Hubble's variable nebula	06h 40m 15.0s	+08° 43' 31"		Nebula	3.0 x 1.0	STF 752 AB (Nair al saif)	05h 36m 24.8s	-05° 53' 54"	2.77 / 7.73	11.40 / 142
NGC2237 CALDWELL 49 - Rosette nebula	06h 31m 58.4s	+05° 01' 57"		Nebula	80.0 x 50.0	STFA 10 AB (θ_2 Tau)	04h 29m 48.5s	15° 54' 50"	3.41 / 3.94	347.90 / 339
Cr70	05h 37m 01.0s	-01° 05' 19"	0.6	Open cluster	2.50° x 1.17°	STF 762 AB,D	05h 39m 45.3s	-02° 35' 24"	3.76 / 6.56	12.80 / 85
Mel25 CALDWELL 41 - Hyades Cluster	04h 28m 08.6s	+16° 02' 37"	1.0	Open cluster	5.50°	STF 762 AB,E	05h 39m 45.3s	-02° 35' 24"	3.76 / 6.34	41.40 / 62
NGC1976 M42 - Orion nebula	05h 36m 16.1s	-05° 22' 43"	4.0	Nebula	40.0 x 35.0	STF 3135 AB,F	05h 39m 45.3s	-02° 35' 24"	3.76 / 7.86	208.0 / 324
NGC2264 - Christmas Tree cluster	06h 42m 04.3s	+09° 52' 32"	4.1	Open cluster	40.0	SHJ 65 AB,H	05h 39m 45.3s	-02° 35' 24"	3.76 / 8.06	306.90 / 125
NGC1981	05h 36m 11.4s	-04° 25' 18"	4.2	Open cluster	28.0	SHJ 65 AB,I	05h 39m 45.3s	-02° 35' 24"	3.76 / 8.44	524.70 / 60
NGC2232	06h 28m 14.3s	-04° 46' 18"	4.2	Open cluster	45.0	SHJ 45 AB (88 Tau)	04h 36m 45.0s	10° 12' 02"	4.27 / 7.84	69.20 / 300
NGC2244 CALDWELL 50	06h 32m 58.8s	+04° 55' 33"	4.8	Open cluster	24.0	STF 900 AB (e Mon)	06h 24m 49.6s	04° 34' 52"	4.42 / 6.64	12.0 / 29
NGC2169	06h 09m 32.4s	+13° 57' 37"	5.9	Open cluster	6.0	STFA 11 (σ_2 Tau)	04h 40m 24.7s	15° 57' 22"	4.69 / 5.09	444.0 / 194
NGC2323 M50	07h 03m 45.5s	-08° 24' 22"	5.9	Open cluster	15.0	STF 747 AB	05h 36m 01.7s	-05° 59' 24"	4.70 / 5.51	36.10 / 224
NGC2301	06h 52m 46.9s	+00° 26' 02"	6.0	Open cluster	15.0	LDS 2246 AB	04h 31m 42.7s	16° 14' 10"	4.78 / 6.54	254.0 / 130
NGC1647	04h 46m 52.5s	+19° 09' 16"	6.4	Open cluster	40.0	STF 696 (23 Ori)	05h 23m 53.1s	03° 33' 44"	4.95 / 6.76	31.50 / 29
NGC1662	04h 49m 33.4s	+10° 57' 50"	6.4	Open cluster	12.0	STFA 16 AB (θ_2 Ori)	05h 36m 22.0s	-05° 24' 16"	5.03 / 6.19	52.40 / 94
NGC1807	05h 11m 55.2s	+16° 32' 12"	7.0	Open cluster	12.0	STFA 16 AC	05h 36m 22.0s	-05° 24' 16"	5.03 / 8.46	128.60 / 99
NGC2251	06h 35m 43.8s	+08° 20' 58"	7.3	Open cluster	10.0	STFA 17 AD	05h 36m 22.0s	-05° 24' 16"	5.03 / 5.06	134.80 / 315
NGC2286	06h 48m 40.2s	-03° 10' 16"	7.5	Open cluster	15.0	WNO 52 AC	05h 25m 34.8s	17° 24' 02"	5.06 / 7.88	706.80 / 252
NGC1817	05h 13m 36.3s	+16° 42' 22"	7.7	Open cluster	20.0	STF 748 CD	05h 36m 15.0s	-05° 22' 41"	5.06 / 6.38	13.30 / 63
NGC2252	06h 36m 15.0s	+05° 24' 11"	7.7	Open cluster	18.0	ARN 36 AC	04h 31m 47.5s	15° 44' 01"	5.48 / 5.70	484.50 / 246
NGC2068 M78	05h 47m 46.5s	+00° 05' 10"	8.3	Nebula	8.0 x 6.0	TOK 252 (63 Eri)	05h 00m 46.8s	-10° 14' 05"	5.48 / 8.47	298.40 / 222
NGC2215	06h 21m 47.3s	-07° 17' 39"	8.4	Open cluster	8.0	STF 855 AB	06h 10m 00.7s	02° 29' 42"	5.68 / 6.68	29.10 / 115
NGC2194	06h 14m 53.5s	+12° 47' 59"	8.5	Open cluster	9.0	SHJ 73 (γ_1 CMa)	06h 37m 15.6s	-18° 40' 40"	5.79 / 7.38	17.30 / 264
NGC2236	06h 30m 44.3s	+06° 48' 58"	8.5	Open cluster	8.0	HJ 3759	05h 26m 52.0s	-19° 40' 45"	5.87 / 7.30	26.60 / 318
NGC2180	06h 10m 39.9s	+04° 42' 26"	8.5	Open cluster	6.0	ARN 37 AC	05h 59m 26.4s	01° 50' 16"	5.92 / 6.94	177.80 / 293
NGC2204	06h 16m 25.5s	-18° 40' 22"	8.6	Open cluster	10.0	Main variable stars				
NGC2186	06h 13m 11.1s	+05° 27' 09"	8.7	Open cluster	5.0	Name	RA (J2020.0)	DEC	Magnitude	
NGC2250	06h 34m 48.9s	-05° 06' 04"	8.9	Open cluster	10.0	Betelgeuse (α Ori)	05h 56m 15.3s	07° 24' 33"	0.6	
NGC2302	06h 52m 54.9s	-07° 06' 35"	8.9	Open cluster	2.5	Lam Tau	04h 01m 47.5s	12° 32' 44"	3.4	
NGC1982 M43	05h 36m 30.4s	-05° 15' 21"	9.0	Nebula	20.0 x 15.0	Sky2000Master 5110066	05h 12m 18.9s	-11° 49' 32"	5.7	
NGC2219	06h 24m 43.6s	-04° 41' 18"	9.0	Open cluster	10.0	Sky2000Master 5300066	05h 31m 23.4s	04° 13' 08"	6.2	
NGC2260	06h 39m 03.8s	-01° 29' 27"	9.0	Open cluster	20.0	Sky2000Master 6250055	06h 26m 17.8s	07° 04' 24"	6.3	
NGC2270	06h 45m 00.8s	+03° 27' 28"	9.0	Open cluster	20.0	Sky2000Master 6220157	06h 23m 44.1s	-02° 12' 25"	6.9	
NGC2112	05h 54m 46.9s	+00° 24' 49"	9.1	Open cluster	18.0	Navigation map				
NGC2254	06h 36m 51.6s	+07° 39' 12"	9.1	Open cluster	6.0	Chart 5 (6h, 35°) Auriga, Gemini				
Cr96	06h 31m 02.8s	+02° 51' 07"	9.1	Open cluster	8.0	Chart 12 (8h, 0°) Canis Minor, Hydra				
IC418	05h 28m 23.8s	-12° 40' 52"	9.3	Planetary nebula	12.0"	Chart 11 (5h, 0°) Orion, Eridanus				
NGC2141	06h 04m 01.4s	+10° 26' 41"	9.4	Open cluster	10.0	Chart 19 (6h, -35°) Columba, Canis Major				
NGC1535	04h 15m 11.9s	-12° 41' 22"	9.6	Planetary nebula	0.8					
NGC2311	06h 58m 46.9s	-04° 38' 22"	9.6	Open cluster	7.0					
NGC1407	03h 41m 05.9s	-18° 31' 00"	9.7	Galaxy	4.6 x 4.3					
NGC2269	06h 44m 20.6s	+04° 36' 12"	10.0	Open cluster	3.0					
NGC2304	06h 56m 21.7s	+17° 57' 42"	10.0	Open cluster	3.0					
NGC2202	06h 17m 55.0s	+05° 59' 18"	10.0	Open cluster	7.0					
NGC2306	06h 55m 27.7s	-07° 13' 30"	10.0	Open cluster						
NGC1300	03h 20m 35.0s	-19° 20' 24"	10.4	Galaxy	6.2 x 4.1	Chart 10 (2h, 0°) Cetus, Pisces				
NGC2309	06h 57m 01.8s	-07° 12' 06"	10.5	Open cluster	5.0					
IC2165	06h 22m 38.1s	-12° 59' 51"	10.5	Planetary nebula	28.2"					
NGC1637	04h 42m 28.4s	-02° 49' 14"	10.8	Galaxy	3.3 x 2.7					
NGC2259	06h 39m 39.9s	+10° 51' 49"	10.8	Open cluster	3.5					

Main objects visible on chart 11



Chart legend

Chart 11, 30° around 5.0h, 0.0° (Orion, Eridanus, Taurus, Lepus)



Main double stars														
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)				
NGC2261 CALDWELL 46 - Hubble's variable nebula	06h 40m 15.0s	+08° 43' 31"		Nebula	3.0 x 1.0	AGC 1 AB (Sirio)	06h 46m 02.6s	-16° 44' 17"	-1.47 / 8.44	11.10 / 70				
NGC2237 CALDWELL 49 - Rosette nebula	06h 31m 58.4s	+05° 01' 57"		Nebula	80.0 x 50.0	STF 900 AB (ϵ Mon)	06h 24m 49.6s	04° 34' 52"	4.42 / 6.64	12.0 / 29				
NGC2632 M44 - Praesepe	08h 41m 32.8s	+19° 35' 53"	3.1	Open cluster	70.0	HJ 1167 (τ_1 Hya)	09h 30m 09.7s	-02° 51' 26"	4.64 / 7.28	67.50 / 4				
NGC2264 - Christmas Tree cluster	06h 42m 04.3s	+09° 52' 32"	4.1	Open cluster	40.0	S 579 AB (F Hya)	08h 44m 38.9s	-07° 18' 24"	4.72 / 8.20	78.80 / 310				
NGC2232	06h 28m 14.3s	-04° 46' 18"	4.2	Open cluster	45.0	SHJ 105 AB (27 Hya)	09h 21m 27.6s	-09° 38' 28"	4.91 / 7.03	229.10 / 211				
NGC2422 M47	07h 37m 30.2s	-14° 31' 32"	4.4	Open cluster	25.0	SHY 204 (α_1 Cnc)	08h 58m 21.7s	15° 14' 41"	5.24 / 5.70	975.60 / 18				
NGC2244 CALDWELL 50	06h 32m 58.8s	+04° 55' 33"	4.8	Open cluster	24.0	STF 855 AB	06h 10m 00.7s	02° 29' 42"	5.68 / 6.68	29.10 / 115				
NGC2548 M48	08h 14m 42.3s	-05° 48' 44"	5.8	Open cluster	30.0	SHJ 73 (ν_1 CMa)	06h 37m 15.6s	-18° 40' 40"	5.79 / 7.38	17.30 / 264				
NGC2169	06h 09m 32.4s	+13° 57' 37"	5.9	Open cluster	6.0	S 585	08h 56m 07.1s	-18° 19' 06"	5.90 / 7.24	64.20 / 151				
NGC2323 M50	07h 03m 45.5s	-08° 24' 22"	5.9	Open cluster	15.0	ARN 37 AC	05h 59m 26.4s	01° 50' 16"	5.92 / 6.94	177.80 / 293				
NGC2301	06h 52m 46.9s	+00° 26' 02"	6.0	Open cluster	15.0	STF 1245 AB	08h 36m 54.9s	06° 33' 01"	5.98 / 7.16	10.10 / 25				
NGC2437 M46	07h 42m 41.9s	-14° 51' 29"	6.1	Open cluster	20.0	STF 1138 AB (2 Pup)	07h 46m 24.2s	-14° 44' 25"	6.00 / 6.73	16.80 / 341				
NGC2539	08h 11m 33.3s	-12° 52' 51"	6.5	Open cluster	15.0	STF 1183 AB	08h 07m 24.8s	-09° 18' 11"	6.22 / 7.77	30.60 / 328				
NGC2343	07h 09m 03.4s	-10° 38' 58"	6.7	Open cluster	6.0	S 574 (ϵ Cnc)	08h 41m 35.7s	19° 28' 22"	6.28 / 7.48	134.0 / 250				
NGC2423	07h 38m 02.2s	-13° 55' 03"	6.7	Open cluster	12.0	STF 924 AB (20 Gem)	06h 33m 29.0s	17° 46' 06"	6.31 / 6.88	20.70 / 212				
NGC2682 M67	08h 52m 23.6s	+11° 44' 27"	6.9	Open cluster	25.0	ENG 37 AB (39 Cnc)	08h 41m 14.9s	19° 56' 09"	6.47 / 6.58	151.80 / 150				
NGC2353	07h 15m 27.2s	-10° 18' 06"	7.1	Open cluster	18.0	STF 1254 AC	08h 41m 30.8s	19° 35' 53"	6.52 / 7.61	64.0 / 343				
NGC2335	07h 07m 46.4s	-10° 03' 39"	7.2	Open cluster	7.0	STTA 82	07h 05m 22.2s	01° 27' 27"	6.54 / 7.62	90.30 / 319				
NGC2360 CALDWELL 58	07h 18m 37.5s	-15° 40' 43"	7.2	Open cluster	14.0	KNT 4 AB	07h 48m 39.7s	-16° 03' 54"	6.60 / 6.54	128.10 / 313				
NGC2251	06h 35m 43.8s	+08° 20' 58"	7.3	Open cluster	10.0	BU 584 DC	08h 40m 59.7s	19° 28' 09"	6.67 / 7.47	99.50 / 89				
NGC2409	07h 32m 30.6s	-17° 13' 60"	7.3	Open cluster	2.5	HJ 99 AB (V401 Hya)	08h 38m 49.0s	-06° 52' 40"	6.82 / 8.27	60.50 / 175				
NGC2396	07h 28m 56.4s	-11° 45' 31"	7.4	Open cluster	10.0	S 550	07h 28m 27.2s	-18° 32' 01"	6.89 / 7.63	39.50 / 116				
NGC2286	06h 48m 40.2s	-03° 10' 16"	7.5	Open cluster	15.0	S 605 (9 Sex)	09h 55m 09.7s	04° 51' 02"	6.89 / 8.40	53.50 / 287				
NGC2506 CALDWELL 54	08h 00m 58.8s	-10° 49' 32"	7.6	Open cluster	12.0	S 529 AC	06h 38m 41.2s	12° 09' 44"	6.91 / 8.09	143.50 / 165				
NGC2252	06h 36m 15.0s	+05° 24' 11"	7.7	Open cluster	18.0	STF 1121 AG	07h 37m 31.2s	-14° 31' 49"	6.92 / 7.66	84.0 / 3				
NGC2345	07h 09m 14.2s	-13° 13' 35"	7.7	Open cluster	12.0	Main variable stars								
NGC2414	07h 34m 07.5s	-15° 29' 53"	7.9	Open cluster	6.0	Main variable stars								
NGC2374	07h 24m 51.6s	-13° 18' 12"	8.0	Open cluster	12.0	Sky2000Master 7190119	07h 20m 22.5s	-16° 26' 03"	5.7	Main variable stars				
NGC2395	07h 28m 20.3s	+13° 34' 00"	8.0	Open cluster	15.0	Sky2000Master 8550066	08h 56m 30.3s	17° 09' 14"	6.2	Main variable stars				
NGC2215	06h 21m 47.3s	-07° 17' 39"	8.4	Open cluster	8.0	Sky2000Master 6250055	06h 26m 17.8s	07° 04' 24"	6.3	Main variable stars				
NGC2324	07h 05m 09.9s	+01° 00' 49"	8.4	Open cluster	8.0	Sky2000Master 7080018	07h 08m 59.5s	-11° 57' 22"	6.7	Main variable stars				
NGC2194	06h 14m 53.5s	+12° 47' 59"	8.5	Open cluster	9.0	Sky2000Master 7300187	07h 31m 44.7s	-09° 49' 12"	6.8	Main variable stars				
NGC2236	06h 30m 44.3s	+06° 48' 58"	8.5	Open cluster	8.0	Sky2000Master 6220157	06h 23m 44.1s	-02° 12' 25"	6.9	Main variable stars				
NGC2180	06h 10m 39.9s	+04° 42' 26"	8.5	Open cluster	6.0	Navigation map								
NGC2204	06h 16m 25.5s	-18° 40' 22"	8.6	Open cluster	10.0	Chart 6 (10h, 35°) Leo Minor, Ursa Major								
NGC2186	06h 13m 11.1s	+05° 27' 09"	8.7	Open cluster	5.0	Chart 13 (11h, 0°) Leo, Sextans								
NGC2250	06h 34m 48.9s	-05° 06' 04"	8.9	Open cluster	10.0	Chart 12 (8h, 0°) Canis Minor, Hydra								
NGC2302	06h 52m 54.9s	-07° 06' 35"	8.9	Open cluster	2.5	Chart 20 (10h, -35°) Antlia, Hydra								
MeI71	07h 38m 14.3s	-12° 08' 46"	8.9	Open cluster	8.0	Chart 11 (5h, 0°) Orion, Eridanus								
NGC2219	06h 24m 43.6s	-04° 41' 18"	9.0	Open cluster	10.0	Main variable stars								
NGC2260	06h 39m 03.8s	-01° 29' 27"	9.0	Open cluster	20.0	Main variable stars								
NGC2270	06h 45m 00.8s	+03° 27' 28"	9.0	Open cluster	20.0	Main variable stars								
NGC2254	06h 36m 51.6s	+07° 39' 12"	9.1	Open cluster	6.0	Main variable stars								
Cr96	06h 31m 02.8s	+02° 51' 07"	9.1	Open cluster	8.0	Main variable stars								
NGC2509	08h 01m 41.3s	-19° 06' 24"	9.3	Open cluster	12.0	Main variable stars								
NGC2141	06h 04m 01.4s	+10° 26' 41"	9.4	Open cluster	10.0	Main variable stars								
NGC2440	07h 42m 49.0s	-18° 15' 22"	9.4	Planetary nebula	1.3	Main variable stars								
NGC2311	06h 58m 46.9s	-04° 38' 22"	9.6	Open cluster	7.0	Main variable stars								
NGC2479	07h 56m 00.0s	-17° 45' 42"	9.6	Open cluster	11.0	Main variable stars								
NGC2355	07h 18m 06.9s	+13° 42' 47"	9.7	Open cluster	8.0	Main variable stars								
NGC2269	06h 44m 20.6s	+04° 36' 12"	10.0	Open cluster	3.0	Main variable stars								
NGC2304	06h 56m 21.7s	+17° 57' 42"	10.0	Open cluster	3.0	Main variable stars								
MeI72	07h 39m 20.9s	-10° 43' 48"	10.0	Open cluster	10.0	Main variable stars								
NGC2202	06h 17m 55.0s	+05° 59' 18"	10.0	Open cluster	7.0	Main variable stars								
NGC2306	06h 55m 27.7s	-07° 13' 30"	10.0	Open cluster		Main variable stars								
NGC2775 CALDWELL 48	09h 11m 23.8s	+06° 57' 17"	10.1	Galaxy	4.3 x 3.3	Main variable stars								
NGC2432	07h 41m 46.1s	-19° 07' 28"	10.2	Open cluster	7.0	Main variable stars								
NGC2309	06h 57m 01.8s	-07° 12' 06"	10.5	Open cluster	5.0	Main variable stars								
IC2165	06h 22m 38.1s	-12° 59' 51"	10.5	Planetary nebula	28.2"	Main variable stars								
NGC2259	06h 39m 39.9s	+10° 51' 49"	10.8	Open cluster	3.5	Main variable stars								
NGC2438	07h 42m 45.8s	-14° 46' 58"	10.8	Planetary nebula	1.3	Main variable stars								
NGC2974	09h 43m 33.7s	-03° 47' 28"	10.9	Galaxy	3.4 x 2.1	Main variable stars								
NGC2143	06h 04m 11.6s	+05° 43' 36"	11.0	Open cluster	11.0	Main variable stars								

Main objects visible on chart 12

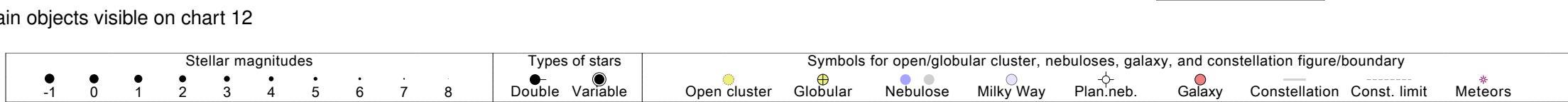
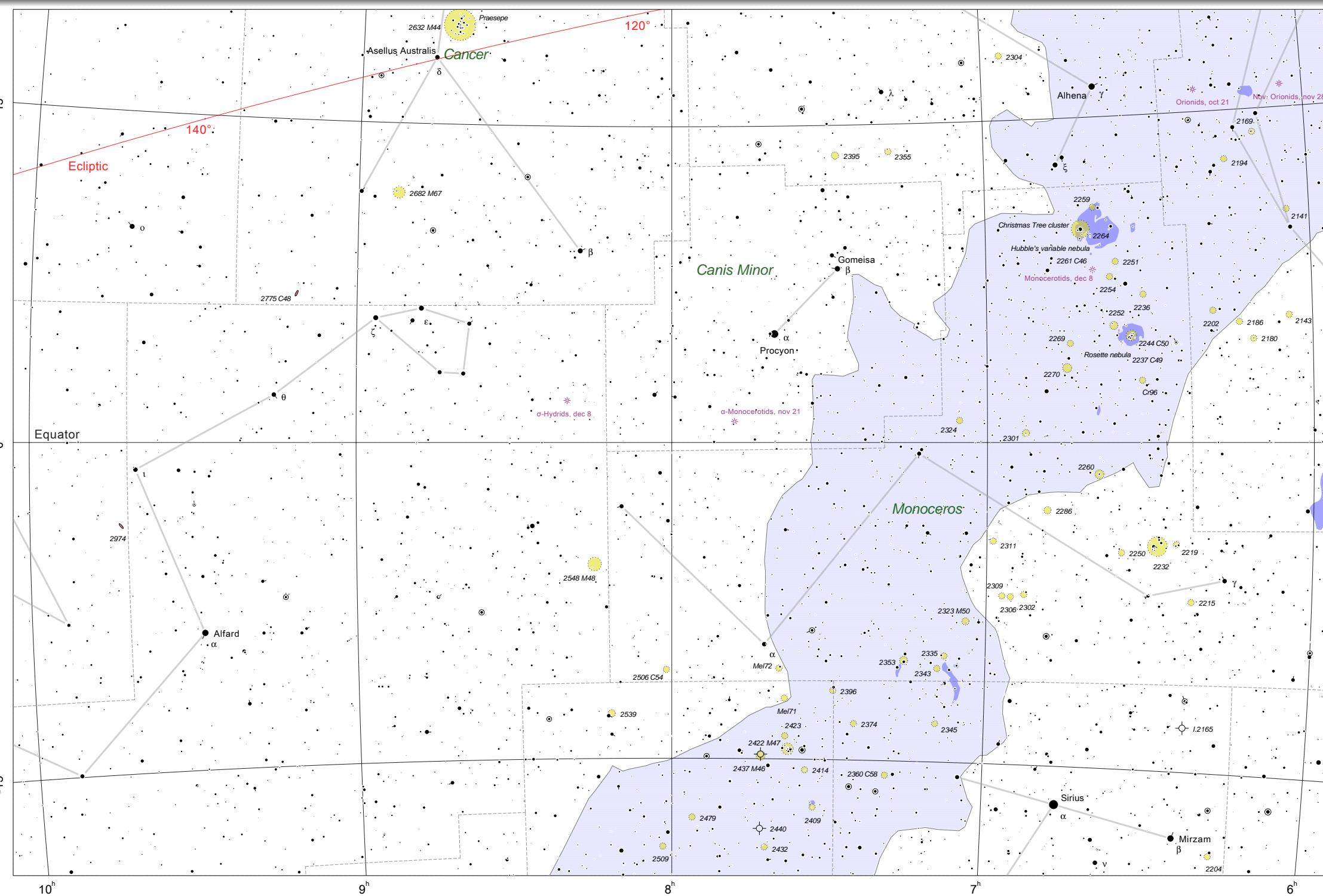


Chart 12, 30° around 8.0h, 0.0° (Canis Minor, Hydra, Monoceros, Cancer)



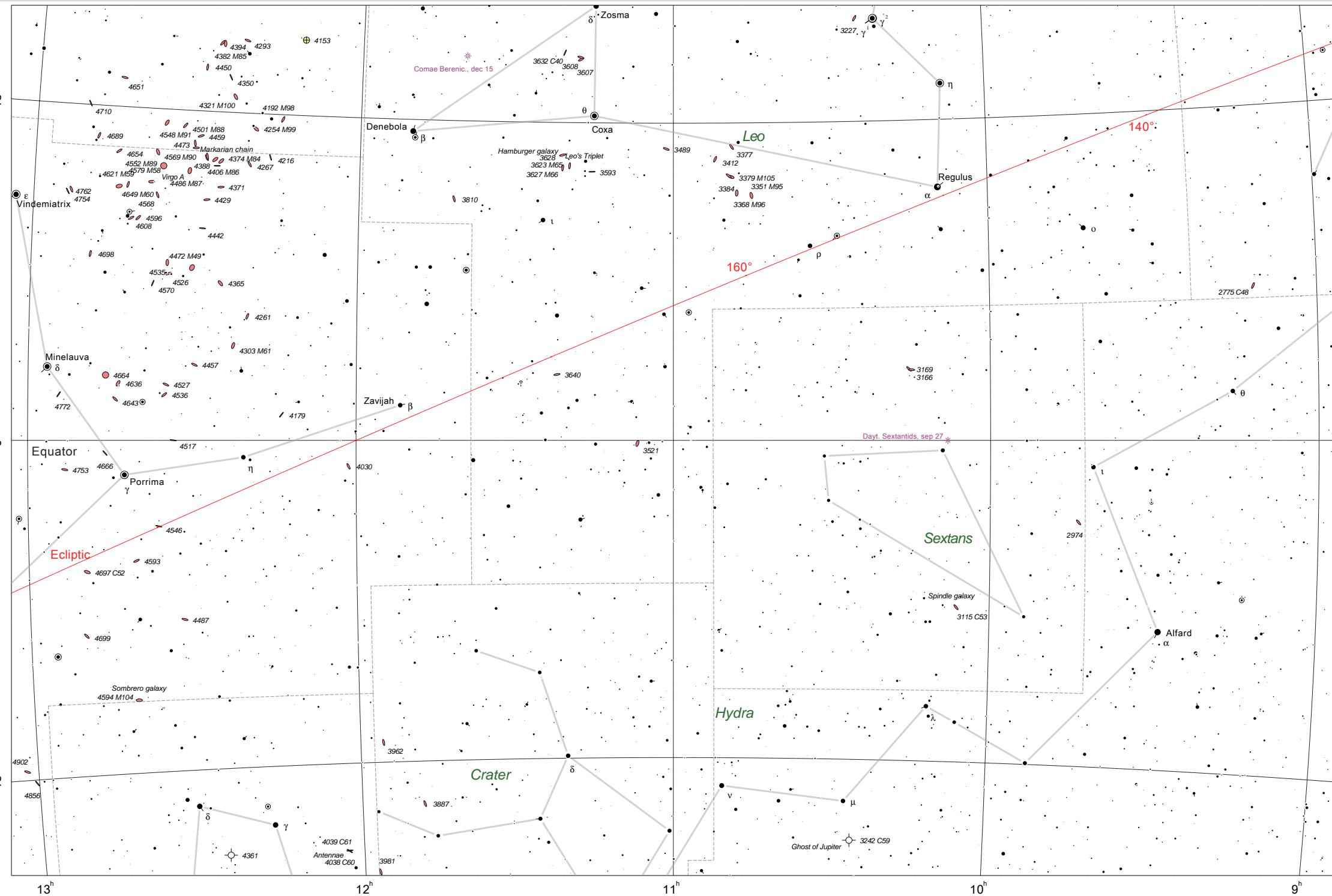
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
NGC3242 CALDWELL 59 - Ghost of Jupiter	10h 25m 44.0s	-18° 44' 38"	7.7	Planetary nebula	1.1	
NGC4594 M104 - Sombrero galaxy	12h 41m 01.8s	-11° 43' 56"	8.0	Galaxy	8.6 x 4.2	
NGC4472 M49	12h 30m 47.7s	+07° 53' 23"	8.4	Galaxy	10.2 x 8.3	
NGC4486 M87 - Virgo A	12h 31m 50.1s	+12° 16' 49"	8.6	Galaxy	8.3 x 6.6	Main double stars
NGC4649 M60	12h 44m 40.3s	+11° 26' 38"	8.8	Galaxy	7.6 x 6.2	
NGC3115 CALDWELL 53 - Spindle galaxy	10h 06m 13.9s	-07° 48' 57"	8.9	Galaxy	7.2 x 2.4	
NGC3627 M66	11h 21m 17.6s	+12° 52' 49"	8.9	Galaxy	9.1 x 4.1	
NGC4406 M86	12h 27m 12.3s	+12° 50' 09"	8.9	Galaxy	8.9 x 5.8	
NGC3521	11h 06m 50.3s	-00° 08' 43"	9.0	Galaxy	11.2 x 5.4	
NGC4374 M84 - Markarian chain	12h 26m 04.4s	+12° 46' 35"	9.1	Galaxy	6.5 x 5.6	
NGC4382 M85	12h 26m 24.4s	+18° 04' 49"	9.1	Galaxy	7.1 x 5.5	
NGC4697 CALDWELL 52	12h 49m 37.9s	-05° 54' 32"	9.2	Galaxy	7.2 x 4.7	
NGC3368 M96	10h 47m 49.0s	+11° 42' 51"	9.3	Galaxy	7.8 x 5.2	
NGC3379 M105	10h 48m 52.8s	+12° 28' 31"	9.3	Galaxy	5.3 x 4.8	
NGC3623 M65 - Leo's Triplet	11h 19m 58.2s	+12° 58' 52"	9.3	Galaxy	9.8 x 2.9	
NGC4526	12h 35m 03.8s	+07° 35' 20"	9.3	Galaxy	7.0 x 2.5	
NGC4321 M100	12h 23m 55.6s	+15° 42' 43"	9.4	Galaxy	7.5 x 6.1	
NGC3628 - Hamburger galaxy	11h 21m 19.3s	+13° 28' 49"	9.5	Galaxy	13.1 x 3.1	
NGC4569 M90	12h 37m 50.5s	+13° 03' 14"	9.5	Galaxy	9.5 x 4.4	
NGC4636	12h 43m 51.0s	+02° 34' 40"	9.5	Galaxy	5.9 x 4.6	
NGC4699	12h 50m 04.6s	-08° 46' 21"	9.5	Galaxy	3.8 x 2.8	
NGC4365	12h 25m 29.3s	+07° 12' 25"	9.6	Galaxy	6.9 x 5.0	
NGC4501 M88	12h 32m 59.5s	+14° 18' 34"	9.6	Galaxy	6.8 x 3.7	
NGC4621 M59	12h 43m 02.7s	+11° 32' 16"	9.6	Galaxy	5.4 x 3.7	
NGC3351 M95	10h 45m 01.1s	+11° 35' 53"	9.7	Galaxy	7.4 x 5.0	
NGC4303 M61	12h 22m 56.2s	+04° 21' 43"	9.7	Galaxy	6.5 x 5.9	
NGC4579 M58	12h 38m 44.3s	+11° 42' 31"	9.7	Galaxy	6.0 x 4.8	
NGC4552 M89	12h 36m 40.5s	+12° 26' 46"	9.8	Galaxy	3.5	
NGC3384	10h 49m 20.0s	+12° 31' 21"	9.9	Galaxy	5.4 x 2.7	
NGC3607	11h 17m 57.6s	+17° 56' 34"	9.9	Galaxy	4.6 x 4.0	
NGC4254 M99	12h 19m 50.2s	+14° 18' 24"	9.9	Galaxy	5.3 x 4.6	
NGC4216	12h 16m 55.1s	+13° 02' 12"	10.0	Galaxy	8.1 x 1.8	
NGC4429	12h 28m 27.2s	+10° 59' 49"	10.0	Galaxy	5.8 x 2.8	
NGC4535	12h 35m 21.1s	+08° 05' 15"	10.0	Galaxy	7.1 x 5.0	
NGC4753	12h 53m 23.7s	-01° 18' 30"	10.0	Galaxy	6.0 x 2.8	
NGC2775 CALDWELL 48	09h 11m 23.8s	+06° 57' 17"	10.1	Galaxy	4.3 x 3.3	
NGC4192 M98	12h 14m 48.9s	+14° 47' 18"	10.1	Galaxy	9.8 x 2.8	
NGC4450	12h 29m 29.8s	+16° 58' 25"	10.1	Galaxy	5.4 x 4.1	
NGC3169	10h 15m 16.9s	+03° 22' 02"	10.2	Galaxy	4.2 x 2.9	
NGC4438 - The Eyes	12h 28m 46.3s	+12° 53' 53"	10.2	Galaxy	8.5 x 3.0	Chart 14 (14h, 0°) Virgo, Bootes
NGC4473	12h 30m 49.4s	+13° 19' 10"	10.2	Galaxy	4.5 x 2.5	
NGC4548 M91	12h 36m 26.8s	+14° 23' 11"	10.2	Galaxy	5.2 x 4.2	Chart 13 (11h, 0°) Leo, Sextans
NGC3227	10h 24m 35.8s	+19° 45' 49"	10.3	Galaxy	4.1 x 3.9	
NGC3489	11h 01m 21.6s	+13° 47' 35"	10.3	Galaxy	3.6 x 2.2	Chart 20 (10h, -35°) Antlia, Hydra
NGC4038 CALDWELL 60 - Antennae	12h 02m 54.4s	-18° 58' 33"	10.3	Galaxy	3.4 x 1.7	
NGC4039 CALDWELL 61	12h 02m 55.4s	-18° 59' 49"	10.3	Galaxy	3.3 x 1.7	
NGC4546	12h 36m 31.3s	-03° 54' 11"	10.3	Galaxy	3.3 x 1.6	
NGC4762	12h 53m 56.2s	+11° 07' 20"	10.3	Galaxy	8.7 x 1.7	
NGC3166	10h 14m 47.7s	+03° 19' 34"	10.4	Galaxy	4.8 x 2.3	
NGC3377	10h 48m 45.8s	+13° 52' 48"	10.4	Galaxy	5.0 x 3.0	

Main objects visible on chart 13



Chart legend

Chart 13, 30° around 11.0h, 0.0° (Leo, Sextans, Virgo, Crater)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')
NGC5904 M5	15h 19m 34.6s	+02° 00' 41"	5.7	Globular cluster	23.0
NGC5024 M53	13h 13m 54.0s	+18° 03' 51"	7.7	Globular cluster	13.0
NGC4594 M104 - Sombrero galaxy	12h 41m 01.8s	-11° 43' 56"	8.0	Galaxy	8.6 x 4.2
NGC4472 M49	12h 30m 47.7s	+07° 53' 23"	8.4	Galaxy	10.2 x 8.3
NGC4486 M87 - Virgo A	12h 31m 50.1s	+12° 16' 49"	8.6	Galaxy	8.3 x 6.6
NGC4649 M60	12h 44m 40.3s	+11° 26' 38"	8.8	Galaxy	7.6 x 6.2
NGC4406 M86	12h 27m 12.3s	+12° 50' 09"	8.9	Galaxy	8.9 x 5.8
NGC5053	13h 17m 25.7s	+17° 35' 37"	9.0	Globular cluster	10.0
NGC4374 M84 - Markarian chain	12h 26m 04.4s	+12° 46' 35"	9.1	Galaxy	6.5 x 5.6
NGC4382 M85	12h 26m 24.4s	+18° 04' 49"	9.1	Galaxy	7.1 x 5.5
NGC4697 CALDWELL 52	12h 49m 37.9s	-05° 54' 32"	9.2	Galaxy	7.2 x 4.7
NGC4526	12h 35m 03.8s	+07° 35' 20"	9.3	Galaxy	7.0 x 2.5
NGC4321 M100	12h 23m 55.6s	+15° 42' 43"	9.4	Galaxy	7.5 x 6.1
NGC4569 M90	12h 37m 50.5s	+13° 03' 14"	9.5	Galaxy	9.5 x 4.4
NGC4636	12h 43m 51.0s	+02° 34' 40"	9.5	Galaxy	5.9 x 4.6
NGC4699	12h 50m 04.6s	-08° 46' 21"	9.5	Galaxy	3.8 x 2.8
NGC5634	14h 30m 40.5s	-06° 03' 51"	9.5	Globular cluster	5.5
NGC4365	12h 25m 29.3s	+07° 12' 25"	9.6	Galaxy	6.9 x 5.0
NGC4501 M88	12h 32m 59.5s	+14° 18' 34"	9.6	Galaxy	6.8 x 3.7
NGC4621 M59	12h 43m 02.7s	+11° 32' 16"	9.6	Galaxy	5.4 x 3.7
NGC4303 M61	12h 22m 56.2s	+04° 21' 43"	9.7	Galaxy	6.5 x 5.9
NGC4579 M58	12h 38m 44.3s	+11° 42' 31"	9.7	Galaxy	6.0 x 4.8
NGC4552 M89	12h 36m 40.5s	+12° 26' 46"	9.8	Galaxy	3.5
NGC4254 M99	12h 19m 50.2s	+14° 18' 24"	9.9	Galaxy	5.3 x 4.6
NGC4216	12h 16m 55.1s	+13° 02' 12"	10.0	Galaxy	8.1 x 1.8
NGC4429	12h 28m 27.2s	+10° 59' 49"	10.0	Galaxy	5.8 x 2.8
NGC4535	12h 35m 21.1s	+08° 05' 15"	10.0	Galaxy	7.1 x 5.0
NGC4753	12h 53m 23.7s	-01° 18' 30"	10.0	Galaxy	6.0 x 2.8
NGC5247	13h 39m 08.0s	-17° 59' 09"	10.0	Galaxy	5.4 x 4.9
NGC5846	15h 07m 30.0s	+01° 31' 44"	10.0	Galaxy	4.0 x 3.7
NGC4192 M98	12h 14m 48.9s	+14° 47' 18"	10.1	Galaxy	9.8 x 2.8
NGC4450	12h 29m 29.8s	+16° 58' 25"	10.1	Galaxy	5.4 x 4.1
NGC5363	13h 57m 07.4s	+05° 09' 24"	10.1	Galaxy	4.1 x 2.6
NGC4438 - The Eyes	12h 28m 46.3s	+12° 53' 53"	10.2	Galaxy	8.5 x 3.0
NGC4473	12h 30m 49.4s	+13° 19' 10"	10.2	Galaxy	4.5 x 2.5
NGC4548 M91	12h 36m 26.8s	+14° 23' 11"	10.2	Galaxy	5.2 x 4.2
NGC4038 CALDWELL 60 - Antennae	12h 02m 54.4s	-18° 58' 33"	10.3	Galaxy	3.4 x 1.7
NGC4039 CALDWELL 61	12h 02m 55.4s	-18° 59' 49"	10.3	Galaxy	3.3 x 1.7
NGC4546	12h 36m 31.3s	-03° 54' 11"	10.3	Galaxy	3.3 x 1.6
NGC4762	12h 53m 56.2s	+11° 07' 20"	10.3	Galaxy	8.7 x 1.7
NGC5248 CALDWELL 45	13h 38m 31.8s	+08° 47' 05"	10.3	Galaxy	6.2 x 4.5
NGC5746	14h 45m 56.6s	+01° 52' 21"	10.3	Galaxy	7.4 x 1.3
NGC4153	12h 11m 07.3s	+18° 25' 53"	10.4	Globular cluster	4.4
NGC4261	12h 20m 24.4s	+05° 42' 49"	10.4	Galaxy	4.1 x 3.6
NGC4293	12h 22m 13.6s	+18° 16' 19"	10.4	Galaxy	5.6 x 2.6
NGC4442	12h 29m 04.8s	+09° 41' 36"	10.4	Galaxy	4.5 x 1.8
NGC4459	12h 30m 00.6s	+13° 52' 05"	10.4	Galaxy	3.5 x 2.7
NGC4477	12h 31m 02.6s	+13° 31' 36"	10.4	Galaxy	3.7 x 3.3
NGC4517	12h 33m 47.1s	+00° 00' 19"	10.4	Galaxy	10.5 x 1.5
NGC4596	12h 40m 56.7s	+10° 04' 00"	10.4	Galaxy	4.0 x 3.0

Main objects visible on chart 14

Stellar magnitudes						Types of stars			Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary																				
● -1	● 0	● 1	● 2	● 3	● 4	● 5	● 6	● 7	● 8	● Double	● Variable	● Open cluster	● Globular	● Nebulose	● Milky Way	● Plan.neb.	● Galaxy	— Constellation	--- Const. limit	* Meteors									

Chart legend

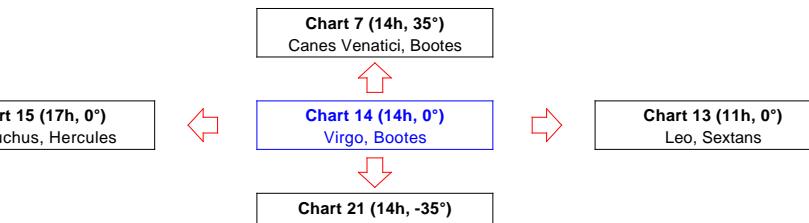
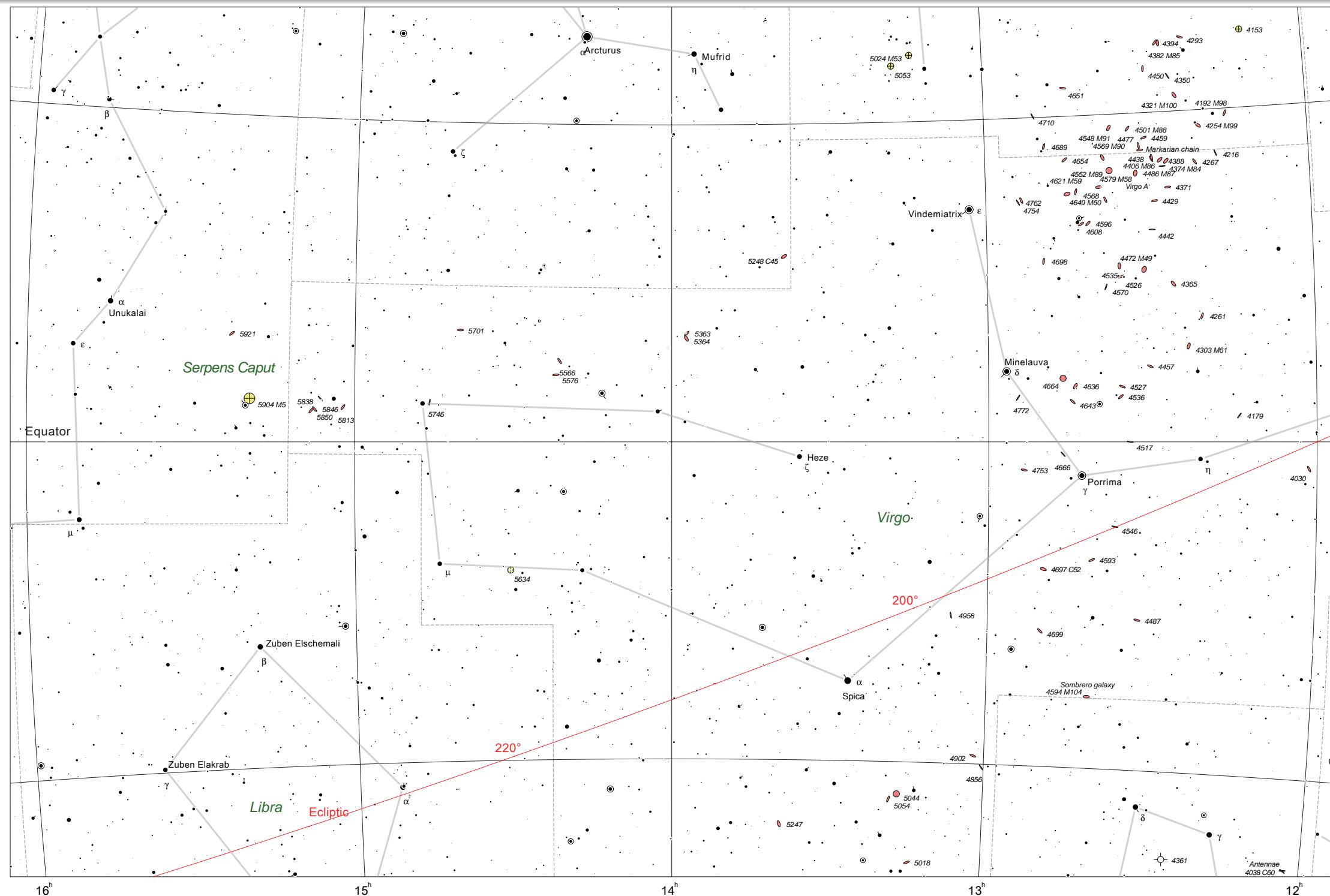


Chart 14, 30° around 14.0h, 0.0° (Virgo, Bootes, Libra, Serpens Caput)



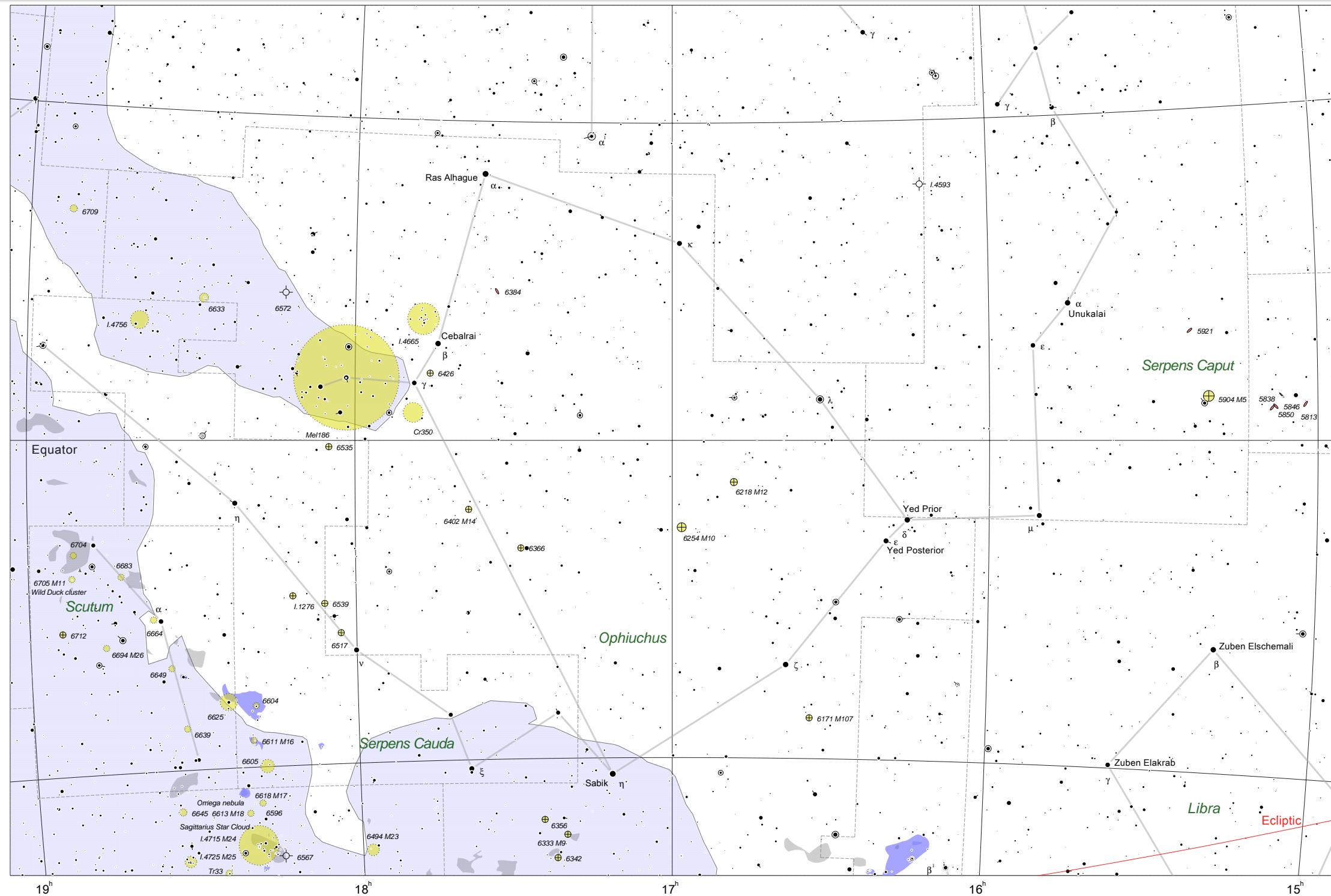
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Mel186	18h 01m 36.1s	+02° 56' 02"	3.0	Open cluster	4.0°	H 3 7 AC	16h 06m 36.0s	-19° 51' 30"	2.59 / 4.52	13.70 / 20
IC4665	17h 47m 10.8s	+05° 42' 37"	4.2	Open cluster	70.0	PWL 9001 AD	16h 06m 36.0s	-19° 51' 30"	2.62 / 7.50	519.20 / 30
NGC6633	18h 28m 13.6s	+06° 31' 18"	4.6	Open cluster	20.0	CSN 9 AD	17h 31m 26.0s	-01° 04' 37"	3.82 / 5.50	16.90 / 317
IC4725 M25	18h 32m 55.7s	-19° 06' 16"	4.6	Open cluster	26.0	H 6 2 AC	18h 01m 39.1s	02° 55' 56"	3.96 / 8.06	55.10 / 142
IC4756	18h 39m 53.0s	+05° 27' 09"	4.6	Open cluster	40.0	LUH 11 (σ Ser)	16h 23m 05.1s	00° 58' 59"	4.09 / 7.82	43.0 / 132
IC4715 M24 - Sagittarius Star Cloud	18h 19m 58.4s	-18° 32' 26"	5.0	Open cluster	1.50°	H 5 6 AC	16h 13m 09.9s	-19° 30' 39"	4.35 / 6.60	41.30 / 337
NGC6494 M23	17h 58m 06.7s	-19° 00' 46"	5.5	Open cluster	25.0	STF 2417 AB (Alya)	18h 57m 12.6s	04° 13' 51"	4.59 / 4.93	22.50 / 104
NGC5904 M5	15h 19m 34.6s	+02° 00' 41"	5.7	Globular cluster	23.0	STF 2417 AC	18h 57m 12.6s	04° 13' 51"	4.59 / 6.78	421.0 / 58
NGC6705 M11 - Wild Duck cluster	18h 52m 09.4s	-06° 14' 42"	5.8	Open cluster	11.0	STF 2417 BC	18h 57m 14.6s	04° 13' 46"	4.93 / 6.78	405.60 / 56
NGC6618 M17 - Omega nebula	18h 21m 56.2s	-16° 09' 41"	6.0	Nebula	20.0 x 15.0	STF 2010 AB (Marfik)	16h 08m 59.3s	16° 59' 42"	5.10 / 6.21	27.10 / 12
NGC6605	18h 17m 32.6s	-14° 59' 30"	6.0	Open cluster	29.0	STFA 31 AB (37 Her)	16h 41m 38.7s	04° 10' 56"	5.76 / 6.92	69.30 / 229
NGC6611 M16	18h 19m 53.0s	-13° 47' 20"	6.0	Open cluster	8.0	STFA 34 AB (53 Oph)	17h 35m 34.0s	09° 34' 29"	5.80 / 7.50	41.20 / 191
NGC6218 M12	16h 48m 16.9s	-01° 58' 54"	6.1	Globular cluster	16.0	STF 2379 AB (5 Aql)	18h 47m 30.9s	-00° 56' 20"	5.88 / 7.02	12.60 / 122
Cr350	17h 49m 00.9s	+01° 17' 40"	6.1	Open cluster	45.0	STFA 33 AB	17h 04m 34.2s	13° 34' 43"	5.91 / 6.17	304.90 / 117
NGC6604	18h 19m 13.3s	-12° 12' 27"	6.5	Open cluster	6.0	STF 2202 AB (61 Oph)	17h 45m 34.3s	02° 34' 20"	6.13 / 6.47	20.80 / 94
NGC6254 M10	16h 58m 12.3s	-04° 07' 44"	6.6	Globular cluster	20.0	H 6 50 AC	18h 50m 45.2s	-05° 53' 19"	6.15 / 8.23	111.80 / 171
NGC6709	18h 52m 26.7s	+10° 21' 30"	6.7	Open cluster	15.0	SHJ 251 AB	17h 40m 08.6s	02° 01' 05"	6.37 / 7.78	110.80 / 328
NGC6613 M18	18h 21m 07.7s	-17° 05' 30"	6.9	Open cluster	7.0	WEB 6	16h 36m 19.9s	17° 01' 02"	6.41 / 7.26	155.50 / 0
NGC6402 M14	17h 38m 39.1s	-03° 15' 21"	7.6	Globular cluster	11.0	STF 1962 (178 Lib)	15h 39m 44.9s	-08° 51' 20"	6.44 / 6.49	11.70 / 190
NGC6171 M107	16h 33m 39.2s	-13° 05' 39"	7.8	Globular cluster	13.0	SHY 696 AE	16h 06m 49.1s	-06° 20' 39"	6.46 / 7.90	260.0 / 271
NGC6333 M9	17h 20m 22.1s	-18° 32' 07"	7.8	Globular cluster	12.0	S 694	17h 53m 06.0s	01° 06' 27"	6.67 / 7.26	79.40 / 238
NGC6664	18h 37m 35.9s	-08° 10' 10"	7.8	Open cluster	12.0	TOK 620	18h 57m 36.6s	04° 17' 33"	6.78 / 8.10	842.10 / 270
NGC6694 M26	18h 46m 20.8s	-09° 21' 46"	8.0	Open cluster	8.0	TOB 271 AC	18h 08m 14.9s	15° 55' 13"	6.82 / 8.31	112.70 / 340
NGC6572	18h 13m 04.7s	+06° 51' 37"	8.1	Planetary nebula	15.0"	SHJ 264 AB,C	18h 19m 53.5s	-18° 36' 37"	6.86 / 7.63	17.20 / 52
NGC6712	18h 54m 09.8s	-08° 40' 47"	8.1	Globular cluster	9.8	BU 966 AG	18h 33m 03.7s	-19° 06' 33"	6.87 / 8.00	429.60 / 254
NGC6356	17h 24m 45.0s	-17° 49' 47"	8.2	Globular cluster	10.0	Main variable stars				
NGC6645	18h 33m 47.3s	-16° 52' 04"	8.5	Open cluster	15.0	Main variable stars				
Tr33	18h 25m 53.0s	-19° 42' 16"	8.5	Open cluster	5.5	Main variable stars				
NGC6539	18h 05m 54.9s	-07° 34' 58"	8.9	Globular cluster	7.9	Main variable stars				
NGC6649	18h 34m 34.6s	-10° 23' 09"	8.9	Open cluster	6.0	Main variable stars				
NGC6625	18h 24m 20.0s	-12° 00' 05"	9.0	Open cluster	39.0	Main variable stars				
NGC6704	18h 51m 49.7s	-05° 10' 49"	9.2	Open cluster	6.0	Ras Algethi (α_1 Her)	17h 15m 33.6s	14° 22' 08"	3.4	
NGC6535	18h 04m 52.3s	-00° 17' 39"	9.3	Globular cluster	3.4	Zuben Elakribi (δ Lib)	15h 02m 02.6s	-08° 35' 50"	4.9	
NGC6683	18h 43m 17.1s	-06° 11' 31"	9.4	Open cluster	3.0	Sky2000Master 18310204	18h 33m 04.0s	-19° 06' 34"	6.4	
NGC6342	17h 22m 21.1s	-19° 36' 19"	9.5	Globular cluster	4.4	Sky2000Master 15500104	15h 51m 37.1s	15° 04' 27"	7.1	
NGC6366	17h 28m 48.2s	-05° 05' 29"	9.5	Globular cluster	13.0	Sky2000Master 17070139	17h 08m 54.8s	-16° 07' 04"	7.1	
NGC5846	15h 07m 30.0s	+01° 31' 44"	10.0	Galaxy	4.0 x 3.7	Sky2000Master 18380073	18h 39m 18.5s	08° 51' 11"	7.4	
NGC6639	18h 32m 05.5s	-13° 09' 19"	10.0	Open cluster	5.0	Navigation map				
NGC6517	18h 02m 56.3s	-08° 57' 26"	10.1	Globular cluster	4.0	Chart 8 (18h, 35°) Hercules, Lyra				
IC1276	18h 11m 50.6s	-07° 12' 20"	10.3	Globular cluster	8.0					
NGC6384	17h 33m 22.4s	+07° 02' 52"	10.4	Galaxy	6.2 x 4.1	Chart 15 (17h, 0°) Ophiuchus, Hercules				
NGC5813	15h 02m 12.0s	+01° 37' 26"	10.5	Galaxy	4.0 x 2.8					
IC4593	16h 12m 40.9s	+12° 01' 17"	10.7	Planetary nebula	42.0"	Chart 16 (20h, 0°) Aquila, Aquarius				
NGC5850	15h 08m 08.5s	+01° 28' 05"	10.8	Galaxy	4.5 x 3.9					
NGC5921	15h 22m 56.0s	+04° 59' 59"	10.8	Galaxy	4.8 x 4.0	Chart 22 (18h, -35°) Sagittarius, Scorpius				
NGC5838	15h 06m 26.8s	+02° 01' 20"	10.9	Galaxy	4.2 x 1.5					
NGC6426	17h 45m 54.7s	+03° 09' 50"	10.9	Globular cluster	4.2	Navigation map				
NGC6567	18h 14m 55.8s	-19° 04' 07"	11.0	Planetary nebula	12.0"	Chart 14 (14h, 0°) Virgo, Bootes				
NGC6596	18h 18m 42.5s	-16° 38' 28"	11.0	Open cluster	10.0					

Main objects visible on chart 15



Chart leyend

Chart 15, 30° around 17.0h, 0.0° (Ophiuchus, Hercules, Serpens Caput, Scorpius)



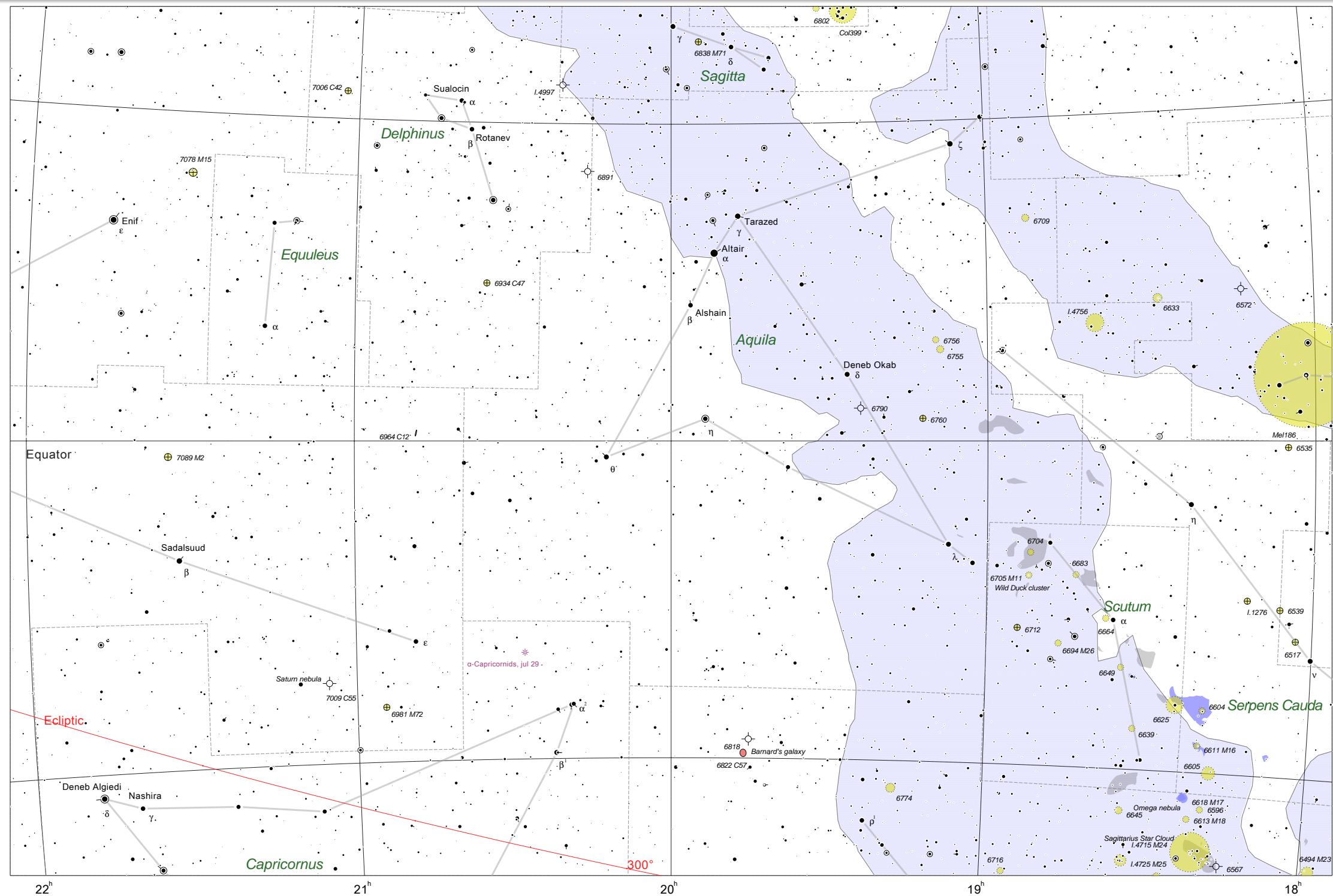
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
Mel186	18h 01m 36.1s	+02° 56' 02"	3.0	Open cluster	4.0°	STFA 52 AB (Dabih)	20h 22m 08.2s	-14° 43' 01"	3.15 / 6.08	205.40 / 267
Col399	19h 26m 16.3s	+20° 13' 27"	3.6	Open cluster	60.0	EHR 16 AB (λ Aql)	19h 07m 18.7s	-04° 51' 01"	3.50 / 7.50	12.50 / 30
NGC6633	18h 28m 13.6s	+06° 31' 18"	4.6	Open cluster	20.0	STFA 51 AE	20h 19m 09.4s	-12° 28' 53"	3.66 / 4.34	381.20 / 290
IC4725 M25	18h 32m 55.7s	-19° 06' 16"	4.6	Open cluster	26.0	H 6 2 AC	18h 01m 39.1s	02° 55' 56"	3.96 / 8.06	55.10 / 142
IC4756	18h 39m 53.0s	+05° 27' 09"	4.6	Open cluster	40.0	STF 2417 AB (Alya)	18h 57m 12.6s	04° 13' 51"	4.59 / 4.93	22.50 / 104
IC4715 M24 - Sagittarius Star Cloud	18h 19m 58.4s	-18° 32' 26"	5.0	Open cluster	1.50°	STF 2417 AC	18h 57m 12.6s	04° 13' 51"	4.59 / 6.78	421.0 / 58
NGC6494 M23	17h 58m 06.7s	-19° 00' 46"	5.5	Open cluster	25.0	STFA 54 AD	21h 11m 18.3s	10° 12' 51"	4.70 / 6.06	335.20 / 152
NGC6705 M11 - Wild Duck cluster	18h 52m 09.4s	-06° 14' 42"	5.8	Open cluster	11.0	STF 2417 BC	18h 57m 14.6s	04° 13' 46"	4.93 / 6.78	405.60 / 56
NGC6618 M17 - Omega nebula	18h 21m 56.2s	-16° 09' 41"	6.0	Nebula	20.0 x 15.0	SHJ 323 AD	20h 30m 00.3s	-17° 44' 46"	4.97 / 6.68	258.70 / 150
NGC6605	18h 17m 32.6s	-14° 59' 30"	6.0	Open cluster	29.0	STF 2737 AB,C	21h 00m 05.1s	04° 22' 21"	5.30 / 7.05	10.50 / 67
NGC6611 M16	18h 19m 53.0s	-13° 47' 20"	6.0	Open cluster	8.0	HJ 599 AC	19h 41m 51.5s	-16° 14' 44"	5.42 / 7.65	45.50 / 42
NGC7078 M15	21h 30m 56.3s	+12° 15' 21"	6.3	Globular cluster	18.0	SHJ 286 (15 Aql)	19h 06m 01.3s	-04° 00' 00"	5.52 / 6.98	39.60 / 211
NGC6604	18h 19m 13.3s	-12° 12' 27"	6.5	Open cluster	6.0	STF 2594 (57 Aql)	19h 55m 42.9s	-08° 10' 25"	5.65 / 6.35	35.70 / 171
NGC7089 M2	21h 34m 28.9s	-00° 43' 60"	6.6	Globular cluster	16.0	STTA 178	19h 16m 14.7s	15° 07' 11"	5.69 / 7.64	89.60 / 268
NGC6709	18h 52m 26.7s	+10° 21' 30"	6.7	Open cluster	15.0	H 6 26 AB (ε Sge)	19h 38m 11.3s	16° 30' 32"	5.77 / 8.35	87.40 / 82
NGC6613 M18	18h 21m 07.7s	-17° 05' 30"	6.9	Open cluster	7.0	STT 592 AC	20h 05m 00.5s	17° 07' 40"	5.86 / 6.92	217.0 / 335
NGC6716	18h 55m 44.9s	-19° 52' 54"	7.5	Open cluster	10.0	STF 2379 AB (5 Aql)	18h 47m 30.9s	-00° 56' 20"	5.88 / 7.02	12.60 / 122
NGC6755	19h 08m 48.6s	+04° 17' 58"	7.5	Open cluster	15.0	SHJ 324 (o Cap)	20h 31m 02.6s	-18° 30' 54"	5.91 / 6.68	21.90 / 239
NGC6664	18h 37m 35.9s	-08° 10' 10"	7.8	Open cluster	12.0	H 6 50 AC	18h 50m 45.2s	-05° 53' 19"	6.15 / 8.23	111.80 / 171
NGC6694 M26	18h 46m 20.8s	-09° 21' 46"	8.0	Open cluster	8.0	STFA 56 AB (3 Peg)	21h 38m 43.7s	06° 42' 33"	6.18 / 7.50	39.0 / 348
NGC7009 CALDWELL 55 - Saturn nebula	21h 05m 16.0s	-11° 16' 58"	8.0	Planetary nebula	1.0 x 0.6	STFA 41 AB (2 Sge)	19h 25m 15.9s	16° 58' 41"	6.26 / 6.86	342.30 / 78
NGC6572	18h 13m 04.7s	+06° 51' 37"	8.1	Planetary nebula	15.0"	STF 2737 BC	21h 00m 04.1s	04° 22' 20"	6.31 / 7.05	10.50 / 67
NGC6712	18h 54m 09.8s	-08° 40' 47"	8.1	Globular cluster	9.8	STFA 40 AB (24 Aql)	19h 19m 52.3s	00° 22' 36"	6.52 / 6.78	423.50 / 316
NGC6838 M71	19h 54m 39.6s	+18° 49' 56"	8.4	Globular cluster	7.2	S 749 AB	20h 28m 30.3s	-02° 02' 09"	6.76 / 7.51	59.80 / 189
NGC6645	18h 33m 47.3s	-16° 52' 04"	8.5	Open cluster	15.0	TOK 620	18h 57m 36.6s	04° 17' 33"	6.78 / 8.10	842.10 / 270
Tr33	18h 25m 53.0s	-19° 42' 16"	8.5	Open cluster	5.5					
NGC6822 CALDWELL 57 - Barnard's galaxy	19h 46m 04.4s	-14° 45' 25"	8.7	Galaxy	15.4 x 14.2					
NGC6802	19h 31m 28.4s	+20° 18' 17"	8.8	Open cluster	5.0					
NGC6539	18h 05m 54.9s	-07° 34' 58"	8.9	Globular cluster	7.9					
NGC6649	18h 34m 34.6s	-10° 23' 09"	8.9	Open cluster	6.0					
NGC6934 CALDWELL 47	20h 35m 10.4s	+07° 28' 27"	8.9	Globular cluster	7.1					
NGC6625	18h 24m 20.0s	-12° 00' 05"	9.0	Open cluster	39.0					
NGC6760	19h 12m 13.1s	+01° 03' 55"	9.0	Globular cluster	9.6	Eta Aql	19h 53m 29.5s	01° 03' 30"	3.9	
NGC6704	18h 51m 49.7s	-05° 10' 49"	9.2	Open cluster	6.0	Sky2000Master 19160159	19h 17m 52.1s	-19° 16' 15"	6.1	
NGC6981 M72	20h 54m 33.7s	-12° 27' 35"	9.2	Globular cluster	6.6	Sky2000Master 18310204	18h 33m 04.0s	-19° 06' 34"	6.4	
NGC6535	18h 04m 52.3s	-00° 17' 39"	9.3	Globular cluster	3.4	Sky2000Master 19180182	19h 19m 40.9s	19° 38' 54"	6.5	
NGC6818	19h 45m 05.3s	-14° 06' 12"	9.3	Planetary nebula	0.8	Sky2000Master 20450122	20h 46m 23.2s	18° 09' 49"	6.8	
NGC6683	18h 43m 17.1s	-06° 11' 31"	9.4	Open cluster	3.0	Sky2000Master 19360161	19h 37m 30.2s	20° 22' 43"	7.1	
NGC6639	18h 32m 05.5s	-13° 09' 19"	10.0	Open cluster	5.0					
NGC6517	18h 02m 56.3s	-08° 57' 26"	10.1	Globular cluster	4.0					
IC1276	18h 11m 50.6s	-07° 12' 20"	10.3	Globular cluster	8.0					
NGC6790	19h 23m 57.8s	+01° 33' 12"	10.5	Planetary nebula	10.2"					
NGC6891	20h 16m 05.4s	+12° 46' 01"	10.5	Planetary nebula	21.0"					
IC4997	20h 21m 03.7s	+16° 47' 47"	10.5	Planetary nebula	13.2"					
NGC6756	19h 09m 41.9s	+04° 44' 20"	10.6	Open cluster	4.0					
NGC7006 CALDWELL 42	21h 02m 25.5s	+16° 16' 03"	10.6	Globular cluster	3.6	Chart 17 (23h, 0°)	Pisces, Pegasus			
NGC6567	18h 14m 55.8s	-19° 04' 07"	11.0	Planetary nebula	12.0"					
NGC6596	18h 18m 42.5s	-16° 38' 28"	11.0	Open cluster	10.0	Chart 16 (20h, 0°)	Aquila, Aquarius			
NGC6774	19h 17m 26.9s	-16° 17' 18"	11.0	Open cluster	20.0					
NGC6964 CALDWELL 12	20h 48m 25.6s	+00° 22' 33"	13.0	Galaxy	1.7 x 1.3	Chart 23 (22h, -35°)	Piscis Austrinus, Grus			

Main objects visible on chart 16



Chart legend

Chart 16, 30° around 20.0h, 0.0° (Aquila, Aquarius, Delphinus, Sagittarius)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')
NGC7078 M15	21h 30m 56.3s	+12° 15' 21"	6.3	Globular cluster	18.0
NGC7089 M2	21h 34m 28.9s	-00° 43' 60"	6.6	Globular cluster	16.0
NGC7293 CALDWELL 63 - Helix nebula	22h 30m 43.8s	-20° 44' 01"	7.3	Planetary nebula	17.6
NGC7009 CALDWELL 55 - Saturn nebula	21h 05m 16.0s	-11° 16' 58"	8.0	Planetary nebula	1.0 x 0.6
NGC157	00h 35m 47.3s	-08° 17' 10"	10.4	Galaxy	3.5 x 2.4
NGC7006 CALDWELL 42	21h 02m 25.5s	+16° 16' 03"	10.6	Globular cluster	3.6
NGC7727	23h 40m 55.7s	-12° 10' 55"	10.6	Galaxy	4.7 x 3.5
NGC7814 CALDWELL 43	00h 04m 16.4s	+16° 15' 24"	10.6	Galaxy	5.5 x 2.3
NGC7606	23h 20m 07.0s	-08° 22' 36"	10.8	Galaxy	5.4 x 2.1
NGC210	00h 41m 35.1s	-13° 45' 47"	10.9	Galaxy	5.0 x 3.3
NGC246 CALDWELL 56 - Skull nebula	00h 48m 03.6s	-11° 45' 45"	10.9	Planetary nebula	4.1
NGC7479 CALDWELL 44	23h 05m 56.8s	+12° 25' 50"	10.9	Galaxy	4.0 x 3.1

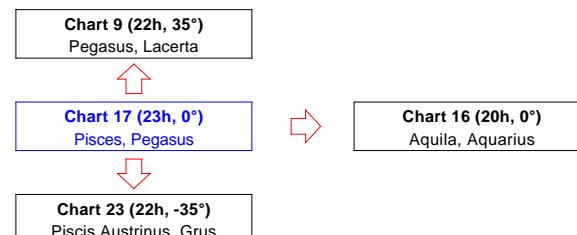
Main double stars

Name	RA (J2020.0)	DEC	Magnitude	Sep ("") / PA (°)
STFA 54 AD	21h 11m 18.3s	10° 12' 51"	4.70 / 6.06	335.20 / 152
STF 2998 AB (94 Aqr)	23h 20m 09.6s	-13° 20' 56"	5.27 / 6.97	12.20 / 352
STF 2737 AB,C	21h 00m 05.1s	04° 22' 21"	5.30 / 7.05	10.50 / 67
STFA 59 AB,C	23h 06m 12.3s	-07° 35' 08"	5.47 / 7.21	257.60 / 149
HJ 323	00h 41m 43.1s	-04° 14' 33"	6.01 / 8.46	63.0 / 286
STF 12 (35 Psc)	00h 16m 00.8s	08° 55' 56"	6.06 / 7.51	11.50 / 148
STFA 56 AB (3 Peg)	21h 38m 43.7s	06° 42' 33"	6.18 / 7.50	39.0 / 348
STF 2737 BC	21h 00m 04.1s	04° 22' 20"	6.31 / 7.05	10.50 / 67
STF 2841 A,BC	21h 55m 13.5s	19° 48' 47"	6.45 / 7.99	22.20 / 108
HJ 1981 A,BC	00h 32m 00.9s	-09° 58' 28"	6.91 / 8.43	78.40 / 89

Main variable stars

Name	RA (J2020.0)	DEC	Magnitude
Sky2000Master 23060093	23h 07m 39.5s	10° 39' 06"	7.9

Navigation map

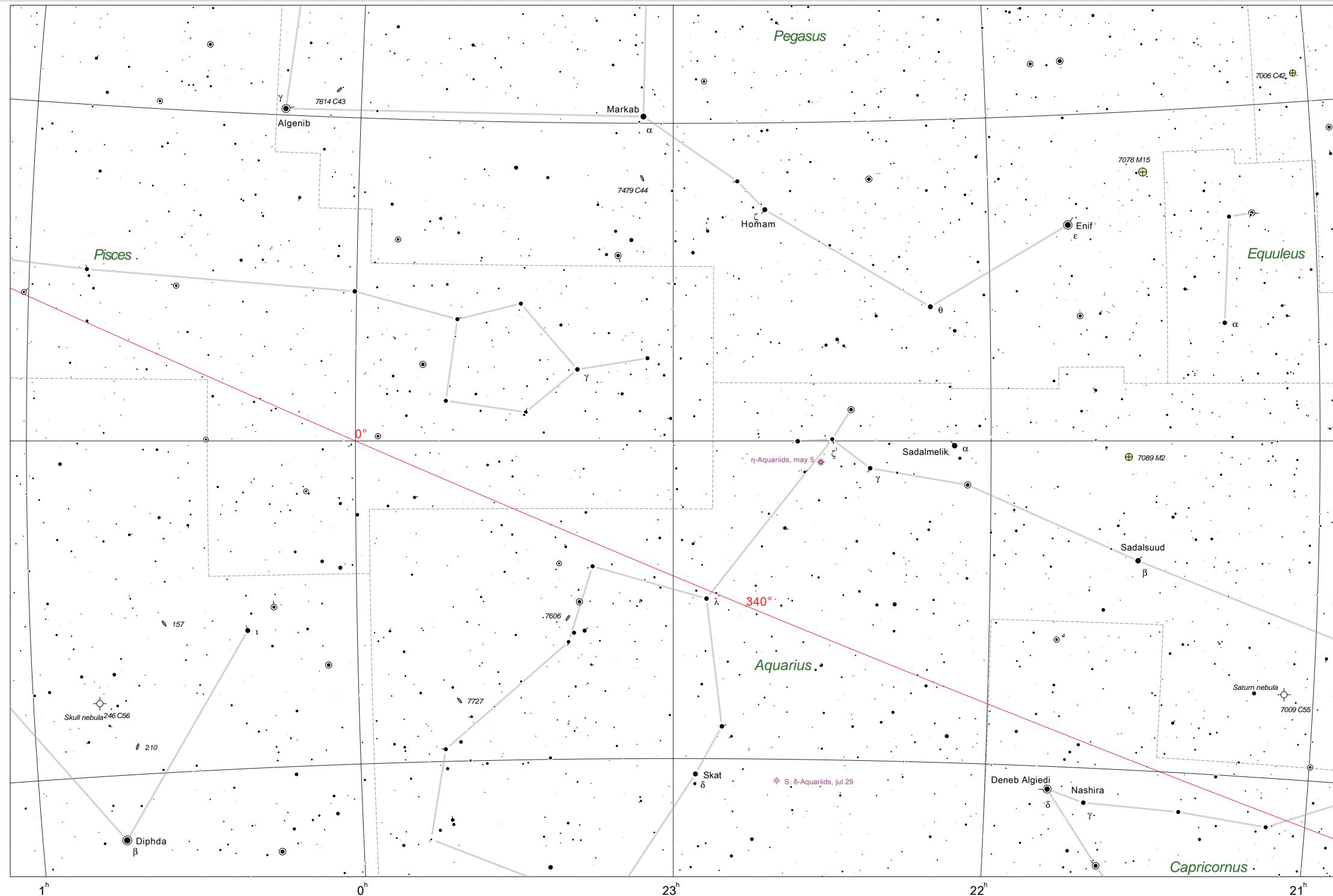


Main objects visible on chart 17

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary											
-1	0	1	2	3	4	5	6	.	.	8	Double	Variable	Open cluster	Globular	Nebulose	Milky Way	Plan.neb.	Galaxy	Constellation	Const. limit	Meteors

Chart legend

Chart 17, 30° around 23.0h, 0.0° (Pisces, Pegasus, Aquarius, Cetus)



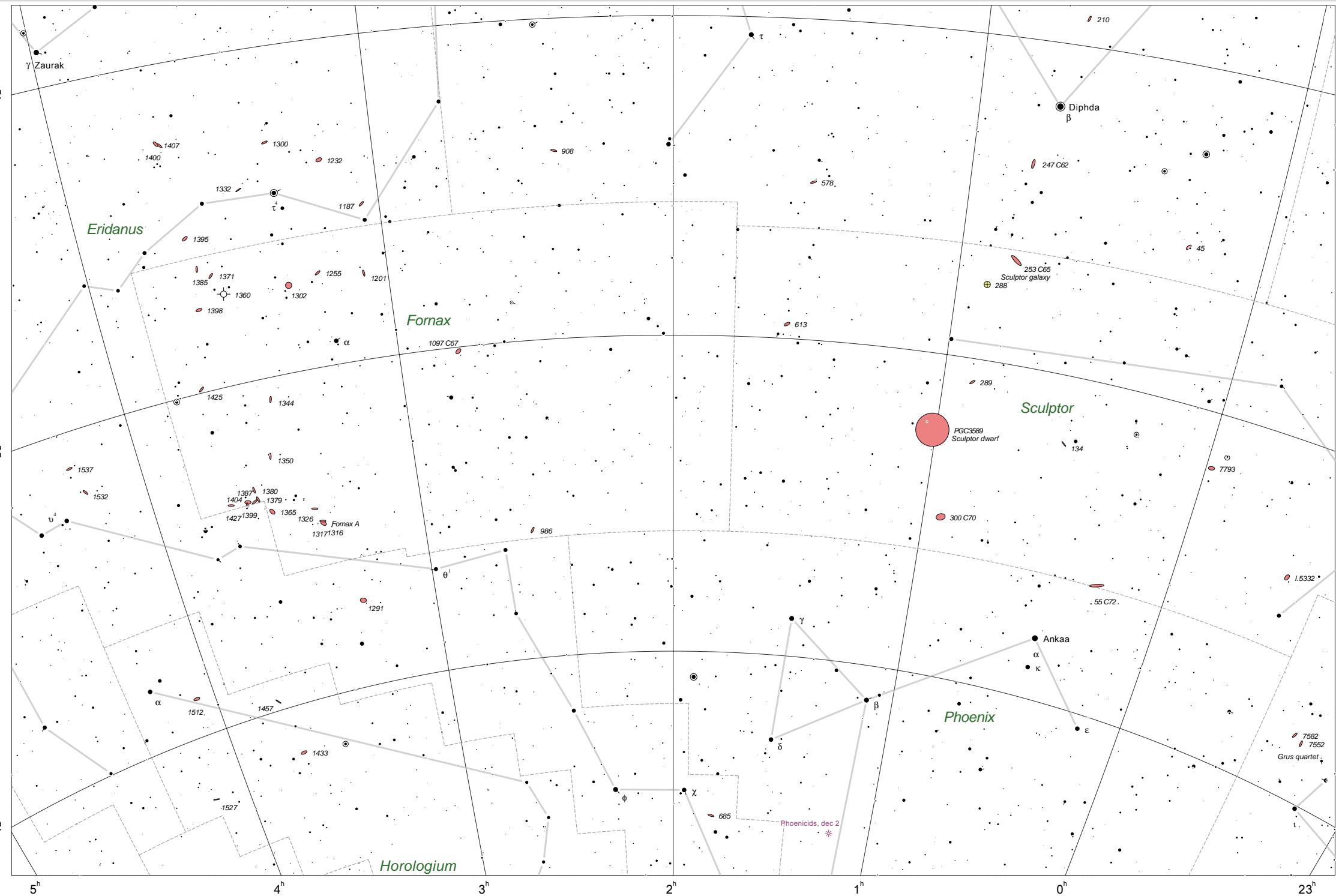
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')
NGC253 CALDWELL 65 - Sculptor galaxy	00h 48m 32.0s	-25° 10' 43"	7.2	Galaxy	29.0 x 6.8
NGC55 CALDWELL 72	00h 16m 08.0s	-39° 06' 30"	7.9	Galaxy	31.2 x 5.9
NGC288	00h 53m 43.9s	-26° 29' 21"	8.1	Globular cluster	13.0
NGC300 CALDWELL 70	00h 55m 49.9s	-37° 34' 34"	8.1	Galaxy	19.0 x 12.9
NGC1291	03h 18m 02.1s	-41° 02' 05"	8.5	Galaxy	11.0 x 9.5
NGC1316 - Fornax A	03h 23m 27.2s	-37° 08' 14"	8.5	Galaxy	11.0 x 7.2
NGC247 CALDWELL 62	00h 48m 07.7s	-20° 39' 04"	9.1	Galaxy	19.2 x 5.5
NGC7793	23h 58m 50.8s	-32° 28' 49"	9.1	Galaxy	9.3 x 6.3
NGC1360	03h 34m 05.7s	-25° 48' 17"	9.4	Planetary nebula	6.4
NGC1097 CALDWELL 67	02h 47m 10.6s	-30° 11' 33"	9.5	Galaxy	9.4 x 6.6
NGC1365	03h 34m 22.5s	-36° 04' 29"	9.6	Galaxy	11.0 x 6.2
NGC1395	03h 39m 21.8s	-22° 57' 47"	9.6	Galaxy	5.0 x 4.5
NGC1399	03h 39m 14.9s	-35° 23' 07"	9.6	Galaxy	6.9 x 6.5
NGC1398	03h 39m 42.7s	-26° 16' 23"	9.7	Galaxy	7.2 x 5.2
NGC1407	03h 41m 05.9s	-18° 31' 00"	9.7	Galaxy	4.6 x 4.3
NGC1232	03h 10m 39.4s	-20° 30' 14"	9.9	Galaxy	7.4 x 6.5
NGC1380	03h 37m 13.9s	-34° 54' 37"	9.9	Galaxy	4.0 x 2.4
NGC1433	03h 42m 38.9s	-47° 09' 32"	9.9	Galaxy	6.5 x 5.9
NGC1532	04h 12m 49.9s	-32° 49' 22"	9.9	Galaxy	11.6 x 3.4
NGC1404	03h 39m 37.6s	-35° 31' 43"	10.0	Galaxy	3.3 x 3.0
NGC613	01h 35m 13.9s	-29° 18' 60"	10.1	Galaxy	5.5 x 4.2
NGC908	02h 24m 00.0s	-21° 08' 35"	10.2	Galaxy	6.1 x 2.7
NGC1332	03h 27m 10.3s	-21° 15' 55"	10.3	Galaxy	4.5 x 1.4
NGC1350	03h 31m 55.2s	-33° 33' 36"	10.3	Galaxy	5.9 x 3.1
NGC1512	04h 04m 33.4s	-43° 17' 42"	10.3	Galaxy	8.9 x 5.6
NGC134	00h 31m 21.0s	-33° 08' 05"	10.4	Galaxy	8.4 x 1.8
NGC1300	03h 20m 35.0s	-19° 20' 24"	10.4	Galaxy	6.2 x 4.1
NGC1344	03h 29m 08.3s	-30° 59' 59"	10.4	Galaxy	4.8 x 3.1
NGC1326	03h 24m 42.6s	-36° 23' 39"	10.5	Galaxy	3.9 x 2.9
IC5332	23h 35m 31.0s	-35° 59' 27"	10.5	Galaxy	8.9 x 8.2
PGC3589 - Sculptor dwarf	01h 00m 50.9s	-33° 35' 33"	10.5	Galaxy	75.0
NGC45	00h 15m 04.8s	-23° 04' 13"	10.6	Galaxy	8.5 x 5.9
NGC1425	03h 43m 00.3s	-29° 49' 53"	10.6	Galaxy	5.8 x 2.5
NGC1537	04h 14m 27.5s	-31° 35' 45"	10.6	Galaxy	3.9 x 2.6
NGC7552 - Grus quartet	23h 17m 16.7s	-42° 28' 31"	10.6	Galaxy	3.4 x 2.7
NGC7582	23h 19m 29.3s	-42° 15' 37"	10.6	Galaxy	5.0 x 2.3
NGC1201	03h 04m 60.0s	-25° 59' 30"	10.7	Galaxy	3.6 x 2.1
NGC1302	03h 20m 42.6s	-25° 59' 21"	10.7	Galaxy	3.9 x 3.7
NGC1371	03h 35m 52.7s	-24° 52' 04"	10.7	Galaxy	5.6 x 3.9
NGC1387	03h 37m 43.2s	-35° 26' 27"	10.7	Galaxy	2.8 x 2.6
NGC1457	03h 45m 10.9s	-44° 35' 02"	10.7	Galaxy	7.6 x 1.7
NGC1187	03h 03m 31.0s	-22° 47' 22"	10.8	Galaxy	4.2 x 3.2
NGC1527	04h 08m 59.5s	-47° 50' 41"	10.8	Galaxy	3.9 x 1.5
NGC210	00h 41m 35.1s	-13° 45' 47"	10.9	Galaxy	5.0 x 3.3
NGC578	01h 31m 26.1s	-22° 33' 50"	10.9	Galaxy	4.8 x 3.0
NGC986	02h 34m 22.1s	-38° 57' 31"	10.9	Galaxy	4.0 x 3.2
NGC1255	03h 14m 23.9s	-25° 39' 02"	10.9	Galaxy	4.2 x 2.7
NGC1379	03h 36m 49.9s	-35° 22' 32"	10.9	Galaxy	2.4 x 2.3
NGC1385	03h 38m 20.2s	-24° 26' 17"	10.9	Galaxy	3.6 x 2.2
NGC1427	03h 43m 05.0s	-35° 19' 48"	10.9	Galaxy	3.8 x 2.6

Main objects visible on chart 18

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary										
● -1	● 0	● 1	● 2	● 3	● 4	● 5	● 6	● 7	● 8	Double	Variable	Open cluster	Globular	Nebulose	Milky Way	Plan.neb.	Galaxy	Constellation	Const. limit	Meteors

Chart legend

Chart 18, 30° around 2.0^{h} , -35.0° (Fornax, Sculptor, Phoenix, Cetus)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
NGC2451	07h 46m 06.8s	-37° 59' 58"	2.8	Open cluster	50.0	Main double stars
NGC2362 CALDWELL 64 - Tau Canis Majoris Cluster	07h 19m 31.2s	-24° 59' 31"	3.8	Open cluster	6.0	
NGC2422 M47	07h 37m 30.2s	-14° 31' 32"	4.4	Open cluster	25.0	
NGC2287 M41	06h 46m 51.6s	-20° 46' 45"	4.5	Open cluster	39.0	
IC2395	08h 43m 08.9s	-48° 10' 51"	4.6	Open cluster	13.0	
NGC2547	08h 10m 44.4s	-49° 17' 06"	4.7	Open cluster	25.0	
NGC2477 CALDWELL 71	07h 52m 52.7s	-38° 34' 57"	5.8	Open cluster	20.0	
NGC2437 M46	07h 42m 41.9s	-14° 51' 29"	6.1	Open cluster	20.0	
NGC2447 M93	07h 45m 20.9s	-23° 54' 21"	6.2	Open cluster	10.0	
NGC2546	08h 13m 08.2s	-37° 40' 39"	6.3	Open cluster	70.0	
NGC2354	07h 14m 59.3s	-25° 43' 32"	6.5	Open cluster	18.0	
NGC2527	08h 05m 47.4s	-28° 12' 15"	6.5	Open cluster	10.0	
NGC2423	07h 38m 02.2s	-13° 55' 03"	6.7	Open cluster	12.0	
NGC2439	07h 41m 32.0s	-31° 44' 24"	6.9	Open cluster	9.0	
NGC2571	08h 19m 45.2s	-29° 48' 46"	7.0	Open cluster	7.0	
NGC2645	08h 39m 43.2s	-46° 17' 55"	7.0	Open cluster	3.0	
NGC1851 CALDWELL 73	05h 14m 45.8s	-40° 01' 29"	7.1	Globular cluster	12.0	
NGC2360 CALDWELL 58	07h 18m 37.5s	-15° 40' 43"	7.2	Open cluster	14.0	
NGC2409	07h 32m 30.6s	-17° 13' 60"	7.3	Open cluster	2.5	
NGC2482	07h 56m 02.9s	-24° 18' 44"	7.3	Open cluster	10.0	
NGC2384	07h 26m 01.9s	-21° 03' 44"	7.4	Open cluster	5.0	
NGC2567	08h 19m 20.5s	-30° 42' 12"	7.4	Open cluster	11.0	
NGC2579	08h 21m 38.2s	-36° 16' 50"	7.5	Open cluster	19.0	
NGC2483	07h 56m 28.1s	-27° 56' 56"	7.6	Open cluster	9.0	
NGC2533	08h 07m 52.5s	-29° 55' 32"	7.6	Open cluster	6.0	
NGC1904 M79	05h 25m 00.1s	-24° 30' 23"	7.7	Globular cluster	9.6	
NGC2367	07h 20m 57.4s	-21° 55' 12"	7.9	Open cluster	5.0	
NGC2414	07h 34m 07.5s	-15° 29' 53"	7.9	Open cluster	6.0	
NGC2489	07h 57m 03.9s	-30° 07' 06"	7.9	Open cluster	5.0	
NGC2374	07h 24m 51.6s	-13° 18' 12"	8.0	Open cluster	12.0	
NGC2421	07h 37m 04.3s	-20° 39' 26"	8.3	Open cluster	8.0	
NGC2453	07h 48m 23.4s	-27° 14' 43"	8.3	Open cluster	4.0	
NGC2383	07h 25m 31.9s	-20° 59' 16"	8.4	Open cluster	5.0	
NGC1291	03h 18m 02.1s	-41° 02' 05"	8.5	Galaxy	11.0 x 9.5	
NGC1316 - Fornax A	03h 23m 27.2s	-37° 08' 14"	8.5	Galaxy	11.0 x 7.2	
NGC2204	06h 16m 25.5s	-18° 40' 22"	8.6	Open cluster	10.0	
NGC2659	08h 43m 17.2s	-45° 04' 22"	8.6	Open cluster	15.0	
NGC2660	08h 43m 17.6s	-47° 16' 24"	8.8	Open cluster	3.0	
T9	07h 56m 32.1s	-25° 56' 15"	9.1	Open cluster	7.0	
NGC2587	08h 24m 13.2s	-29° 34' 26"	9.2	Open cluster	10.0	
NGC2298	06h 49m 41.7s	-36° 01' 43"	9.3	Globular cluster	5.0	
NGC2509	08h 01m 41.3s	-19° 06' 24"	9.3	Open cluster	12.0	
NGC2243	06h 30m 19.8s	-31° 17' 45"	9.4	Open cluster	8.3	
NGC2440	07h 42m 49.0s	-18° 15' 22"	9.4	Planetary nebula	1.3	
NGC1365	03h 34m 22.5s	-36° 04' 29"	9.6	Galaxy	11.0 x 6.2	
NGC1399	03h 39m 14.9s	-35° 23' 07"	9.6	Galaxy	6.9 x 6.5	
NGC1535	04h 15m 11.9s	-12° 41' 22"	9.6	Planetary nebula	0.8	
NGC2479	07h 56m 00.0s	-17° 45' 42"	9.6	Open cluster	11.0	
NGC2580	08h 22m 16.8s	-30° 21' 23"	9.7	Open cluster	8.0	
NGC1380	03h 37m 13.9s	-34° 54' 37"	9.9	Galaxy	4.0 x 2.4	
NGC1433	03h 42m 38.9s	-47° 09' 32"	9.9	Galaxy	6.5 x 5.9	
NGC1532	04h 12m 49.9s	-32° 49' 22"	9.9	Galaxy	11.6 x 3.4	
NGC1808	05h 08m 24.0s	-37° 29' 18"	9.9	Galaxy	6.5 x 3.9	
NGC1404	03h 39m 37.6s	-35° 31' 43"	10.0	Galaxy	3.3 x 3.0	
NGC1792	05h 05m 55.0s	-37° 57' 13"	10.2	Galaxy	5.2 x 2.6	
NGC2432	07h 41m 46.1s	-19° 07' 28"	10.2	Open cluster	7.0	
NGC2455	07h 49m 52.2s	-21° 21' 10"	10.2	Open cluster	15.0	
NGC1350	03h 31m 55.2s	-33° 33' 36"	10.3	Galaxy	5.9 x 3.1	
NGC1512	04h 04m 33.4s	-43° 17' 42"	10.3	Galaxy	8.9 x 5.6	
NGC2280	06h 45m 36.7s	-27° 39' 39"	10.3	Galaxy	6.3 x 3.0	
NGC1326	03h 24m 42.6s	-36° 23' 39"	10.5	Galaxy	3.9 x 2.9	
NGC1425	03h 43m 00.3s	-29° 49' 53"	10.6	Galaxy	5.8 x 2.5	
NGC1537	04h 14m 27.5s	-31° 35' 45"	10.6	Galaxy	3.9 x 2.6	
NGC1387	03h 37m 43.2s	-35° 26' 27"	10.7	Galaxy	2.8 x 2.6	
NGC1457	03h 45m 10.9s	-44° 35' 02"	10.7	Galaxy	7.6 x 1.7	
NGC2217	06h 22m 27.6s	-27° 14' 42"	10.7	Galaxy	4.7 x 4.3	
NGC2568	08h 19m 03.0s	-37° 10' 07"	10.7	Open cluster	3.0	
NGC1527	04h 08m 59.5s	-47° 50' 41"	10.8	Galaxy	3.9 x 1.5	
NGC1964	05h 34m 12.6s	-21° 55' 57"	10.8	Galaxy	5.6 x 1.8	
NGC2438	07h 42m 45.8s	-14° 46' 58"	10.8	Planetary nebula	1.3	

Main objects visible on chart 19



Chart legend

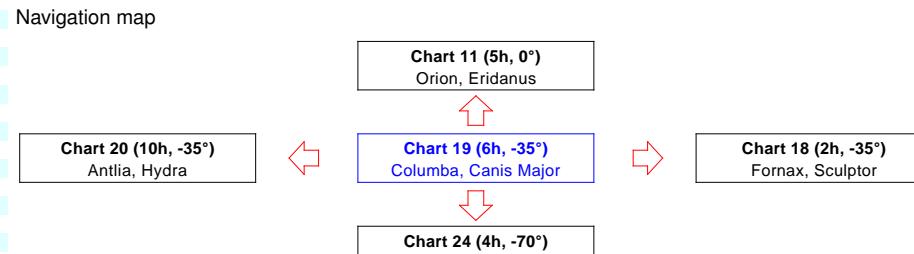
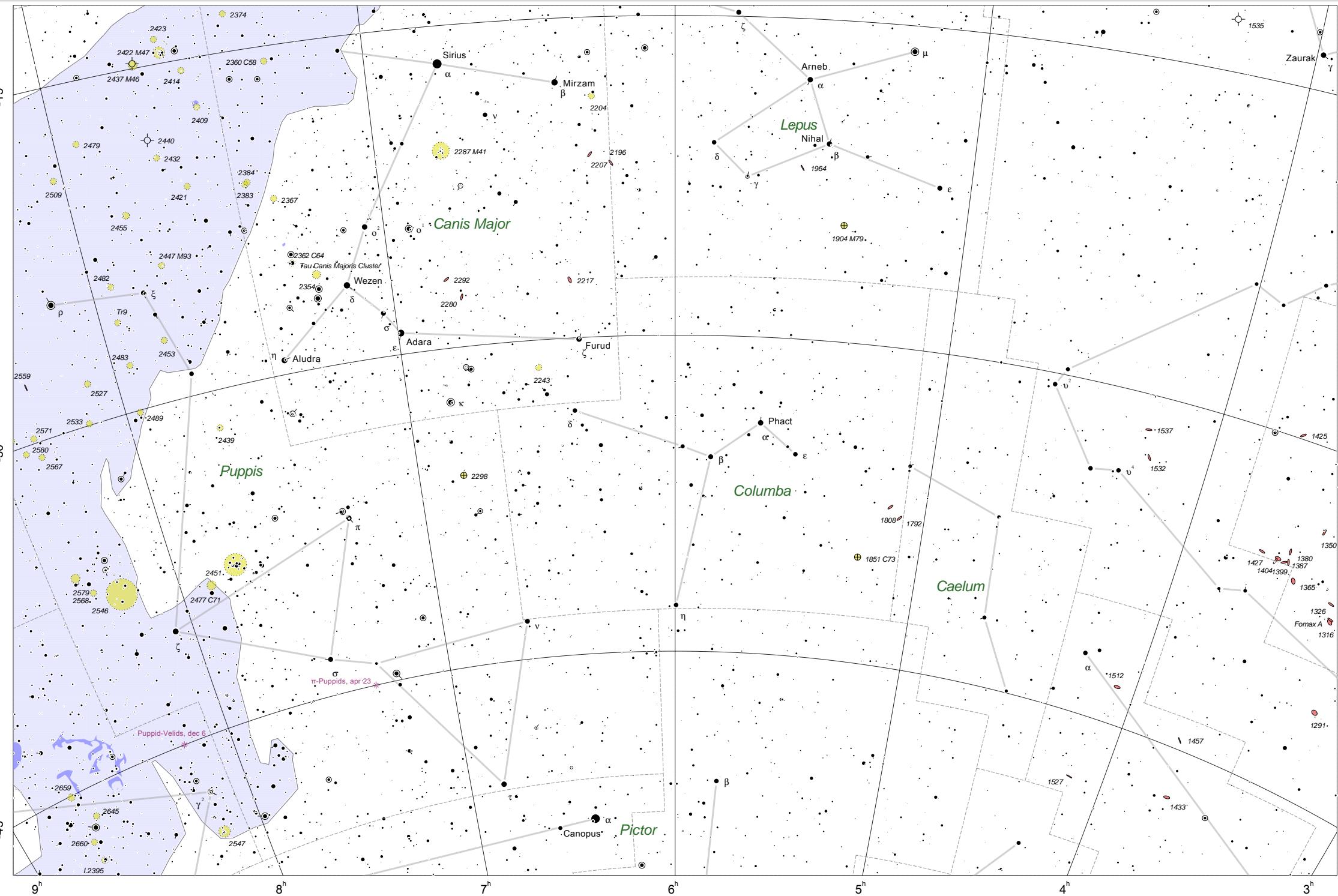


Chart 19, 30° around 6.0^{h} , -35.0° (Columba, Canis Major, Puppis, Lepus)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
IC2391 CALDWELL 85 - Omicron Velorum cluster	08h 40m 52.4s	-52° 59' 18"	2.6	Open cluster	60.0	Main double stars
NGC2451	07h 46m 06.8s	-37° 59' 58"	2.8	Open cluster	50.0	
IC2395	08h 43m 08.9s	-48° 10' 51"	4.6	Open cluster	13.0	
NGC2547	08h 10m 44.4s	-49° 17' 06"	4.7	Open cluster	25.0	
NGC2477 CALDWELL 71	07h 52m 52.7s	-38° 34' 57"	5.8	Open cluster	20.0	
NGC3228	10h 22m 09.4s	-51° 49' 47"	6.0	Open cluster	5.0	
NGC2669	08h 46m 54.0s	-53° 00' 32"	6.1	Open cluster	14.0	
NGC2447 M93	07h 45m 20.9s	-23° 54' 21"	6.2	Open cluster	10.0	
NGC2546	08h 13m 08.2s	-37° 40' 39"	6.3	Open cluster	70.0	
NGC2527	08h 05m 47.4s	-28° 12' 15"	6.5	Open cluster	10.0	
NGC2539	08h 11m 33.3s	-12° 52' 51"	6.5	Open cluster	15.0	
NGC2439	07h 41m 32.0s	-31° 44' 24"	6.9	Open cluster	9.0	
NGC3201 CALDWELL 79	10h 18m 26.2s	-46° 30' 40"	6.9	Globular cluster	20.0	
NGC2571	08h 19m 45.2s	-29° 48' 46"	7.0	Open cluster	7.0	
NGC2645	08h 39m 43.2s	-46° 17' 55"	7.0	Open cluster	3.0	
NGC2910	09h 31m 09.0s	-53° 00' 09"	7.2	Open cluster	6.0	
NGC2482	07h 56m 02.9s	-24° 18' 44"	7.3	Open cluster	10.0	
NGC2567	08h 19m 20.5s	-30° 42' 12"	7.4	Open cluster	11.0	
NGC3330	10h 39m 34.7s	-54° 13' 10"	7.4	Open cluster	6.0	
NGC2579	08h 21m 38.2s	-36° 16' 50"	7.5	Open cluster	19.0	
NGC2483	07h 56m 28.1s	-27° 56' 56"	7.6	Open cluster	9.0	
NGC2533	08h 07m 52.5s	-29° 55' 32"	7.6	Open cluster	6.0	
NGC3680	11h 26m 35.8s	-43° 21' 36"	7.6	Open cluster	7.0	
NGC3242 CALDWELL 59 - Ghost of Jupiter	10h 25m 44.0s	-18° 44' 38"	7.7	Planetary nebula	1.1	
NGC2670	08h 46m 08.6s	-48° 51' 55"	7.8	Open cluster	7.0	
NGC2489	07h 57m 03.9s	-30° 07' 06"	7.9	Open cluster	5.0	
Mel96	09h 16m 58.5s	-36° 42' 37"	8.2	Open cluster	8.0	
NGC2453	07h 48m 23.4s	-27° 14' 43"	8.3	Open cluster	4.0	
NGC2925	09h 33m 50.9s	-53° 29' 07"	8.3	Open cluster	15.0	
NGC2627	08h 38m 04.6s	-30° 01' 33"	8.4	Open cluster	9.0	
NGC2659	08h 43m 17.2s	-45° 04' 22"	8.6	Open cluster	15.0	
NGC2660	08h 43m 17.6s	-47° 16' 24"	8.8	Open cluster	3.0	Main variable stars
Tr9	07h 56m 32.1s	-25° 56' 15"	9.1	Open cluster	7.0	
NGC2587	08h 24m 13.2s	-29° 34' 26"	9.2	Open cluster	10.0	
NGC2658	08h 44m 15.8s	-32° 43' 45"	9.2	Open cluster	10.0	
NGC3132 CALDWELL 74 - Eight-burst planetary	10h 07m 52.5s	-40° 32' 03"	9.2	Planetary nebula	1.5	
NGC2509	08h 01m 41.3s	-19° 06' 24"	9.3	Open cluster	12.0	
NGC2997	09h 46m 31.2s	-31° 17' 00"	9.5	Galaxy	8.9 x 6.8	Navigation map
NGC2479	07h 56m 00.0s	-17° 45' 42"	9.6	Open cluster	11.0	
NGC2580	08h 22m 16.8s	-30° 21' 23"	9.7	Open cluster	8.0	
NGC3105	10h 01m 22.2s	-54° 53' 03"	9.7	Open cluster	2.0	
NGC3621	11h 19m 14.2s	-32° 55' 14"	9.7	Galaxy	12.3 x 6.8	
NGC3923	11h 52m 02.6s	-28° 55' 02"	9.8	Galaxy	5.9 x 3.9	
NGC2972	09h 40m 54.6s	-50° 24' 42"	9.9	Open cluster	5.0	Chart 21 (14h, -35°) Centaurus, Hydra
NGC3109	10h 04m 01.7s	-26° 15' 20"	9.9	Galaxy	19.1 x 3.7	
NGC3585	11h 14m 16.1s	-26° 51' 51"	9.9	Galaxy	4.6 x 2.5	
NGC2866	09h 22m 47.0s	-51° 11' 18"	10.0	Open cluster	20.0	
NGC3446	10h 53m 05.7s	-45° 15' 60"	10.0	Open cluster	6.5	
NGC3909	11h 50m 30.2s	-48° 22' 34"	10.0	Open cluster	20.0	
NGC2455	07h 49m 52.2s	-21° 21' 10"	10.2	Open cluster	15.0	

Main objects visible on chart 20



Chart legend

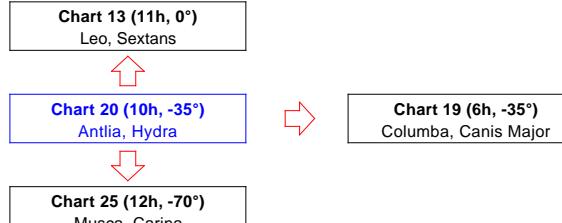
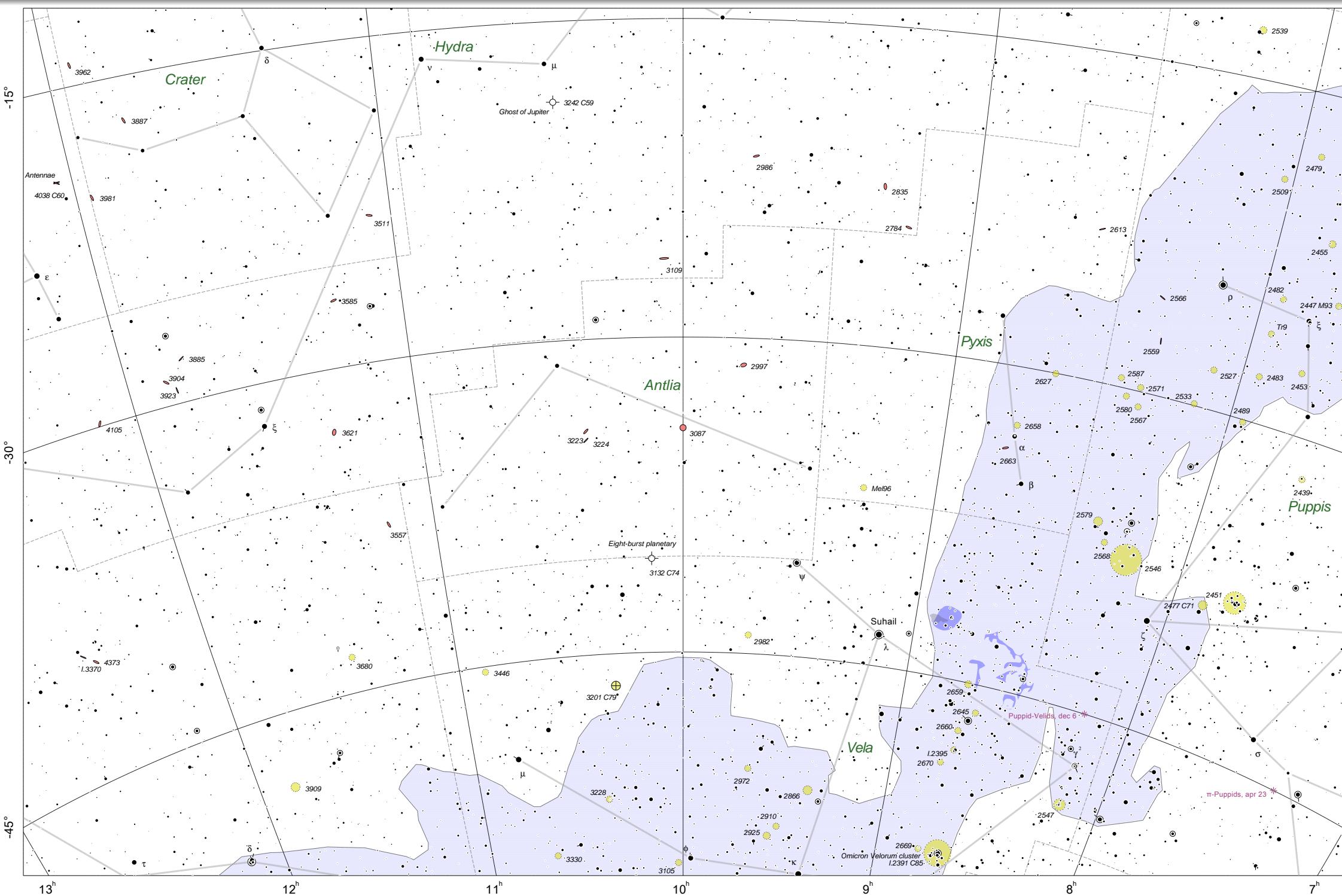


Chart 25 (12h, -70°)
Musca, Carina

Chart 20, 30° around 10.0h, -35.0° (Antlia, Hydra, Pyxis, Vela)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
NGC6193 CALDWELL 82	16h 42m 50.6s	-48° 48' 02"	5.2	Open cluster	14.0	Main double stars
NGC5139 CALDWELL 80 - Omega Centauri	13h 27m 59.4s	-47° 35' 03"	5.3	Globular cluster	55.0	
NGC5460	14h 08m 53.4s	-48° 23' 40"	5.6	Open cluster	35.0	
NGC6124 CALDWELL 75	16h 26m 39.8s	-40° 42' 41"	5.8	Open cluster	40.0	
NGC6250	16h 59m 24.1s	-45° 57' 58"	5.9	Open cluster	16.0	
NGC5822	15h 05m 30.7s	-54° 24' 58"	6.5	Open cluster	35.0	
NGC6169	16h 35m 30.6s	-44° 05' 09"	6.6	Open cluster	12.0	
NGC5128 CALDWELL 77 - Centaurus A	13h 26m 39.7s	-43° 07' 11"	6.8	Galaxy	25.7 x 20.0	
NGC6134	16h 29m 13.6s	-49° 12' 27"	7.2	Open cluster	6.0	
NGC6178	16h 37m 17.9s	-45° 41' 11"	7.2	Open cluster	5.0	
NGC4590 M68	12h 40m 31.8s	-26° 51' 07"	7.3	Globular cluster	11.0	
NGC5286 CALDWELL 84	13h 47m 43.1s	-51° 28' 20"	7.4	Globular cluster	11.0	
NGC6200	16h 45m 37.7s	-47° 30' 20"	7.4	Open cluster	15.0	
NGC5236 M83	13h 38m 08.0s	-29° 58' 07"	7.5	Galaxy	12.9 x 11.5	
NGC3680	11h 26m 35.8s	-43° 21' 36"	7.6	Open cluster	7.0	
NGC5986	15h 47m 22.3s	-37° 50' 48"	7.6	Globular cluster	9.6	
NGC5927	15h 29m 27.8s	-50° 44' 26"	8.0	Globular cluster	6.0	
Hogg18	14h 52m 07.0s	-52° 20' 54"	8.0	Open cluster	3.0	
NGC6204	16h 47m 36.6s	-47° 02' 50"	8.2	Open cluster	6.0	
NGC6249	16h 59m 08.8s	-44° 50' 03"	8.2	Open cluster	6.0	
NGC4945 CALDWELL 83	13h 06m 36.5s	-49° 34' 10"	8.4	Galaxy	19.8 x 4.0	
NGC5897	15h 18m 33.8s	-21° 04' 55"	8.4	Globular cluster	11.0	
NGC5946	15h 36m 56.4s	-50° 43' 27"	8.4	Globular cluster	3.0	
NGC6192	16h 41m 46.1s	-43° 24' 10"	8.5	Open cluster	9.0	
NGC5749	14h 50m 15.6s	-54° 34' 33"	8.8	Open cluster	10.0	
NGC5834	15h 05m 12.6s	-33° 08' 40"	9.1	Globular cluster	7.4	
NGC6139	16h 29m 01.7s	-38° 53' 30"	9.1	Globular cluster	8.2	
NGC5882	15h 18m 12.3s	-45° 43' 17"	9.4	Planetary nebula	19.8"	
NGC5102	13h 23m 05.5s	-36° 44' 09"	9.6	Galaxy	8.6 x 2.7	
NGC3923	11h 52m 02.6s	-28° 55' 02"	9.8	Galaxy	5.9 x 3.9	
NGC4976	13h 09m 48.2s	-49° 36' 44"	10.0	Galaxy	5.6 x 3.0	
NGC5068	13h 19m 59.5s	-21° 08' 34"	10.0	Galaxy	7.3 x 6.4	
NGC5247	13h 39m 08.0s	-17° 59' 09"	10.0	Galaxy	5.4 x 4.9	
NGC5643	14h 33m 58.3s	-44° 15' 42"	10.0	Galaxy	4.7 x 4.2	
NGC3909	11h 50m 30.2s	-48° 22' 34"	10.0	Open cluster	20.0	Main variable stars
NGC6216	16h 50m 50.3s	-44° 45' 53"	10.1	Open cluster	4.0	
NGC5694 CALDWELL 66	14h 40m 46.6s	-26° 37' 23"	10.2	Globular cluster	4.3	
IC4406	14h 23m 43.1s	-44° 14' 27"	10.2	Planetary nebula	1.8	
NGC4038 CALDWELL 60 - Antennae	12h 02m 54.4s	-18° 58' 33"	10.3	Galaxy	3.4 x 1.7	
NGC4039 CALDWELL 61	12h 02m 55.4s	-18° 59' 49"	10.3	Galaxy	3.3 x 1.7	
NGC4696	12h 49m 55.6s	-41° 25' 14"	10.4	Galaxy	4.7 x 3.3	
NGC5061	13h 19m 11.3s	-26° 56' 31"	10.4	Galaxy	3.5 x 3.0	
NGC5253	13h 41m 04.3s	-31° 44' 33"	10.4	Galaxy	5.0 x 1.9	
NGC4856	13h 00m 24.5s	-15° 08' 59"	10.5	Galaxy	4.3 x 1.2	
NGC5084	13h 21m 21.9s	-21° 55' 55"	10.5	Galaxy	9.3 x 1.7	
NGC5121	13h 25m 54.4s	-37° 47' 10"	10.6	Galaxy	1.9 x 1.5	
IC4296	13h 37m 47.7s	-34° 04' 02"	10.6	Galaxy	2.8	
NGC4105	12h 07m 42.6s	-29° 52' 17"	10.7	Galaxy	2.8 x 2.1	
NGC4936	13h 05m 22.9s	-30° 38' 01"	10.7	Galaxy	2.7 x 2.3	
NGC5101	13h 22m 52.4s	-27° 32' 06"	10.7	Galaxy	5.4 x 4.6	

Main objects visible on chart 21

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary										
● -1	● 0	● 1	● 2	● 3	● 4	● 5	● 6	● 7	● 8	● Double	● Variable	● Open cluster	● Globular	● Nebulose	● Milky Way	● Plan.neb.	● Galaxy	— Constellation	--- Const. limit	* Meteors

Chart legend

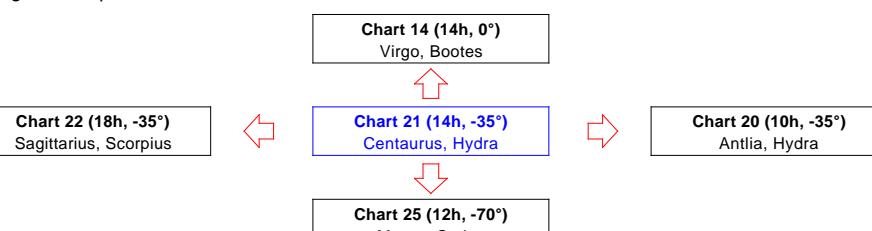
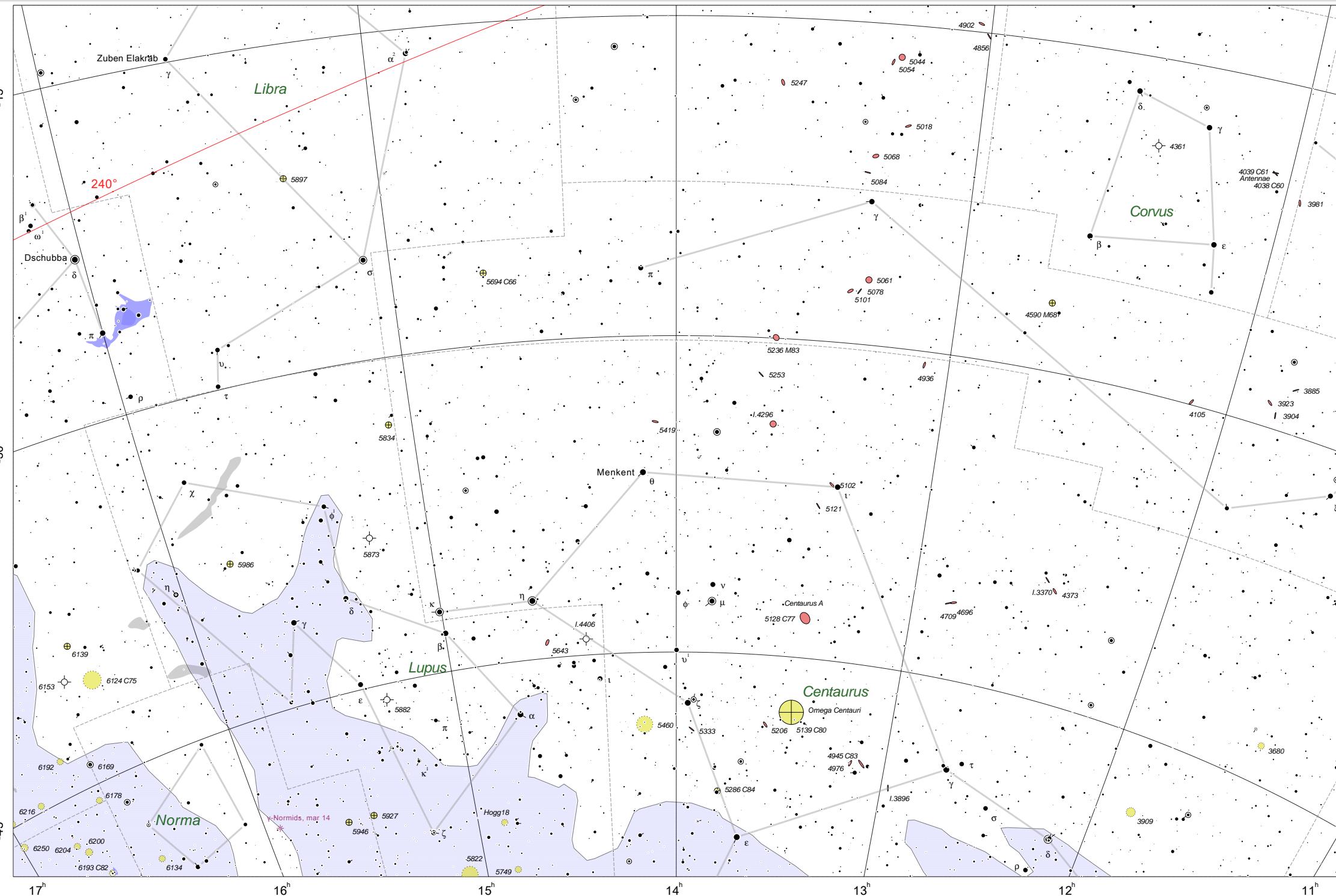


Chart 21, 30° around 14.0h, -35.0° (Centaurus, Hydra, Lopus, Libra)



Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Main double stars				
						Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)
NGC6729 CALDWELL 68	19h 03m 16.1s	-36° 55' 40"		Nebula	25.0 x 20.0	H 3 7 AC	16h 06m 36.0s	-19° 51' 30"	2.59 / 4.52	13.70 / 20
NGC6231 CALDWELL 76	16h 55m 34.3s	-41° 51' 22"	2.6	Open cluster	14.0	PWL 9001 AD	16h 06m 36.0s	-19° 51' 30"	2.62 / 7.50	519.20 / 30
NGC6475 M7 - Ptolemy's cluster	17h 55m 10.1s	-34° 47' 46"	3.3	Open cluster	75.0	H 4 121 AB (Alniyat)	16h 22m 24.2s	-25° 38' 21"	2.89 / 8.42	20.30 / 273
NGC6405 M6	17h 41m 38.3s	-32° 16' 03"	4.2	Open cluster	33.0	SKF 2608 AD	16h 53m 13.5s	-38° 04' 46"	2.97 / 3.51	346.80 / 72
NGC6523 M8 - Lagoon nebula	18h 04m 55.6s	-24° 22' 40"	4.6	Nebula	45.0 x 30.0	RMK 21 AB (η Lup)	16h 01m 26.9s	-38° 27' 07"	3.37 / 7.50	15.0 / 19
NGC6530	18h 05m 43.6s	-24° 21' 21"	4.6	Open cluster	15.0	DUN 226 (Arkab prior)	19h 24m 04.0s	-44° 25' 09"	3.98 / 7.21	28.40 / 76
IC4725 M25	18h 32m 55.7s	-19° 06' 16"	4.6	Open cluster	26.0	H 5 6 AC	16h 13m 09.9s	-19° 30' 39"	4.35 / 6.60	41.30 / 337
IC4715 M24 - Sagittarius Star Cloud	18h 19m 58.4s	-18° 32' 26"	5.0	Open cluster	1.50°	HJ 4853 (ϵ Nor)	16h 28m 39.4s	-47° 35' 54"	4.51 / 6.12	22.90 / 334
NGC6193 CALDWELL 82	16h 42m 50.6s	-48° 48' 02"	5.2	Open cluster	14.0	H 2 19 AC	16h 26m 47.1s	-23° 29' 27"	5.07 / 7.29	149.20 / 0
NGC6656 M22	18h 37m 37.4s	-23° 53' 06"	5.2	Globular cluster	32.0	H 2 19 AD	16h 26m 47.1s	-23° 29' 27"	5.07 / 6.81	156.40 / 252
NGC6397 CALDWELL 86	17h 42m 19.0s	-53° 40' 55"	5.3	Globular cluster	31.0	PZ 4 (ξ_1 Lup)	15h 58m 10.0s	-34° 01' 22"	5.09 / 5.56	10.30 / 50
NGC6121 M4	16h 24m 49.2s	-26° 34' 12"	5.4	Globular cluster	36.0	SHJ 243 AC	17h 16m 35.6s	-26° 37' 23"	5.12 / 6.46	731.60 / 74
NGC6281	17h 06m 08.9s	-37° 54' 50"	5.4	Open cluster	8.0	SHJ 243 AD	17h 16m 35.6s	-26° 37' 23"	5.12 / 7.80	276.90 / 338
NGC6383	17h 36m 00.7s	-32° 35' 37"	5.5	Open cluster	20.0	SHJ 243 BD	17h 16m 35.6s	-26° 37' 27"	5.12 / 7.80	272.30 / 337
NGC6494 M23	17h 58m 06.7s	-19° 00' 46"	5.5	Open cluster	25.0	HJ 599 AC	19h 41m 51.5s	-16° 14' 44"	5.42 / 7.65	45.50 / 42
NGC6416	17h 45m 38.3s	-32° 22' 06"	5.7	Open cluster	15.0	BSO 12 AB	16h 20m 49.0s	-30° 57' 13"	5.55 / 6.88	23.50 / 318
NGC6124 CALDWELL 75	16h 26m 39.8s	-40° 42' 41"	5.8	Open cluster	40.0	DUN 222 (κ_2 Cra)	18h 34m 45.7s	-38° 42' 35"	5.58 / 6.16	21.50 / 358
NGC6250	16h 59m 24.1s	-45° 57' 58"	5.9	Open cluster	16.0	DUN 216 AC	17h 28m 20.8s	-45° 51' 31"	5.63 / 7.12	102.50 / 312
NGC6531 M21	18h 05m 25.9s	-22° 29' 52"	5.9	Open cluster	16.0	JC 23 AF	16h 55m 26.4s	-41° 50' 16"	5.65 / 6.56	56.50 / 20
NGC6618 M17 - Omega nebula	18h 21m 56.2s	-16° 09' 41"	6.0	Nebula	20.0 x 15.0	DUN 206 AC	16h 42m 50.3s	-48° 48' 01"	5.71 / 6.76	10.20 / 265
NGC6322	17h 19m 51.7s	-42° 57' 13"	6.0	Open cluster	5.0	DUN 219 AB	18h 00m 17.5s	-36° 51' 31"	5.84 / 7.75	54.20 / 253
NGC6605	18h 17m 32.6s	-14° 59' 30"	6.0	Open cluster	29.0	CPO 70 AB	16h 45m 17.6s	-41° 08' 58"	6.11 / 6.22	97.30 / 257
NGC6514 M20 - Trifid nebula	18h 03m 54.8s	-22° 58' 12"	6.3	Nebula	20.0	WFC 201 AB	17h 55m 06.1s	-34° 47' 20"	6.27 / 6.98	34.70 / 209
NGC6541 CALDWELL 78	18h 09m 29.2s	-43° 42' 25"	6.3	Globular cluster	15.0	BSO 14 AB	19h 02m 24.9s	-37° 01' 55"	6.33 / 6.58	13.40 / 281
NGC6809 M55	19h 41m 15.4s	-30° 54' 52"	6.3	Globular cluster	19.0	WFC 183 AB	16h 55m 36.5s	-41° 52' 49"	6.39 / 7.74	30.50 / 36
NGC6242	16h 56m 53.3s	-39° 29' 51"	6.4	Open cluster	9.0	Main variable stars				
NGC6266 M62	17h 02m 29.1s	-30° 08' 23"	6.4	Globular cluster	15.0					
Cr367	18h 11m 13.4s	-23° 59' 41"	6.5	Open cluster	50.0 x 30.0					
NGC6169	16h 35m 30.6s	-44° 05' 09"	6.6	Open cluster	12.0					
NGC6167	16h 36m 05.9s	-49° 48' 44"	6.7	Open cluster	7.0					
NGC6273 M19	17h 03m 52.0s	-26° 17' 41"	6.8	Globular cluster	17.0					
NGC6388	17h 37m 44.8s	-44° 44' 44"	6.8	Globular cluster	10.4					
NGC6723	19h 00m 53.9s	-36° 36' 08"	6.8	Globular cluster	13.0					
NGC6613 M18	18h 21m 07.7s	-17° 05' 30"	6.9	Open cluster	7.0					
NGC6626 M28	18h 25m 46.7s	-24° 51' 26"	6.9	Globular cluster	13.8					
IC4651	17h 26m 24.9s	-49° 57' 36"	6.9	Open cluster	10.0					
NGC6134	16h 29m 13.6s	-49° 12' 27"	7.2	Open cluster	6.0					
NGC6178	16h 37m 17.9s	-45° 41' 11"	7.2	Open cluster	5.0					
NGC6208	16h 51m 02.0s	-53° 44' 18"	7.2	Open cluster	18.0					
NGC6425	17h 48m 17.9s	-31° 32' 10"	7.2	Open cluster	10.0					
NGC6441	17h 51m 34.6s	-37° 03' 18"	7.2	Globular cluster	9.6					
NGC6093 M80	16h 18m 14.2s	-23° 01' 21"	7.3	Globular cluster	10.0					
NGC6200	16h 45m 37.7s	-47° 30' 20"	7.4	Open cluster	15.0					
NGC6401	17h 39m 50.2s	-23° 55' 06"	7.4	Globular cluster	4.8					
NGC6544	18h 08m 34.6s	-24° 59' 35"	7.5	Globular cluster	9.2					
NGC6716	18h 55m 44.9s	-19° 52' 54"	7.5	Open cluster	10.0					
T29	17h 42m 54.0s	-40° 09' 31"	7.5	Open cluster	10.0					
NGC5986	15h 47m 22.3s	-37° 50' 48"	7.6	Globular cluster	9.6					
NGC6520	18h 04m 40.6s	-27° 53' 21"	7.6	Open cluster	5.0					
NGC6624	18h 24m 57.6s	-30° 20' 56"	7.6	Globular cluster	8.8					
NGC6715 M54	18h 56m 20.1s	-30° 27' 04"	7.7	Globular cluster	12.0					
NGC6171 M107	16h 33m 39.2s	-13° 05' 39"	7.8	Globular cluster	13.0					
NGC6333 M9	17h 20m 22.1s	-18° 32' 07"	7.8	Globular cluster	12.0					
NGC6352 CALDWELL 81	17h 27m 00.5s	-48° 26' 19"	7.8	Globular cluster	9.0					
NGC6681 M70	18h 44m 30.8s	-32° 16' 13"	7.8	Globular cluster	8.0					
NGC6584	18h 20m 13.5s	-52° 12' 18"	7.9	Globular cluster	6.6					
NGC6259	17h 02m 12.4s	-44° 40' 59"	8.0	Open cluster	15.0					
NGC6546	18h 08m 35.0s	-23° 17' 34"	8.0	Open cluster	15.0					
NGC6152	16h 34m 19.1s	-52° 41' 04"	8.1	Open cluster	25.0					
NGC6316	17h 17m 53.0s	-28° 09' 36"	8.1	Globular cluster	5.4					
NGC6204	16h 47m 36.6s	-47° 02' 50"	8.2	Open cluster	6.0					
NGC6249	16h 59m 08.8s	-44° 50' 03"	8.2	Open cluster	6.0					
NGC6356	17h 24m 45.0s	-17° 49' 47"	8.2	Globular cluster	10.0					
NGC6451	17h 51m 57.6s	-30° 12' 57"	8.2	Open cluster	8.0					
NGC6469	17h 54m 09.0s	-22° 18' 54"	8.2	Open cluster	8.0					
NGC6293	17h 11m 25.0s	-26° 36' 17"	8.3	Globular cluster	8.2					
NGC6304	17h 15m 48.8s	-29° 28' 60"	8.3	Globular cluster	8.0					
NGC6553	18h 10m 30.1s	-25° 54' 09"	8.3	Globular cluster	9.2					
NGC6637 M69	18h 32m 41.4s	-32° 19' 55"	8.3	Globular cluster	7.1					
NGC6569	18h 14m 56.9s	-31° 49' 08"	8.4	Globular cluster	6.4					

Main objects visible on chart 22

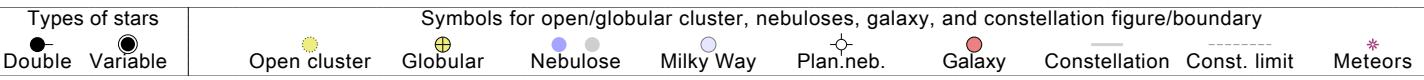


Chart legend

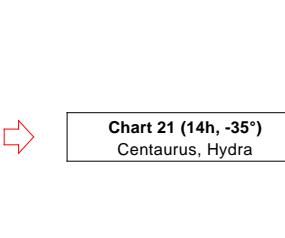
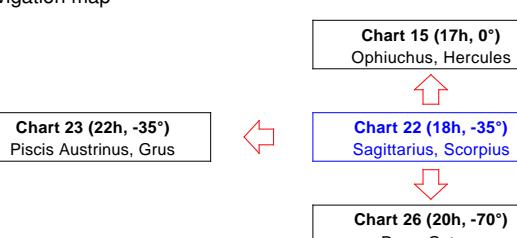
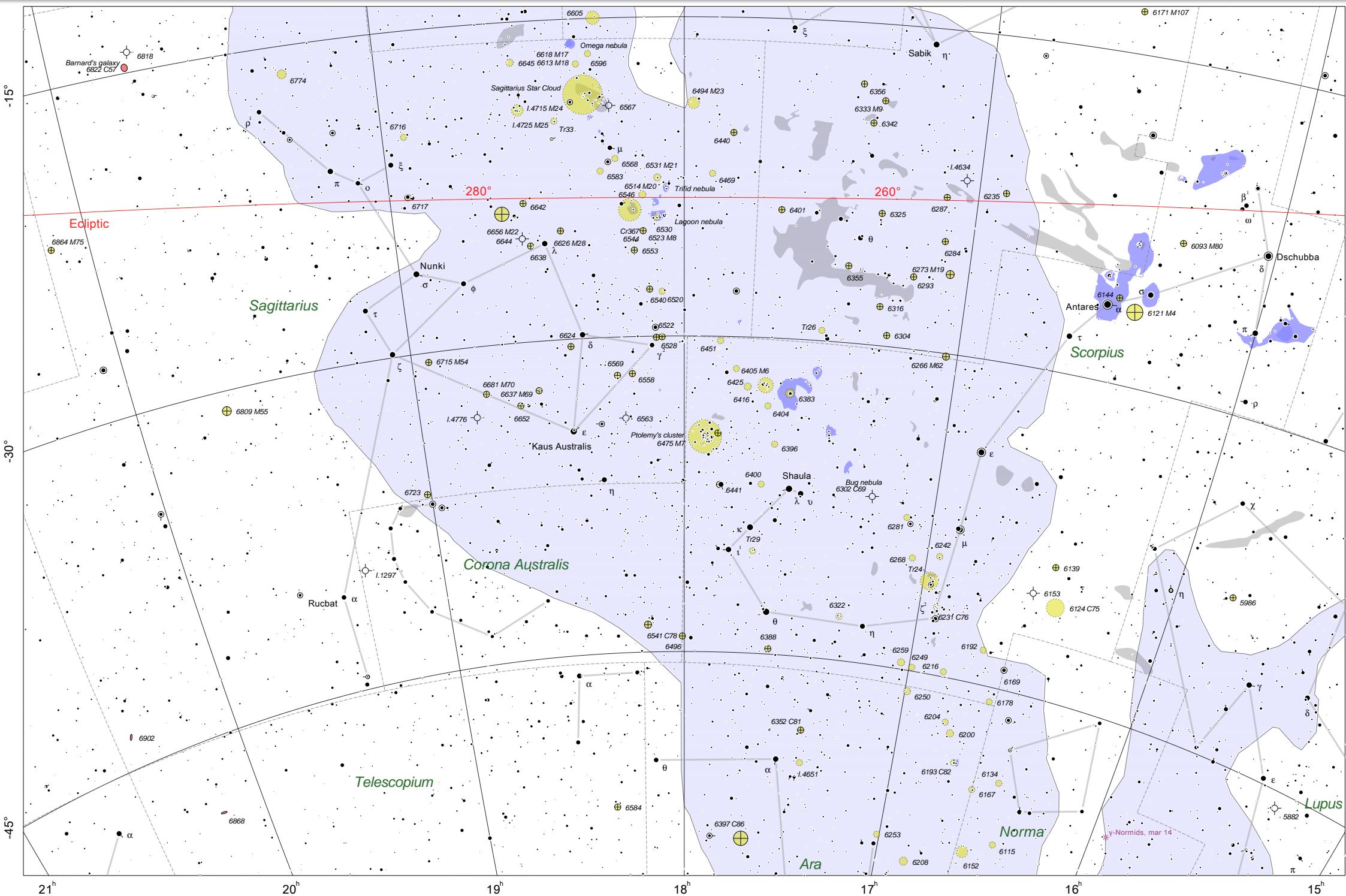


Chart 22, 30° around 18.0h, -35.0° (Sagittarius, Scorpius, Corona Australis, Ophiuchus)



Main double stars													
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	Name	RA (J2020.0)	DEC	Magnitude	Sep ('') / PA (°)			
NGC6809 M55	19h 41m 15.4s	-30° 54' 52"	6.3	Globular cluster	19.0	STFA 52 AB (Dabih)	20h 22m 08.2s	-14° 43' 01"	3.15 / 6.08	205.40 / 267			
NGC7099 M30	21h 41m 30.0s	-23° 05' 14"	6.9	Globular cluster	12.0	PZ 7 AC	22h 32m 37.8s	-32° 14' 34"	4.28 / 7.12	30.60 / 172			
NGC7293 CALDWELL 63 - Helix nebula	22h 30m 43.8s	-20° 44' 01"	7.3	Planetary nebula	17.6	JC 20 AC	23h 08m 00.3s	-43° 24' 43"	4.45 / 7.77	158.90 / 292			
NGC55 CALDWELL 72	00h 16m 08.0s	-39° 06' 30"	7.9	Galaxy	31.2 x 5.9	SHY 834 AC	23h 36m 09.1s	-42° 30' 15"	4.70 / 6.68	294.10 / 212			
NGC6864 M75	20h 07m 15.4s	-21° 51' 45"	8.6	Globular cluster	6.8	SHY 836	23h 39m 59.9s	-45° 30' 03"	4.74 / 7.05	804.40 / 122			
NGC7793	23h 58m 50.8s	-32° 28' 49"	9.1	Galaxy	9.3 x 6.3	SHJ 323 AD	20h 30m 00.3s	-17° 44' 46"	4.97 / 6.68	258.70 / 150			
IC1459	22h 58m 17.2s	-36° 21' 19"	10.0	Galaxy	5.2 x 1.8	SEE 437 AC	21h 07m 43.6s	-41° 18' 17"	5.66 / 7.92	127.80 / 88			
NGC7213	22h 10m 31.0s	-47° 04' 06"	10.1	Galaxy	3.1 x 2.8	SHY 811 AC	22h 38m 08.5s	-40° 29' 13"	5.88 / 6.29	337.90 / 275			
NGC7410	22h 56m 08.2s	-39° 33' 19"	10.3	Galaxy	5.2 x 1.6	SHJ 324 (o Cap)	20h 31m 02.6s	-18° 30' 54"	5.91 / 6.68	21.90 / 239			
NGC7507	23h 13m 12.0s	-28° 25' 47"	10.4	Galaxy	2.8 x 2.7	DUN 241	22h 37m 42.3s	-31° 33' 35"	5.93 / 7.55	93.40 / 32			
NGC7424	22h 58m 26.1s	-40° 57' 49"	10.5	Galaxy	9.5 x 8.1	SKF 760 (AL Scl)	23h 56m 18.8s	-31° 48' 36"	6.09 / 6.82	133.90 / 1			
IC5152	22h 03m 59.6s	-51° 11' 56"	10.5	Galaxy	5.0 x 3.2	DUN 249 (DQ Gru)	23h 25m 02.1s	-53° 41' 56"	6.14 / 7.07	26.40 / 211			
IC5267	22h 58m 22.0s	-43° 17' 19"	10.5	Galaxy	5.2 x 3.9	DUN 248 AB,C	23h 21m 56.9s	-50° 11' 48"	6.15 / 6.58	16.90 / 211			
IC5332	23h 35m 31.0s	-35° 59' 27"	10.5	Galaxy	8.9 x 8.2	H 6 119 AB	22h 40m 50.4s	-28° 13' 15"	6.43 / 7.50	85.90 / 159			
NGC7049	21h 20m 21.2s	-48° 28' 34"	10.6	Galaxy	4.5 x 3.0	HJ 5188 AC	20h 21m 41.7s	-29° 07' 59"	6.66 / 7.55	27.20 / 321			
NGC7513	23h 14m 18.1s	-28° 14' 56"	10.6	Galaxy	3.2 x 2.1	DUN 236	21h 03m 31.9s	-42° 55' 21"	6.68 / 6.95	57.50 / 73			
NGC7552 - Grus quartet	23h 17m 16.7s	-42° 28' 31"	10.6	Galaxy	3.4 x 2.7	JC 19 AB	22h 25m 50.0s	-41° 20' 18"	6.68 / 8.15	16.60 / 62			
NGC7582	23h 19m 29.3s	-42° 15' 37"	10.6	Galaxy	5.0 x 2.3	CRU 9041 AD	22h 25m 50.0s	-41° 20' 18"	6.68 / 7.80	238.0 / 37			
NGC6868	20h 11m 20.8s	-48° 19' 12"	10.7	Galaxy	3.6 x 2.8	Main variable stars							
NGC7090	21h 37m 51.1s	-54° 27' 53"	10.7	Galaxy	7.3 x 1.2	Name	RA (J2020.0)	DEC	Magnitude				
IC1297	19h 18m 45.7s	-39° 34' 31"	10.7	Planetary nebula	24.0"	Sky2000Master 20170028	20h 18m 16.6s	-21° 15' 18"	7.4				
NGC7144	21h 53m 59.8s	-48° 09' 36"	10.8	Galaxy	3.7 x 3.6	Navigation map							
IC5201	22h 22m 10.5s	-45° 56' 01"	10.8	Galaxy	8.5 x 3.9	Chart 17 (23h, 0°) Pisces, Pegasus							
IC5271	22h 59m 07.8s	-33° 38' 05"	10.8	Galaxy	2.6 x 0.9	Chart 18 (2h, -35°) Fornax, Sculptor							
NGC6902	20h 25m 49.9s	-43° 35' 14"	10.9	Galaxy	5.6 x 3.9	Chart 23 (22h, -35°) Piscis Austrinus, Grus							
NGC7184	22h 03m 46.3s	-20° 42' 55"	10.9	Galaxy	5.9 x 1.3	Chart 26 (20h, -70°) Pavo, Octans							
NGC7314	22h 36m 52.1s	-25° 56' 47"	11.0	Galaxy	4.6 x 2.0								
IC5150	22h 00m 47.5s	-39° 17' 19"	11.0	Planetary nebula	2.2								

Main objects visible on chart 23

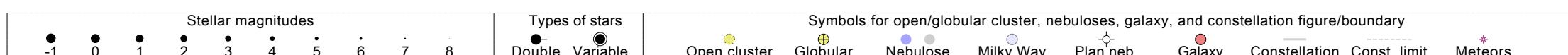


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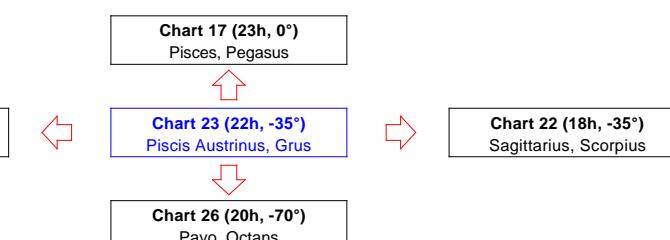
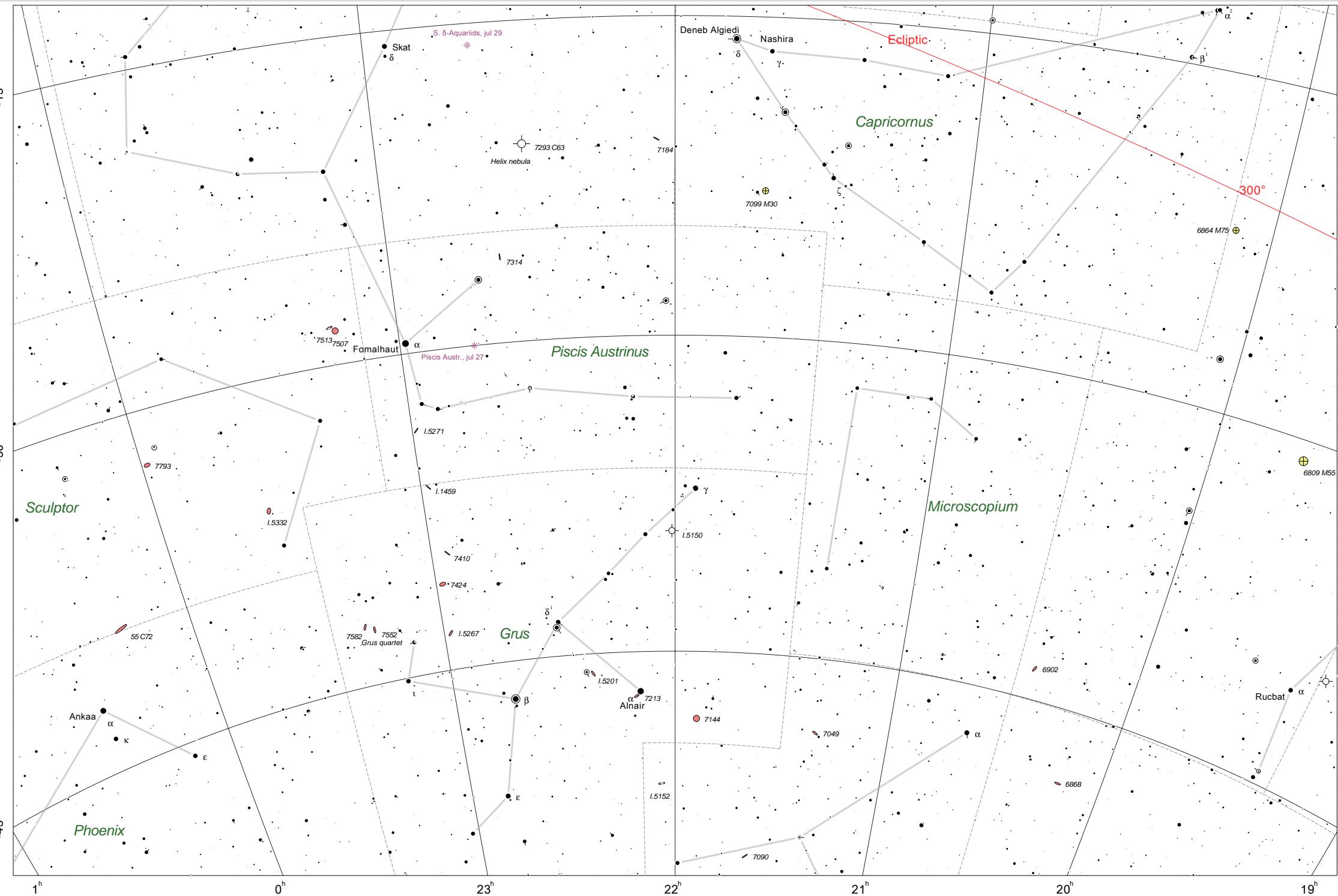


Chart 23, 30° around 22.0h, -35.0° (Piscis Austrinus, Grus, Sculptor, Aquarius)



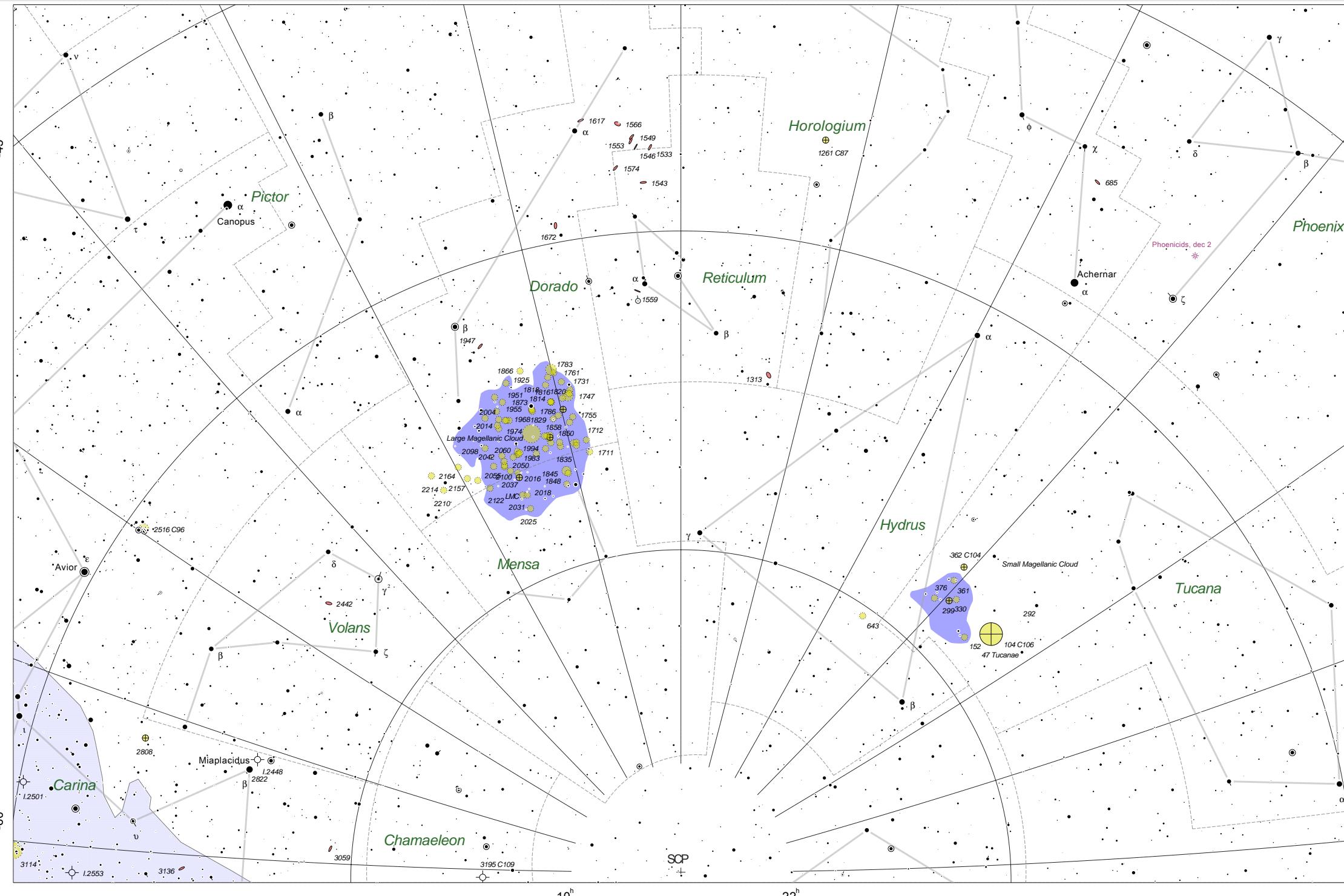
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
NGC2070 CALDWELL 103 - Tarantula nebula (30 Dor)	05h 38m 34.3s	-69° 05' 26"		Nebula	30.0 x 20.0	
LMC - Large Magellanic Cloud	05h 23m 24.5s	-69° 44' 07"	0.5	Galaxy	7.20°	
NGC292 - Small Magellanic Cloud	00h 53m 26.5s	-72° 43' 13"	2.3	Galaxy	5.32° x 3.42°	
NGC2516 CALDWELL 96	07h 58m 23.9s	-60° 48' 30"	3.8	Open cluster	22.0	
NGC104 CALDWELL 106 - 47 Tucanae	00h 24m 57.9s	-71° 58' 10"	4.0	Globular cluster	50.0	Main double stars
NGC3114	10h 03m 14.7s	-60° 11' 50"	4.2	Open cluster	35.0	
NGC2808	09h 12m 26.0s	-64° 56' 43"	6.2	Globular cluster	14.0	
NGC362 CALDWELL 104	01h 03m 54.8s	-70° 44' 26"	6.8	Globular cluster	14.0	
NGC1261 CALDWELL 87	03h 12m 48.2s	-55° 08' 31"	8.3	Globular cluster	6.8	
NGC2055	05h 36m 53.7s	-69° 25' 14"	8.4	Open cluster	36.0"	
NGC1829	05h 04m 54.5s	-68° 01' 45"	8.5	Open cluster	2.1	
NGC1313	03h 18m 30.8s	-66° 25' 23"	8.7	Galaxy	9.2 x 7.2	
NGC1814	05h 03m 46.1s	-67° 16' 26"	9.0	Open cluster	1.0	
NGC1816	05h 03m 50.5s	-67° 14' 02"	9.0	Open cluster	1.0	
NGC1820	05h 04m 03.6s	-67° 14' 41"	9.0	Open cluster		
NGC1850	05h 08m 39.3s	-68° 44' 13"	9.0	Open cluster	3.4	
NGC1955	05h 26m 07.7s	-67° 28' 52"	9.0	Open cluster	1.8	
NGC1968	05h 27m 21.8s	-67° 26' 51"	9.0	Open cluster	1.1	
NGC1974	05h 27m 58.3s	-67° 24' 27"	9.0	Open cluster	1.7	
NGC2014	05h 32m 16.8s	-67° 40' 36"	9.0	Open cluster	1.8	
NGC2050	05h 36m 29.8s	-69° 22' 20"	9.3	Open cluster	1.0	
NGC1553	04h 16m 36.8s	-55° 43' 51"	9.4	Galaxy	4.5 x 2.8	
NGC1747	04h 55m 11.6s	-67° 08' 16"	9.4	Open cluster	24.0 x 20.0	
NGC330	00h 57m 00.7s	-72° 21' 15"	9.6	Globular cluster	1.4	
NGC2004	05h 30m 38.5s	-67° 16' 19"	9.6	Open cluster	2.7	
NGC2042	05h 36m 02.2s	-68° 54' 43"	9.6	Open cluster	9.0	
NGC2060	05h 37m 43.2s	-69° 09' 44"	9.6	Nebula	3.4	
NGC2100	05h 42m 00.4s	-69° 12' 12"	9.6	Open cluster	2.8	
NGC1566	04h 20m 27.5s	-54° 53' 25"	9.7	Galaxy	8.2 x 6.5	
NGC1672	04h 46m 01.7s	-59° 12' 45"	9.7	Galaxy	6.7 x 5.6	
NGC1818	05h 04m 16.9s	-66° 24' 27"	9.7	Open cluster	3.4	
NGC1848	05h 07m 12.3s	-71° 10' 13"	9.7	Open cluster	2.0	
NGC1866	05h 13m 43.3s	-65° 26' 36"	9.7	Open cluster	4.5	
NGC1549	04h 16m 11.5s	-55° 32' 33"	9.8	Galaxy	4.9 x 4.1	
NGC1994	05h 28m 13.9s	-69° 07' 36"	9.8	Open cluster	36.0"	Navigation map
NGC1731	04h 53m 33.5s	-66° 53' 36"	9.9	Open cluster	8.0	
NGC1755	04h 55m 12.3s	-68° 10' 23"	9.9	Open cluster	2.6	
NGC1761	04h 56m 44.5s	-66° 26' 56"	9.9	Open cluster	1.2	
NGC1858	05h 09m 48.9s	-68° 52' 27"	9.9	Open cluster		
NGC1983	05h 27m 37.0s	-68° 58' 14"	9.9	Open cluster	2.0	Chart 25 (12h, -70°) Musca, Carina
NGC1984	05h 27m 33.1s	-69° 07' 08"	10.0	Open cluster	3.0 x 2.4	
NGC1712	04h 50m 52.1s	-69° 22' 28"	10.0	Open cluster	2.5	
NGC1901	05h 17m 43.1s	-68° 24' 47"	10.0	Open cluster	40.0	
NGC1711	04h 50m 27.7s	-69° 57' 08"	10.1	Open cluster	2.4	
NGC1856	05h 09m 22.6s	-69° 06' 12"	10.1	Open cluster	1.8	
NGC1871	05h 13m 50.3s	-67° 25' 50"	10.1	Open cluster	2.0	
NGC2002	05h 30m 19.8s	-66° 52' 11"	10.1	Open cluster	2.0	
NGC1845	05h 05m 32.9s	-70° 33' 20"	10.2	Open cluster	20.0	
NGC2157	05h 57m 26.1s	-69° 11' 46"	10.2	Open cluster	2.7	
NGC2210	06h 11m 23.4s	-69° 07' 35"	10.2	Open cluster	2.1	

Main objects visible on chart 24

Stellar magnitudes								Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary										
-1	0	1	2	3	4	5	6	7	8	Double	Variable	Open cluster	Globular	Nebulose	Milky Way	Plan.neb.	Galaxy	Constellation	Const. limit	Meteors

Chart legend

Chart 24, 30° around 4.0^{h} , -70.0° (Hydrus, Mensa, Dorado, Reticulum)



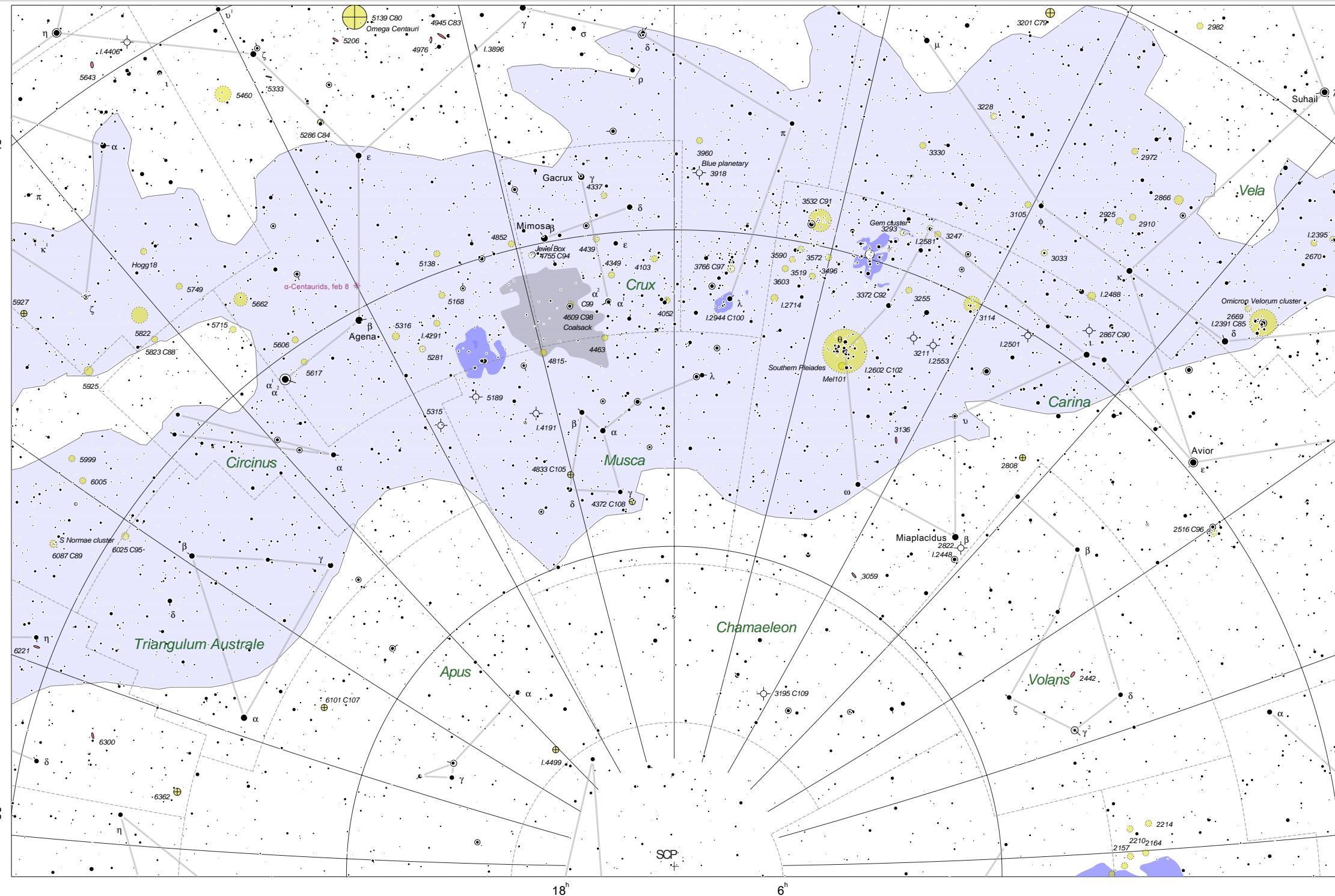
Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')	
CALDWELL 99 - Coalsack	12h 51m 12.8s	-62° 36' 31"		Nebula	7.0° x 5.0°	
IC2944 CALDWELL 100 - Running Chicken nebula	11h 36m 43.4s	-63° 07' 50"		Nebula	40.0 x 20.0	
NGC3372 CALDWELL 92 - Eta Carinae nebula	10h 45m 52.8s	-59° 58' 20"		Nebula	2.0°	
LMC - Large Magellanic Cloud	05h 23m 24.5s	-69° 44' 07"	0.5	Galaxy	7.20°	
IC2602 CALDWELL 102 - Southern Pleiades	10h 43m 39.6s	-64° 29' 58"	1.6	Open cluster	1.67°	
IC2391 CALDWELL 85 - Omicron Velorum cluster	08h 40m 52.4s	-52° 59' 18"	2.6	Open cluster	60.0	
NGC3532 CALDWELL 91	11h 06m 31.2s	-58° 50' 30"	3.0	Open cluster	50.0	Main double stars
NGC2516 CALDWELL 96	07h 58m 23.9s	-60° 48' 30"	3.8	Open cluster	22.0	
NGC3114	10h 03m 14.7s	-60° 11' 50"	4.2	Open cluster	35.0	
NGC4755 CALDWELL 94 - Jewel Box	12h 54m 51.5s	-60° 28' 12"	4.2	Open cluster	10.0	
IC2581	10h 28m 11.1s	-57° 43' 41"	4.3	Open cluster	5.0	
IC2395	08h 43m 08.9s	-48° 10' 51"	4.6	Open cluster	13.0	
NGC3293 - Gem cluster	10h 36m 37.0s	-58° 20' 02"	4.7	Open cluster	5.0	
NGC6025 CALDWELL 95	16h 05m 00.5s	-60° 29' 07"	5.1	Open cluster	15.0	
NGC3766 CALDWELL 97	11h 37m 10.8s	-61° 43' 15"	5.3	Open cluster	15.0	
NGC5139 CALDWELL 80 - Omega Centauri	13h 27m 59.4s	-47° 35' 03"	5.3	Globular cluster	55.0	
NGC6087 CALDWELL 89 - S Normae cluster	16h 20m 31.9s	-57° 56' 49"	5.4	Open cluster	15.0	
NGC5662	14h 36m 57.9s	-56° 44' 57"	5.5	Open cluster	30.0	
NGC5460	14h 08m 53.4s	-48° 23' 40"	5.6	Open cluster	35.0	
NGC5281	13h 48m 01.8s	-63° 00' 32"	5.9	Open cluster	8.0	
NGC3228	10h 22m 09.4s	-51° 49' 47"	6.0	Open cluster	5.0	
NGC5316	13h 55m 25.5s	-61° 56' 52"	6.0	Open cluster	15.0	
NGC2669	08h 46m 54.0s	-53° 00' 32"	6.1	Open cluster	14.0	
NGC2808	09h 12m 26.0s	-64° 56' 43"	6.2	Globular cluster	14.0	
NGC5617	14h 31m 14.6s	-60° 47' 56"	6.3	Open cluster	10.0	
NGC5822	15h 05m 30.7s	-54° 24' 58"	6.5	Open cluster	35.0	
NGC3572	11h 11m 18.1s	-60° 21' 10"	6.6	Open cluster	7.0	
NGC3201 CALDWELL 79	10h 18m 26.2s	-46° 30' 40"	6.9	Globular cluster	20.0	
NGC4609 CALDWELL 98	12h 43m 31.1s	-63° 06' 12"	6.9	Open cluster	6.0	
NGC2910	09h 31m 09.0s	-53° 00' 09"	7.2	Open cluster	6.0	
NGC4372 CALDWELL 108	12h 26m 56.7s	-72° 46' 09"	7.2	Globular cluster	5.0	
NGC4463	12h 31m 04.2s	-64° 53' 59"	7.2	Open cluster	6.0	
NGC3330	10h 39m 34.7s	-54° 13' 10"	7.4	Open cluster	6.0	
NGC4103	12h 07m 42.5s	-61° 21' 41"	7.4	Open cluster	6.0	
NGC4349	12h 25m 12.9s	-61° 58' 52"	7.4	Open cluster	4.0	
NGC5286 CALDWELL 84	13h 47m 43.1s	-51° 28' 20"	7.4	Globular cluster	11.0	
IC2488	09h 28m 03.1s	-57° 02' 40"	7.4	Open cluster	18.0	
NGC3247	10h 24m 56.3s	-57° 51' 55"	7.6	Open cluster	5.0	
NGC5138	13h 28m 34.2s	-59° 08' 42"	7.6	Open cluster	8.0	
NGC3519	11h 04m 52.4s	-61° 28' 34"	7.7	Open cluster	8.0	
NGC5606	14h 29m 16.3s	-59° 43' 16"	7.7	Open cluster	3.0	
NGC2670	08h 46m 08.6s	-48° 51' 55"	7.8	Open cluster	7.0	
NGC5823 CALDWELL 88	15h 07m 00.4s	-55° 40' 49"	7.9	Open cluster	12.0	
NGC5927	15h 29m 27.8s	-50° 44' 26"	8.0	Globular cluster	6.0	
Hogg18	14h 52m 07.0s	-52° 20' 54"	8.0	Open cluster	3.0	
NGC3918 - Blue planetary	11h 51m 17.6s	-57° 17' 35"	8.1	Planetary nebula	22.8"	
NGC6362	17h 33m 59.0s	-67° 03' 38"	8.1	Globular cluster	15.0	
NGC3496	11h 00m 25.3s	-60° 26' 39"	8.2	Open cluster	7.0	
NGC3590	11h 13m 50.7s	-60° 53' 53"	8.2	Open cluster	2.0	
IC2714	11h 18m 14.0s	-62° 49' 52"	8.2	Open cluster	15.0	
NGC2925	09h 33m 50.9s	-53° 29' 07"	8.3	Open cluster	15.0	
NGC3960	11h 51m 33.1s	-55° 47' 16"	8.3	Open cluster	7.0	
NGC4439	12h 29m 33.7s	-60° 12' 49"	8.4	Open cluster	4.0	
NGC4833 CALDWELL 105	13h 00m 56.6s	-70° 58' 54"	8.4	Globular cluster	14.0	
NGC4945 CALDWELL 83	13h 06m 36.5s	-49° 34' 10"	8.4	Galaxy	19.8 x 4.0	Navigation map
NGC5925	15h 28m 57.1s	-54° 35' 49"	8.4	Open cluster	20.0	Chart 26 (20h, -70°) Pavo, Octans
Mel101	10h 42m 54.4s	-65° 12' 18"	8.4	Open cluster	15.0	
NGC4815	12h 59m 14.3s	-65° 04' 10"	8.6	Open cluster	5.0	Chart 21 (14h, -35°) Centaurus, Hydra
NGC3033	09h 49m 19.7s	-56° 30' 19"	8.8	Open cluster	12.0	
NGC4052	12h 03m 02.1s	-63° 19' 59"	8.8	Open cluster	10.0	
NGC5749	14h 50m 15.6s	-54° 34' 33"	8.8	Open cluster	10.0	
NGC4337	12h 25m 09.3s	-58° 14' 04"	8.9	Open cluster	3.5	Chart 25 (12h, -70°) Musca, Carina
NGC4852	13h 01m 22.5s	-59° 43' 15"	8.9	Open cluster	12.0	
NGC5999	15h 53m 44.3s	-56° 31' 53"	9.0	Open cluster	3.0	Chart 24 (4h, -70°) Hydrus, Mensa
NGC3603	11h 15m 58.7s	-61° 22' 13"	9.1	Open cluster	4.0	
NGC5168	13h 32m 27.5s	-61° 02' 30"	9.1	Open cluster	4.0	
NGC6101 CALDWELL 107	16h 28m 06.7s	-72° 14' 42"	9.2	Globular cluster	5.0	
NGC2867 CALDWELL 90	09h 21m 59.3s	-58° 23' 49"	9.7	Planetary nebula	24.0"	
NGC3105	10h 01m 22.2s	-54° 53' 03"	9.7	Open cluster	2.0	
IC4291	13h 38m 18.7s	-62° 11' 40"	9.7	Open cluster	4.0	

Main objects visible on chart 25

Stellar magnitudes		Types of stars		Symbols for open/globular cluster, nebuloses, galaxy, and constellation figure/boundary							
● -1	● 0	● 1	● 2	● 3	● 4	● 5	● 6	● 7	● 8	● Double	● Variable
● Open cluster	● Globular	● Nebulose	● Milky Way	● Plan.neb.	● Galaxy	— Constellation	— Const. limit	— Meteors	— Meteor	— Meteor	— Meteor

Chart legend

Chart 25, 30° around 12.0h, -70.0° (Musca, Carina, Circinus, Centaurus)

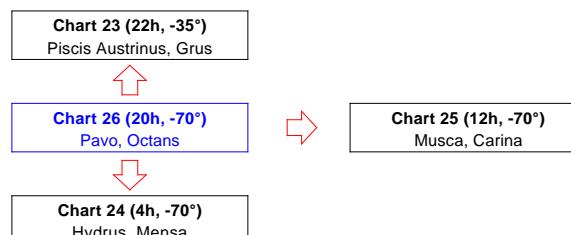


Name	RA (J2020.0)	DEC	Magnitude	Type	Angular size (')
NGC292 - Small Magellanic Cloud	00h 53m 26.5s	-72° 43' 13"	2.3	Galaxy	5.32° x 3.42°
NGC104 CALDWELL 106 - 47 Tucanae	00h 24m 57.9s	-71° 58' 10"	4.0	Globular cluster	50.0
NGC6025 CALDWELL 95	16h 05m 00.5s	-60° 29' 07"	5.1	Open cluster	15.0
NGC6193 CALDWELL 82	16h 42m 50.6s	-48° 48' 02"	5.2	Open cluster	14.0
NGC6397 CALDWELL 86	17h 42m 19.0s	-53° 40' 55"	5.3	Globular cluster	31.0
NGC6752 CALDWELL 93	19h 12m 37.3s	-59° 56' 50"	5.3	Globular cluster	29.0
NGC6087 CALDWELL 89 - S Normae cluster	16h 20m 31.9s	-57° 56' 49"	5.4	Open cluster	15.0
NGC6067	16h 14m 45.6s	-54° 16' 07"	5.6	Open cluster	15.0
NGC5281	13h 48m 01.8s	-63° 00' 32"	5.9	Open cluster	8.0
NGC6250	16h 59m 24.1s	-45° 57' 58"	5.9	Open cluster	16.0
NGC5316	13h 55m 25.5s	-61° 56' 52"	6.0	Open cluster	15.0
NGC6322	17h 19m 51.7s	-42° 57' 13"	6.0	Open cluster	5.0
NGC5617	14h 31m 14.6s	-60° 47' 56"	6.3	Open cluster	10.0
NGC6167	16h 36m 05.9s	-49° 48' 44"	6.7	Open cluster	7.0
NGC362 CALDWELL 104	01h 03m 54.8s	-70° 44' 26"	6.8	Globular cluster	14.0
NGC6388	17h 37m 44.8s	-44° 44' 44"	6.8	Globular cluster	10.4
IC4651	17h 26m 24.9s	-49° 57' 36"	6.9	Open cluster	10.0
NGC6208	16h 51m 02.0s	-53° 44' 18"	7.2	Open cluster	18.0
NGC6200	16h 45m 37.7s	-47° 30' 20"	7.4	Open cluster	15.0
NGC5606	14h 29m 16.3s	-59° 43' 16"	7.7	Open cluster	3.0
NGC6352 CALDWELL 81	17h 27m 00.5s	-48° 26' 19"	7.8	Globular cluster	9.0
NGC6584	18h 20m 13.5s	-52° 12' 18"	7.9	Globular cluster	6.6
NGC6259	17h 02m 12.4s	-44° 40' 59"	8.0	Open cluster	15.0
NGC6152	16h 34m 19.1s	-52° 41' 04"	8.1	Open cluster	25.0
NGC6362	17h 33m 59.0s	-67° 03' 38"	8.1	Globular cluster	15.0
NGC6204	16h 47m 36.6s	-47° 02' 50"	8.2	Open cluster	6.0
NGC6249	16h 59m 08.8s	-44° 50' 03"	8.2	Open cluster	6.0
NGC6031	16h 09m 08.5s	-54° 04' 08"	8.5	Open cluster	3.0
NGC6744 CALDWELL 101	19h 11m 39.4s	-63° 49' 22"	8.5	Galaxy	20.1 x 12.9
NGC5999	15h 53m 44.3s	-56° 31' 53"	9.0	Open cluster	3.0
NGC6101 CALDWELL 107	16h 28m 06.7s	-72° 14' 42"	9.2	Globular cluster	5.0
NGC330	00h 57m 00.7s	-72° 21' 15"	9.6	Globular cluster	1.4
NGC5315	13h 55m 28.2s	-66° 36' 40"	9.8	Planetary nebula	13.8"
NGC6115	16h 25m 59.6s	-51° 59' 53"	9.8	Open cluster	3.4
NGC6221	16h 54m 30.6s	-59° 15' 00"	9.9	Galaxy	3.5 x 2.5
NGC7213	22h 10m 31.0s	-47° 04' 06"	10.1	Galaxy	3.1 x 2.8
IC4499	15h 03m 40.7s	-82° 17' 27"	10.1	Globular cluster	8.0
NGC6253	17h 00m 41.5s	-52° 44' 41"	10.2	Open cluster	4.0
NGC6300	17h 18m 52.4s	-62° 50' 26"	10.2	Galaxy	4.3 x 2.8
NGC6684	18h 50m 55.3s	-65° 08' 55"	10.4	Galaxy	4.6 x 2.9
IC5052	20h 53m 59.7s	-69° 07' 44"	10.5	Galaxy	5.9 x 0.9
IC5152	22h 03m 59.6s	-51° 11' 56"	10.5	Galaxy	5.0 x 3.2
NGC7049	21h 20m 21.2s	-48° 28' 34"	10.6	Galaxy	4.5 x 3.0
NGC6005	15h 57m 24.9s	-57° 30' 03"	10.7	Open cluster	5.0
NGC7090	21h 37m 51.1s	-54° 27' 53"	10.7	Galaxy	7.3 x 1.2
NGC7144	21h 53m 59.8s	-48° 09' 36"	10.8	Galaxy	3.7 x 3.6
IC5201	22h 22m 10.5s	-45° 56' 01"	10.8	Galaxy	8.5 x 3.9
NGC376	01h 04m 31.1s	-72° 43' 01"	10.9	Open cluster	1.0
NGC6782	19h 25m 42.4s	-59° 52' 55"	11.0	Galaxy	2.4 x 2.0
NGC7205	22h 09m 54.1s	-57° 20' 38"	11.0	Galaxy	4.0 x 2.0
NGC152	00h 33m 45.7s	-73° 00' 21"	11.0	Open cluster	1.7
NGC299	00h 54m 06.9s	-72° 05' 17"	11.0	Open cluster	42.0"
NGC361	01h 02m 51.0s	-71° 29' 58"	11.0	Open cluster	1.6
NGC643	01h 35m 20.5s	-75° 27' 17"	11.0	Open cluster	1.5

Main double stars

Name	RA (J2020.0)	DEC	Magnitude	Sep ('") / PA (°)
DUN 166 AB (α Cir)	14h 44m 09.0s	-65° 03' 33"	3.18 / 8.47	15.70 / 224
LCL 119 AC	00h 32m 27.2s	-62° 50' 52"	4.28 / 4.51	27.30 / 168
SHY 114 AE	00h 32m 27.2s	-62° 50' 52"	4.28 / 5.07	548.90 / 118
HJ 4825 AB,C	16h 05m 10.6s	-57° 49' 44"	4.64 / 8.02	11.30 / 242
BSO 22 AB (δ_1 Aps)	16h 23m 24.4s	-78° 44' 30"	4.90 / 5.41	103.0 / 10
HJ 3423 A,CD	01h 16m 25.0s	-68° 46' 14"	5.00 / 7.85	319.20 / 310
TOK 331 AC	19h 24m 27.4s	-54° 23' 03"	5.02 / 7.09	416.30 / 171
SHY 314	19h 11m 58.8s	-68° 23' 26"	5.41 / 7.59	448.90 / 1
SHY 759 AB	19h 52m 26.1s	-59° 08' 29"	5.48 / 7.06	406.60 / 232
DUN 227	19h 54m 13.0s	-54° 55' 06"	5.80 / 6.39	23.0 / 148
HJ 5114 AB	19h 29m 23.9s	-54° 16' 60"	5.85 / 8.24	76.10 / 236
JRN 16 AD	14h 50m 28.2s	-66° 40' 33"	5.86 / 7.72	88.20 / 322
DUN 249 (DQ Gru)	23h 25m 02.1s	-53° 41' 56"	6.14 / 7.07	26.40 / 211
DUN 248 AB,C	23h 21m 56.9s	-50° 11' 48"	6.15 / 6.58	16.90 / 211
DUN 232 (μ_2 Oct)	20h 44m 02.8s	-75° 16' 42"	6.51 / 7.07	16.40 / 19
JC 25 AB	21h 45m 23.7s	-57° 13' 57"	6.54 / 6.90	152.30 / 4
JC 25 AC	21h 45m 23.7s	-57° 13' 57"	6.54 / 7.47	187.0 / 214
DUN 2 (λ_1 Tuc)	00h 53m 10.2s	-69° 23' 44"	6.70 / 7.35	91.80 / 15
DUN 247	23h 19m 11.1s	-60° 53' 39"	6.87 / 8.17	51.80 / 294

Navigation map



Main objects visible on chart 26



Chart leyend

Chart 26, 30° around 20.0h, -70.0° (Pavo, Octans, Indus, Telescopium)

