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What's Up – December 2020

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Sun and Moon

The Last Quarter Moon falls on the 8th of December at 02h36 and the New Moon occurs on the 14th of December at 18h16. The First Quarter Moon falls on the 22nd of December at 01h41 while the Full Moon will occur on the 30th of December at 05h28.

The Moon will be at apogee (furthest from Earth) at a distance of about 405 000km on the 24th at 18h32. The Moon will be at perigee (closest approach to Earth) at a distance of about 361 800 km on the 12th at 22h42. The Summer Solstice will occur on the 21st of December at 12h02

On the 14th of December, there is a total solar eclipse. It will however be seen as a partial eclipse just before sunset in the western and central South Africa. First Contact will occur at about 18h50 for many SA towns and cities and end at sunset. For Cape Town 64% of the solar disc will be obscured, while towns such as Springbok and Vredendal will have 72% and 76 % obscuration.

Planetary and Other Events – Morning and Evening

Venus still shines brightly and dazzles at dawn as the morning star. Venus can be located near the stars of the constellation Libra. This planet will be near the Moon on the 12th of December. Mercury is very close to the sun and trapped in the solar glare, and it will be difficult to observe. Mars is still visible in the evening and can be located near the stars of the constellation Pisces. Mars will be near the Moon on the 24th of December. Jupiter and Saturn can be still be observed in the evening near the stars of the constellation Sagittarius and later near Capricornus by the end of the month. Jupiter and Saturn will be near the Moon on the 17th of December. Do not miss out on the great Saturn – Jupiter conjunction on the 21st of December. The angle between the two planets will be a mere one tenth of a degree, which is about one fifth of the Moon's diameter. This makes it the closest approach of the two since 1623! Uranus and Neptune can be observed with the aid of a telescope in the evening near the stars of the constellations Cetus and Aquarius, respectively. Uranus will be near the Moon on the 25th of December. With a telescope or binoculars, catch Jupiter and its moons in a line leading to Saturn on the last day of this year.

Three meteor showers are active in December, the December Phoenicids (active 3rd December – 9th December, peaking on the 6th), the Puppis-Velids (active 5th December – 7th January, peaking on the 29th) and the Geminids. The Geminids are active from the 4th – 16th December, peaking early morning on the 14th. Observations of the Geminids, which are one of the strongest meteor showers, can be done from 23:30 PM to 3:00 AM on the night of the 13th/14th and the radiant is located towards the Gemini constellation in a NNE direction. Observing prospects for the Puppis-Velids are good and they are best viewed between 22:30 PM and 03:30 AM looking towards the constellations of Puppis and Vela.

The Evening Sky Stars

The stars of the Great Square of Pegasus and of Andromeda can still be seen low in the north, with the Andromeda Galaxy visible as a faint fuzzy spot below the star Beta Andromeda. It's believed that in another few billion years, this galaxy will collide with our own Milky Way. Gas and dust clouds will collide, producing large numbers of new stars, but the odds are that not

even one star will collide with another. There's too much empty space. If the Sun were a 10 cm ball, the nearest star system (Alpha Centauri) would be about 3000 km away.

Much of the sky on December evenings is dominated by 'watery constellations' and birds. Above Pegasus and Andromeda are the dim stars of the Fish (Pisces) tied together at their tails with a knot, and above the Fish is Cetus, the Whale, representing the sea monster coming to devour Andromeda. The most famous star in Cetus is one that's not usually visible. Named 'Mira', i.e. 'wonderful', it was first recognised as a periodic variable by the Dutchman Jan Holwarda, who found that this star (discovered in 1596 by Fabricius) reached peak brightness roughly every 11 months, when it would typically be visible as a fairly dim star. In between this mysterious object would disappear. We now know of many similar stars, all of them cool 'red giants' hundreds of times the diameter of our own Sun. If Mira were placed at the centre of our solar system, Earth would be inside it! West of Cetus in the early evening sky is Aquarius the water carrier, while south of Aquarius are the stars of the Southern Fish, headlined by the brightish star Fomalhaut. West of the Southern Fish is the large dim triangle made by the stars of the Sea Goat.

High in the south is the bright star Achernar, with the stars of the Phoenix (the Fire Bird) just above it and the stars of the Toucan and the Crane to the right. The Peacock is moderately low in the SW, below and to the right of the Toucan. Continuing the birds-and-water theme, we find the Water Snake (which looks like a triangle!) directly below Achernar, while the celestial river Eridanus runs its course from Achernar to the knee of Orion, whose stars are rising in the east.

Below Achernar and to the right, among the stars of the Toucan, is the dim glow of the Small Magellanic Cloud. The Large Magellanic Cloud, below Achernar and to the left, is a bit easier to see, and was imagined by some South African groups to be a hunting plain for the gods. The two brightest stars in the sky, Canopus and Sirius, are rising in the southeast and east, respectively, with Orion shouldering his way into the summer skies in the northeast, preceded by Taurus the Bull. The small cluster of stars on the Bull's shoulder, the Pleiades, were used all over Africa to keep track of the seasons. In Isi Xhosa, Pleiades is called Isilimela. Rising in the east as well is the Milky Way, dimmer than the brilliant Milky Way of winter, but still very impressive on a dark Karoo night.

The Morning Sky Stars

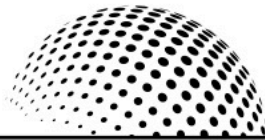
The Cross and the Pointers (the two brightest stars in Centaurus) are rising higher in the southeast this month. Just above the Southern Cross and the Housefly are the stars of the great ship Argo as it sails along the Milky Way, accompanied by the dim stars of the Flying Fish. The Milky Way still stretches across the predawn sky from the southeast to the northwest as it did last month, running from Scorpio in the ESE through the Wolf and the Centaur to Argo, then west through the stars of the Unicorn, Orion and the Twins. The southern part is much brighter with obvious dark patches, but all of it will reward a scanner with binoculars, revealing beautiful clumps and clustering of stars. Away from the Milky Way, bright Arcturus glows orange in the NE, with blue-white Spica rising in the E and lonely Alpheratz, heart of the great Water Serpent, above Regulus high in the north.

If you look carefully at where most of the bright stars are, you'll notice that they are concentrated near the Milky Way, but offset

a bit. These local bright stars are part of a 'spur' sticking out at a bit of an angle from the local spiral arm in the great pinwheel of stars that is our Milky Way Galaxy. Ironically, although most of the stars visible in the night sky are brighter than our Sun, most of the stars in the Milky Way Galaxy are much dimmer than the Sun. The common red dwarf stars that make up most of the

population are too dim to see unless they are extremely close, while the rare super giants are visible thousands of light years away.

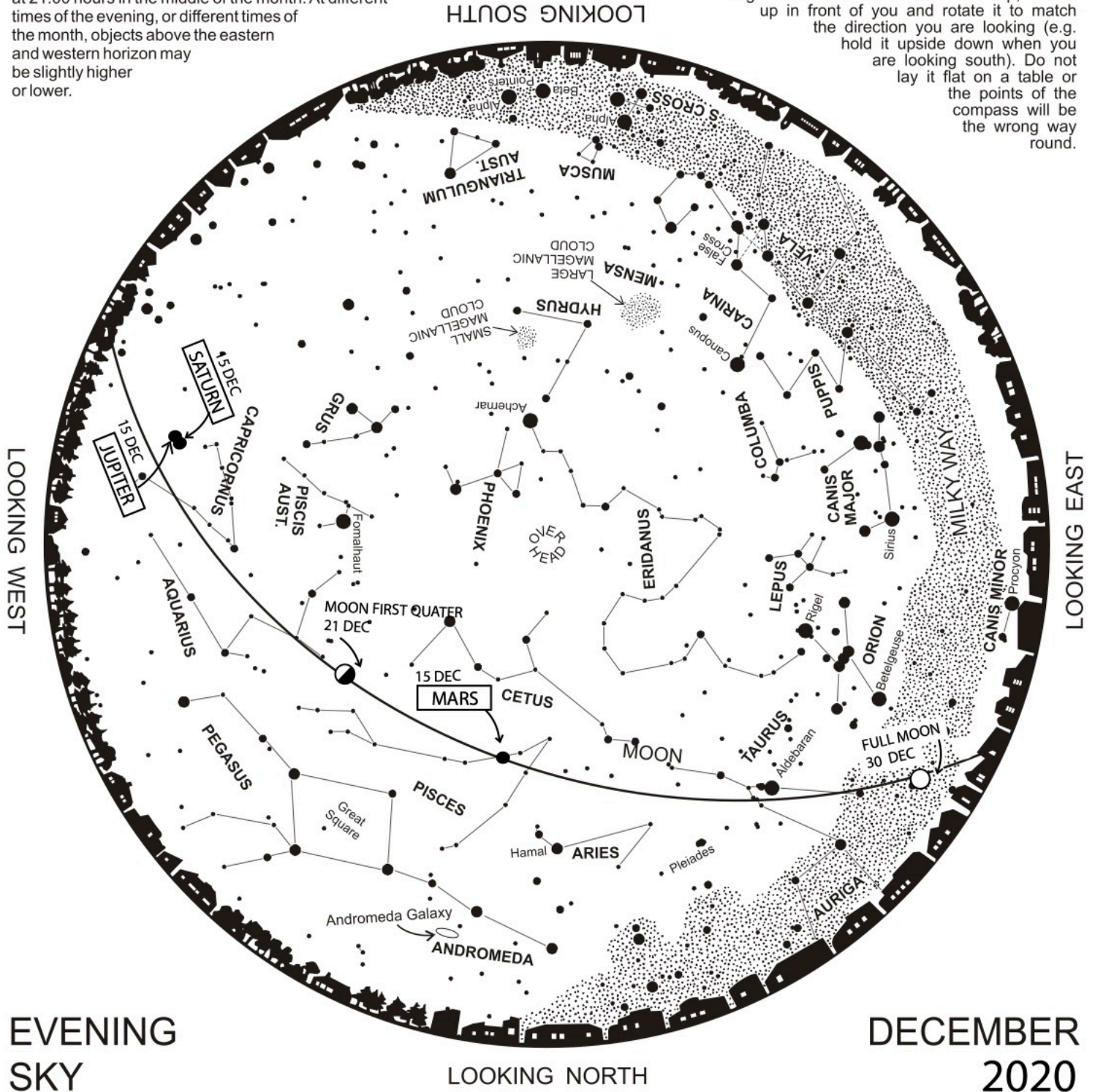
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IZIKO PLANETARIUM AND DIGITAL DOME

The map shows the night sky visible above the Cape at 21:00 hours in the middle of the month. At different times of the evening, or different times of the month, objects above the eastern and western horizon may be slightly higher or lower.

The centre of the map is the overhead point, the edge is the horizon. To use the map, hold it up in front of you and rotate it to match the direction you are looking (e.g. hold it upside down when you are looking south). Do not lay it flat on a table or the points of the compass will be the wrong way round.



EVENING SKY

DECEMBER 2020

Break out the telescopes for a once in a lifetime event occurring on 21 December, the Summer Solstice (longest day): a special 'Great Conjunction' of Saturn and Jupiter. Looking low to the west just after sunset, they'll appear so close together they'll seem like one object to the naked eye. Although a conjunction of these two planets occurs every 19.6 years, this month's event will be the closest since 1623 AD! The summer constellations Taurus (bull) and Orion (hunter) return to our evening skies, followed closely by the Milky Way stretching across our eastern horizon. Sirius, the brightest star in the night sky, lies within Canis Major (big dog) in the east.

The second brightest star, Canopus, is in the south-east in Carina (ship's keel). Since Sirius rises later than Canopus, in Xam Bushman starlore, Sirius was thought of as "the grandmother of Canopus", trailing behind the more agile Canopus. In the North, the faint Andromeda galaxy trails behind Pegasus (winged horse). Using binoculars to view Pleiades (isiLimela) in the north-east just below Aries (ram) reveals an impressive open cluster of stars. In African starlore, the appearance of these 'digging stars' in Southern Africa heralded the start of the growing season. The Moon appears in the evening until 5 December and then from 16 December, with Full Moon on 30 December.