

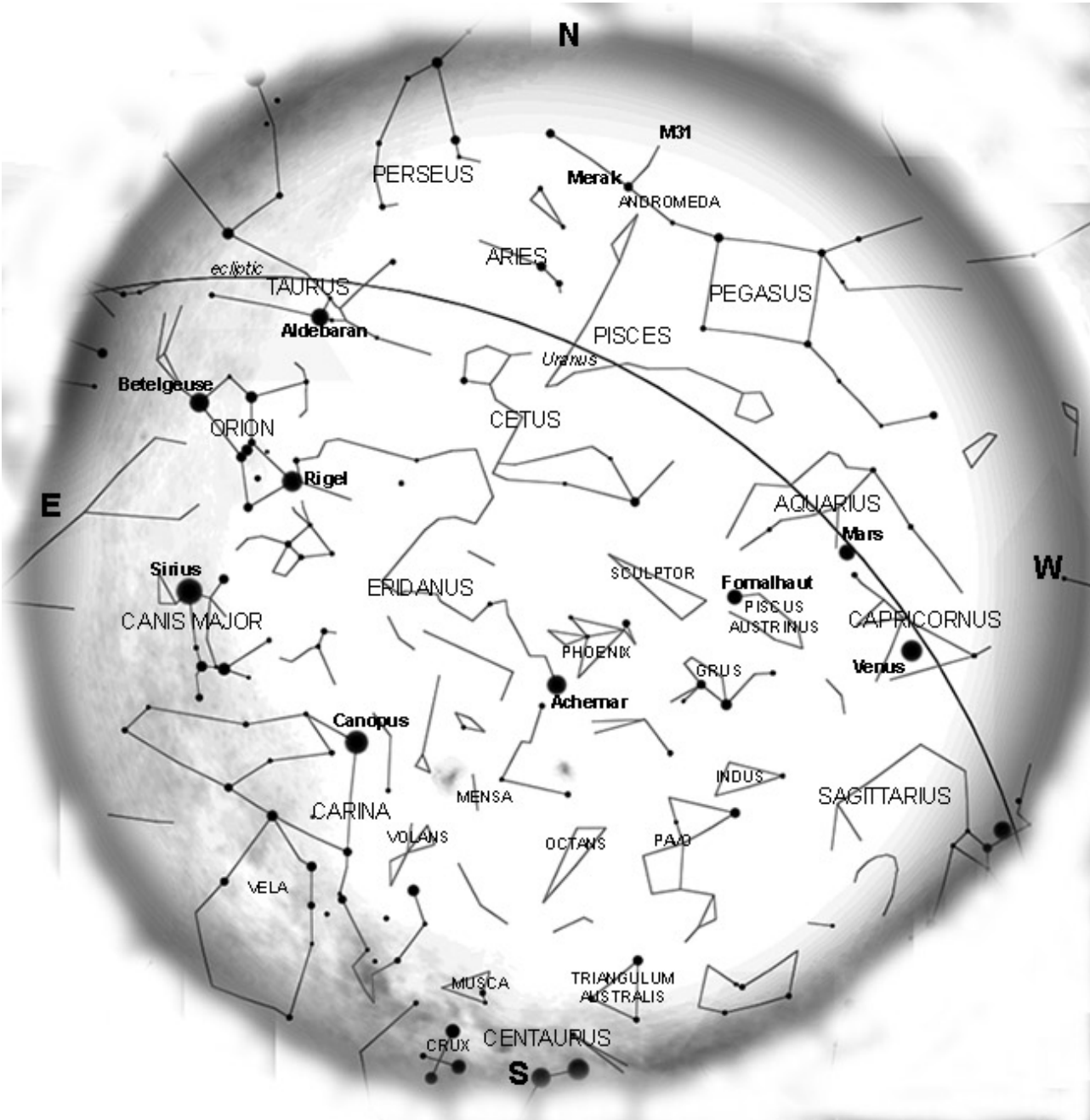
DECEMBER 2016



1. SKY MAPS

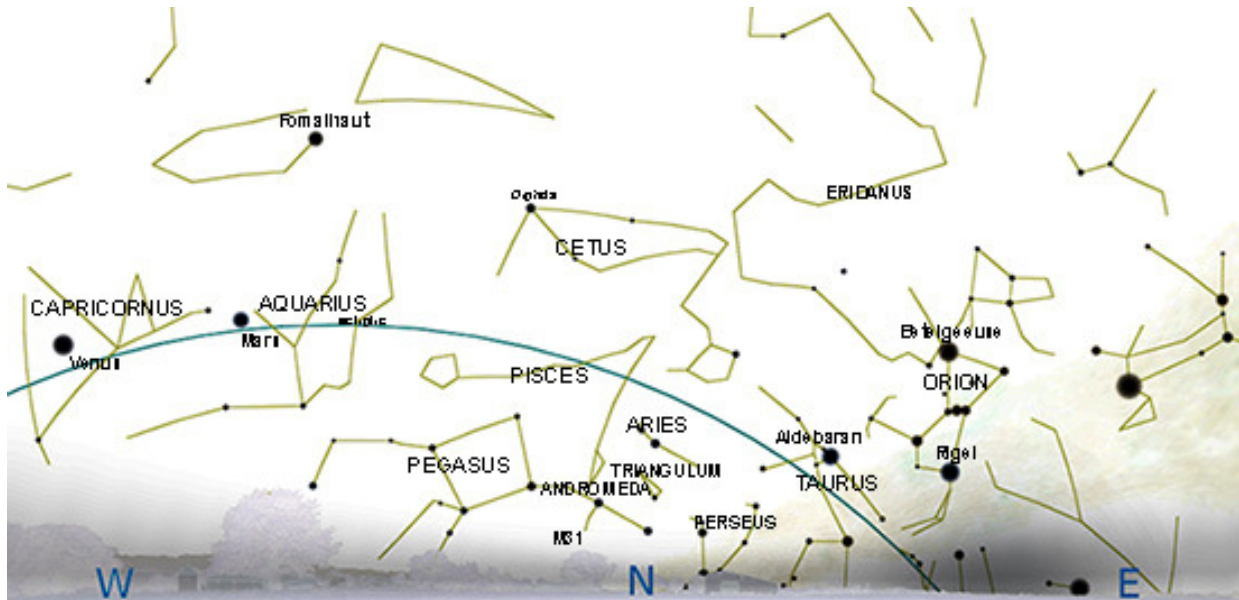
EVENING SKY MID DECEMBER at 21^h00

(WHOLE SKY)



EVENING SKY MID DECEMBER at 21^h00

(NORTH DOWN)



PLEASE NOTE: All events predicted below are as observed from **Hermanus, Western Cape, South Africa**

2. THE SOLAR SYSTEM

PLANET VISIBILITY

Mercury	Visible low in the west after sunset
Venus	The "Evening Star"
Mars	Visible in the evening
Jupiter	Visible in the morning
Saturn	Initially too close to the sun to be observed becoming visible in the morning
Uranus	Visible in the evening
Neptune	Visible in the evening
Pluto	Visible in the evening becoming too close to the sun

Sun & Planets	DECEMBER 2016		1 st	31 st
Sun Constellation Length of day	Ophiuchus 14h 17m to 14h 25m	Rises:	05h24	05h24
		Transits:	12h33	12h47
		Sets:	19h41	19h59
Mercury ϕ phase Constellation Magnitude	6" to 10" 83% to 4% Sagittarius -0.5 to +3.2	Rises:	06h31	05h20
		Transits:	13h52	12h19
		Sets:	21h13	19h19
Venus ϕ phase Constellation Magnitude	17" to 22" 68% to 57% Sagittarius to Capricorn -4.2 to -4.3	Rises:	08h27	09h19
		Transits:	15h41	16h01
		Sets:	22h55	22h42
Mars ϕ phase Constellation Magnitude	6" 88% to 90% Capricornus to Aquarius +0.6 to +0.9	Rises:	10h26	10h19
		Transits:	17h18	16h46
		Sets:	00h11	23h13
Jupiter ϕ Constellation Magnitude	33" to 35" Virgo -1.8 to -1.9	Rises:	02h48	01h02
		Transits:	09h06	07h23
		Sets:	15h22	13h44
Saturn Diameter Constellation Magnitude	15" Ophiuchus +0.5	Rises:	06h03	04h19
		Transits:	13h08	11h25
		Sets:	20h13	18h31
Uranus ϕ Constellation Magnitude	4" Pisces +5.7 to +5.8	Rises:	15h36	13h37
		Transits:	21h17	19h18
		Sets:	03h02	01h03
Neptune ϕ Constellation Magnitude	2" Aquarius +7.9	Rises:	12h18	10h22
		Transits:	18h44	16h48
		Sets:	01h15	23h14
Pluto Constellation Magnitude	Sagittarius + 14.3	Rises:	08h05	06h11
		Transits:	15h09	13h15
		Sets:	22h13	20h19

'Beg

inner's guide' to the table above.

Phase: In a telescope, the inner planets (Mercury, Venus and Mars) appear to us in phases, depending on the angle of the Sun's illumination, as does the Moon. The **angular diameter** (ϕ) is given in arc seconds ("). This is the apparent size of the object as we see it from Earth. To illustrate this point, consider the average binoculars through which we see about 7° of sky. Therefore, for example, Mars at 19" on 1st December would cover approximately 1/1300th of the field of view.

Magnitude: we are accustomed to hearing stars described in terms of 'magnitude', for example **Antares** (in Scorpius) at +1.05 and the planet **Jupiter**, at magnitude -1.9. The latter is considerably brighter than Antares as the scale is 'inverse'; *the brighter the object, the lower the number*. A 'good' human eye on a clear night can see down to a magnitude of about +6.

Transit: When an object crosses the local **meridian** it is said to '**transit**'. The local meridian is an imaginary line from the horizon directly north passing overhead to the horizon directly south.

THE MOON.

Lunar Highlight (information from the Sky Guide Africa South):

GASSENDI

Type: Crater with a double peaked central mountain and a system of hills rising from its central floor. **Location:** Northern edge of Mare Humorum.

Diameter: 114 km

Best seen: three days after **first Quarter** and two days after **last Quarter**

Notes: Named for Pierre Gassendi, 17th century astronomer. The rilles in this crater can be seen in modest-sized telescopes. **Age:** about 3.9 billion years.



Eclipses (visible from Southern Africa): There are no eclipses in December 2016.

METEOR SHOWERS

Name	Date & Time of Max	Duration	Radiant	ZHR velocity		Observing Prospect
				ZHR	velocity	
December Phoenicids	6 th December 20h30 to 02h00	3 rd to 9 th December	7 ^o NW of Achernar	5	22	Good
Puppis-Velids	29 th December	5 th December To 7 th January	27 ^o WNW of Crux	5	40	Favourable

Key to the table above:

ZHR – zenithal hourly rate
vel. - velocity in km per second

For more details regarding meteor watching, please see the Sky Guide Africa South (SGAS), pages 86- 87

3. DECEMBER HIGHLIGHTS FROM THE SKY GUIDE

<i>Date</i>	<i>Time</i>	<i>Item</i>
1	21h56	Moon furthest south (-18.9°)
2		Moon to Pluto 2.8° south
3	12h00	Moon to Venus 6° south (Sun 43° to the west)
5	12h39	Moon to Mars 3.1° south
6		Moon to Neptune 0.7° south
7	11h03	Moon 1 st quarter
9		Moon to Uranus 2.9° north
10	13h03	Saturn at conjunction
11	05h59	Mercury at greatest elongation (20.8° east)
13	01h27	Moon at perigee (368 500km)
	06h14	Moon to Aldebaran 0.4° south
14	02h05	Full Moon
	23h43	Moon furthest north (+18.9°)
15		Ceres stationary
18	20h14	Moon to Regulus 1.1° north
19		Mercury stationary
21	03h56	Moon last quarter
	12h45	SUMMER SOLSTICE
22	18h37	Moon to Jupiter 2.7° south
23		Moon to Spica 5.8° south
25	07h55	Moon at apogee
27		Moon to Saturn 3.6° south
28	20h41	Moon at inferior conjunction
29	05h30	Moon furthest south (-19°)
	08h53	New Moon
		Moon to Mercury 1.8° south
		Uranus stationary
30		Moon to Pluto 2.7° south
		Puppis-Velid meteor shower

4. STARGAZING

SUGGESTED BEST OBSERVATION DAYS FOR DECEMBER:

Unless specifically targeting the moon, *my* suggestion for the most convenient dates to plan *evening* stargazing in December: **1st December** (moonset 21h14) and **16th** (moonrise 22h10) to **31st December**



The next stargazing evening is scheduled for Friday 6th January 2017, with the usual weather caveat!

More information will be published closer to the time.

5. DEEP SKY



Summer evenings

(with special thanks to Auke Slotegraaf)

Early summer evenings are contradictory. They are both the best and worst times for observers keen on galaxy spotting.

On the one hand, our own Milky Way galaxy - the largest galaxy we can see from Earth - is almost invisible. Its milky band, despite eternally encircling the sky, is draped along the horizon. Buildings, trees and other terrestrial features may hide it completely. The brightest part of the Milky Way, the galactic centre, is hidden by the glare of the Sun, which passes through Sagittarius in December and January.

When looking directly overhead on such evenings, we're looking outward from the Milky Way, into inter-galactic space. Very few nebulae and open star clusters will be seen in this direction, since these objects typically make up the arms of our spiral galaxy. Instead, we're peering into the realm of the galaxies.

High overhead after sunset lies the dim constellation Fornax, home to the splendid Fornax Propeller (NGC 1365). This magnificent barred spiral galaxy can be glimpsed in binoculars. A modest-sized telescope under dark skies, or a larger instrument from a somewhat light-polluted vantage point, reveals its two graceful spiral arms. Each arm stretches out for more than 100,000 light years, making this galaxy about twice the size of our own.

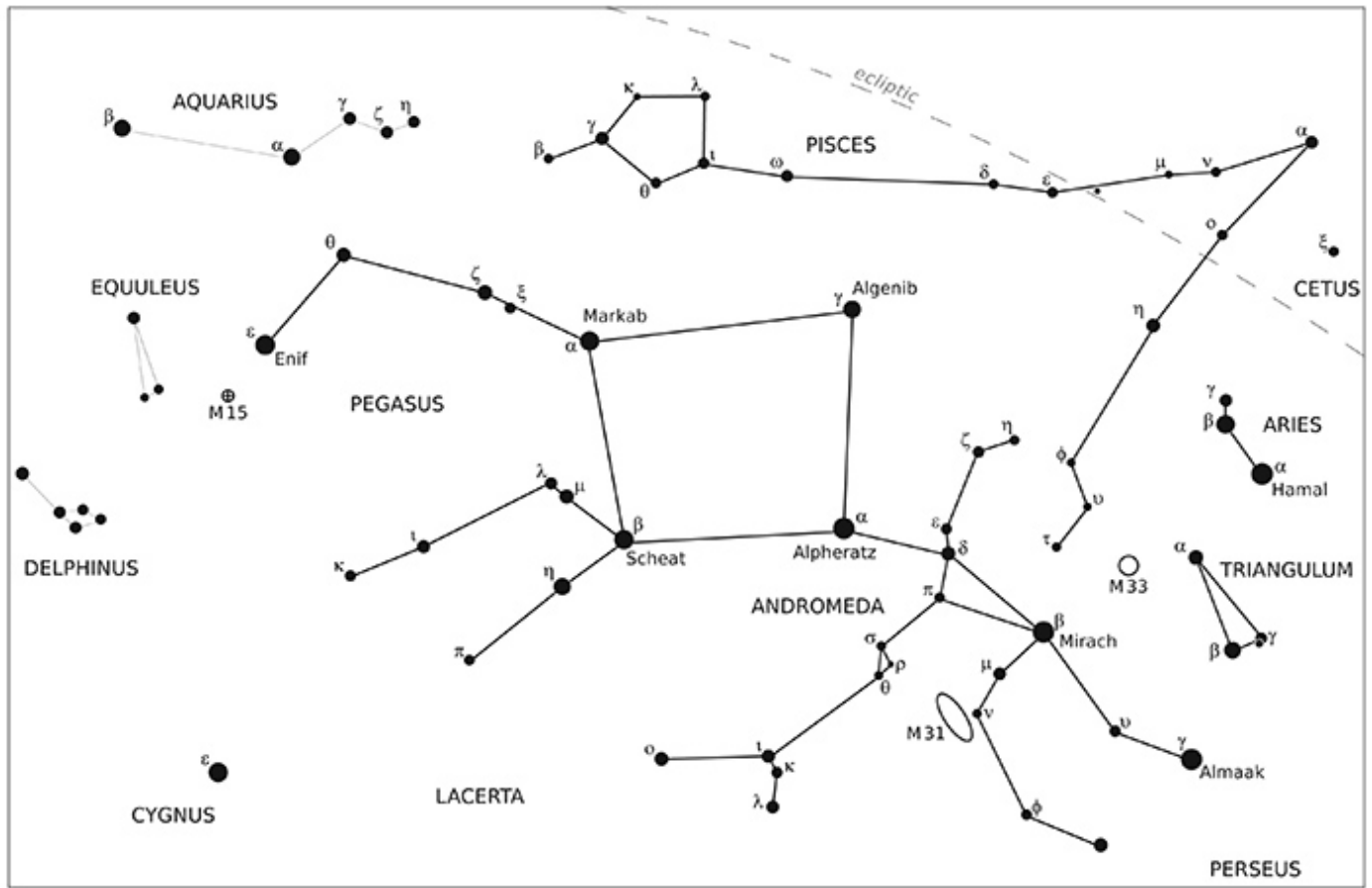
But two far more famous galaxies are on view during summer. To find this pair of gems, face north, and look for the iconic Square of Pegasus. These four stars mark the body of the mythological flying horse, which we see vaulting gracefully across the North horizon marker. Trailing behind Pegasus is the beautiful princess Andromeda. The star marking her head - Alpheratz - is shared with Pegasus, and is one of a few "linking stars" in the heavens.

Star-hop from Alpheratz to Mirach (beta Andromedae) and then (discretely) follow the line to her knee, marked by nu Andromedae. A short distance on brings you to the celebrated Andromeda Galaxy, Messier 31. From a dark site, M 31 is a naked-eye object, appearing like a small fuzzy star. Binoculars show it immediately, as a bright round glow (the nuclear region) within a dimmer extended flat oval. This sister galaxy to our own is a massive spiral that we see more-or-less edge on. Like our Milky Way, its arms are rich in star clusters, and bright and dark nebulae. Because of its distance, these features merge into a hazy glow in small telescopes. A modest-sized telescope will reveal a dim dark band near the edge of the glowing oval. Larger telescopes begin to pick out individual super-clusters and star-forming regions within the galaxy.

The second galactic gem to snack on lies on the opposite side of Mirach. Look to the right of Andromeda for the obvious, narrow triangle predictably called Triangulum. Next, find Triangulum in your binoculars. The longest side of the triangle is about 7° long so the entire triangle will fit into wide-field binoculars. Higher-power models can have fields as narrow as 5°. Find alpha Trianguli, a bright pale-yellow star known in Arabic as "Ras al Muthallah", meaning "the head of the triangle". Scan just 2.5° in the direction of Alpheratz and you'll find an obvious little star (at 6th magnitude it is visible to the naked eye). Continue in this direction for another 2° and you're spot-on Messier 33, the Triangulum Galaxy. Look for a pretty large, round, glow - unlike Messier 31, we see Messier 33 almost face on. Its delicate spiral arms are beautifully shown in long-exposure photographs.

With these two famous northern galaxies safely stored in your memory palace, turn southward and enjoy our very own Cape Clouds. Much smaller in physical extent than M 31 or M33, but also much closer to home, the two Magellanic Clouds can be seen with the naked eye. Summer evenings show these fuzzy patches at their best, with the Small Magellanic Cloud at its highest early evening, and the Large Magellanic Cloud culminating around midnight. The Large Cloud in particular is a treasure trove of star clusters, star-forming regions, and diffuse nebulosity. An observer using binoculars can see about as much detail in the Large Cloud as can be seen in Messier 31 with a 32-inch (81 cm) telescope!

After an evening's extra-galactic galaxy hunting, it's probably time to sit back and enjoy our own Galaxy, which has, in the hours since sunset, climbed higher in the sky. By morning, the Milky Way arches overhead, from the Pointers and Crux in the south-east through old Argo Navis at the zenith and down to Orion in the north-west.



Foot note

Although very low on the northern horizon, Andromeda is still available to the southern hemisphere viewers but we need to be quick as she is disappearing fast into the western sky. We gave it our best shot at the Southern Star Party in Bonnievale last month but, sadly, the weather did not play along. I, for one, did not see our closest neighbour galaxy, M31.

On 16th December, the Andromeda Galaxy sets at about 21h20. Sunset is 19h55 with the moon rising at 22h10. A narrow window, indeed! Will the cloud play along? Watch this space...

However, more promising is M33, 4^o west-north-west of α Trianguli.

HOW TO READ A STARCHART [adapted to southern African conditions from Brian Ventrudo's "One Minute Astronomer"]

When you're just starting out you need a good basic star chart that shows you where to find the bright stars and main constellations at a particular time and place. At first, star charts are a little confusing. So here's how to read a star chart:

On page 1 above there is a basic star chart showing the sky on 15th of the month at 21.00 from 34.4° south and 19.2° east (Hermanus).

The chart tries to represent a hemispherical sky on a flat surface. The edge of the chart represents the horizon, and the centre of the chart is supposed to represent the zenith (the point directly overhead) at 34° south. East and west are reversed compared to a map of the Earth but they will point in the right directions when you raise the map over your head.

To learn the night sky, you will need star charts.

- Find a location that's isolated from street and house lights. Stray light will make it harder for you to see fainter stars. Also, for the same reason, try to avoid nights with a full moon or too much haze.
- Once you go outside, give your eyes 5 or 10 minutes to become adapted to the dark. And to see the star charts, use a red LED flashlight or a white flashlight covered with red plastic. The red light will preserve the sensitivity of your eye for night viewing.
- Pick a direction to face, say, South, and rotate the chart so South is at the bottom. Now raise the chart overhead. The directions on the chart will now correspond to the directions in the sky.
- Don't try to take in the whole sky at once. Choose a quarter of the map, preferably one with several bright stars or a large well-known constellation like Orion or Crux (Southern Cross). Now, look up at the quarter of the sky that corresponds to the quarter of the map. Make a connection with what you see in the sky with what you see on the map. Take your time... it's a little strange and overwhelming at first.
- Learn a few more stars at a time... don't rush. Once you've identified a few bright stars and constellations, move from what you know to what you don't know. Once you've learned most of a quarter of the sky, move to another quarter.
- While the charts are set for 21.00 (9 p.m.) local time, they are still useful for an hour or two on either side. The stars will appear in about the same position, except for the stars near the horizon. After 3 hours, the stars will have turned 1/8 of the way around the sky. And after 6 hours, they will have turned 1/4 of the way around the sky.
- If you see an out-of-place star near the ecliptic (and in one of the constellations of the zodiac), it's almost certainly a planet. Since the planets move around in the sky almost daily, you will need to consult an almanac or website to figure out which planet you are seeing. We also review the positions of the planets each month in the SKY THIS MONTH.

That's all there is to it. Well, that and a whole lot of practice. Be patient, and savour your personal discovery of each new star and constellation.

Please keep in touch...

Don't forget to have a look at our excellent website, edited by Derek Duckitt.
<http://www.hermanusastronomy.co.za/>

Also...

[ASSA Deep-Sky Section](#)

Whatsapp chat group: [074 100 7237]

[Official Big 5 of the African Sky web page](#)

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[ASSA Deep-Sky Section mailing list](#)

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