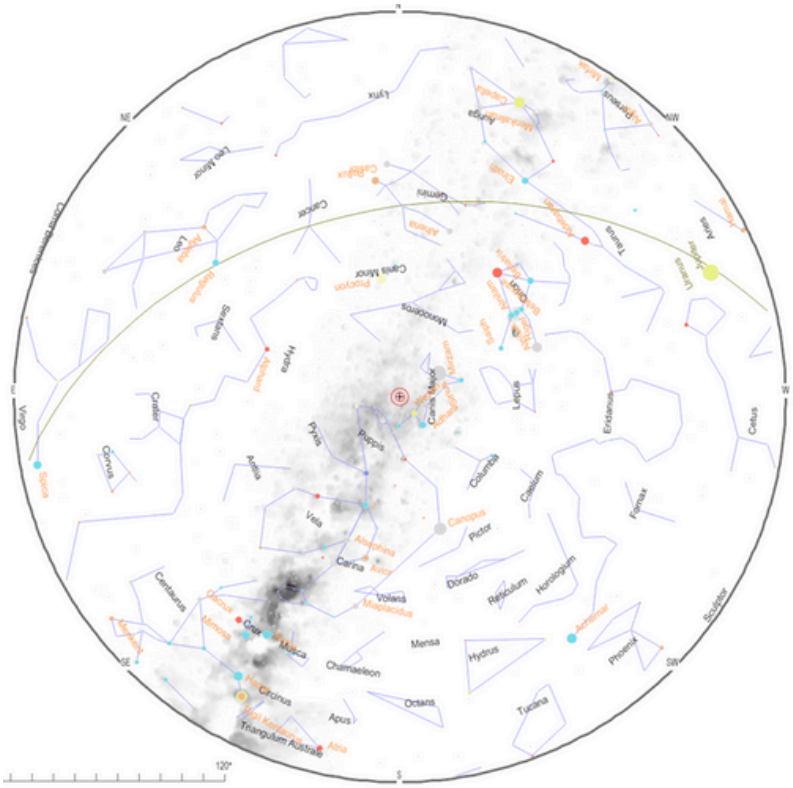
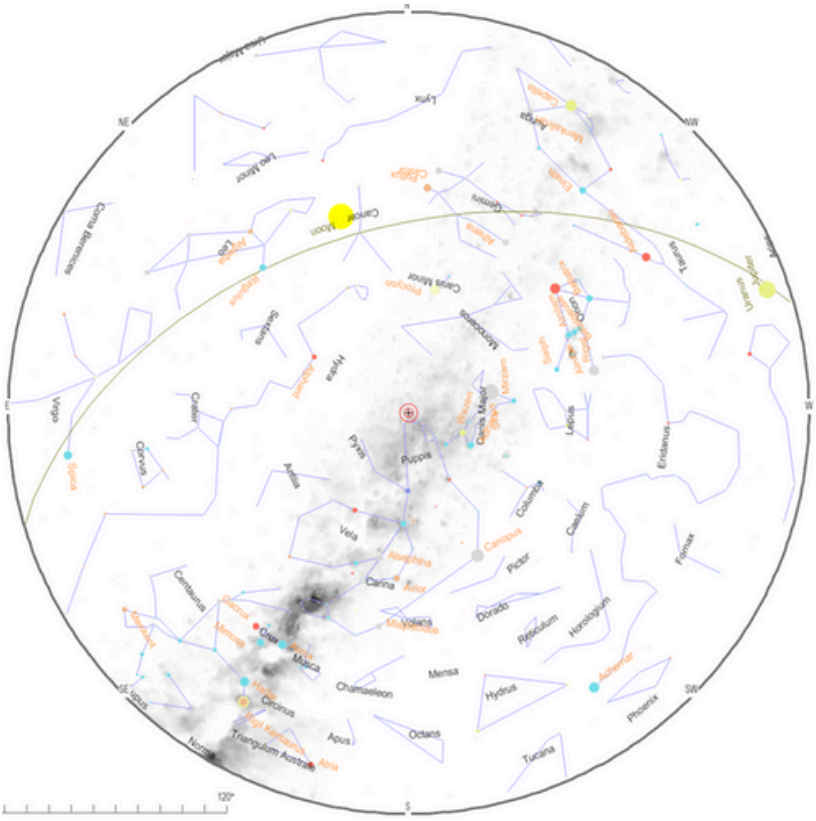
NAMIBIA Scientific Society
Wissenschaftliche Gesellschaft
P.O. Box 67, Windhoek, Namibia • Tel.: +264-(061-225 372) • Fax: +264-(0)61-226 846
email: info@namscience.com • www.namscience.com
110 Robert Mugabe Ave., Windhoek, Namibia

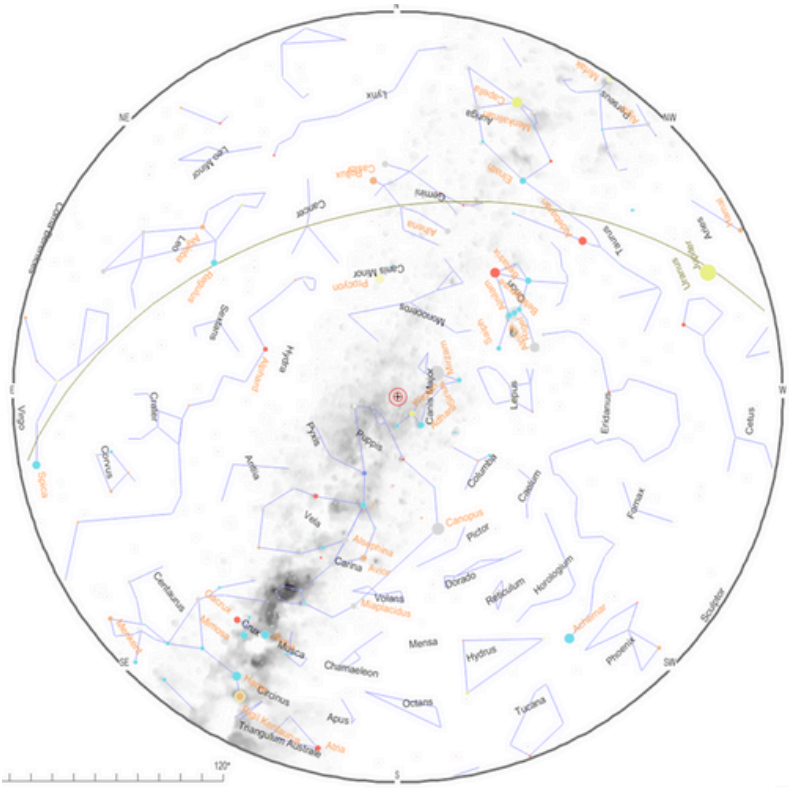
Astronews March 2025



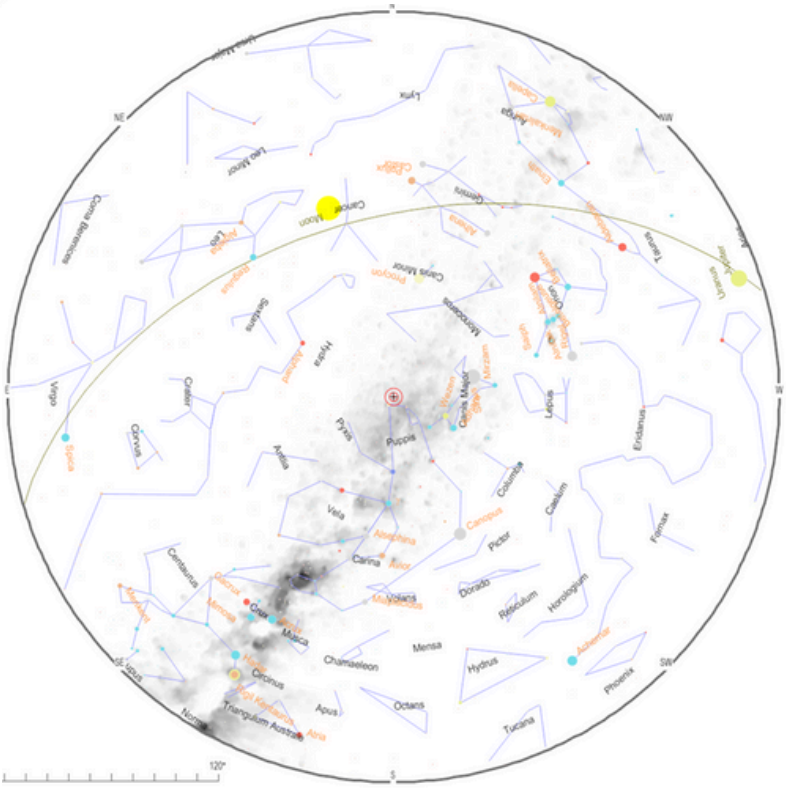
Skychart at Windhoek on 10 March 2025
at 21h00 CAT



Skychart at Windhoek on 20 March 2025
at 21h00 CAT



Skychart at Windhoek on 10 March 2025
at 04h00 CAT



Skychart at Windhoek on 20 March 2025
at 04h00 CAT

Moon Phases

06 Mar 2025	First Quarter
14 Mar 2025	Full Moon
22 Mar 2025	Last Quarter
29 Mar 2025	New Moon

Solar System

Planet Visibility	Rise	Culm.	Set
15 February 2025			
Mercury	07:55	13:47	19:38
Venus	07:46	13:30	19:15
Mars	15:22	20:39	01:57
Jupiter	12:41	18:05	23:29
Saturn	06:41	12:52	19:02

Mercury will reach its highest point in the sky in its Feb–Mar 2025 evening apparition. It will be shining brightly at mag -0.4. From Windhoek, this apparition will not be one of the most prominent and very difficult to observe, reaching a peak altitude of 10° above the horizon at sunset on 6 Mar 2025.

Venus will soon pass in front of the Sun at inferior solar conjunction. From Windhoek, it is not observable.

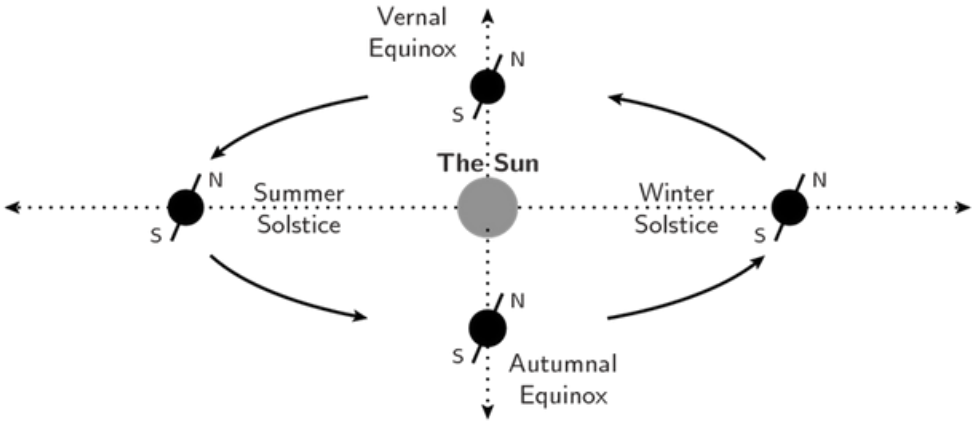
Mars recently passed opposition. From Namibia, it is visible in the evening sky as dusk fades to darkness. It will then reach its highest point in the sky at 20:39, 42° above your northern horizon. It will continue to be observable until around 01:15, when it sets in the north-western horizon.

Jupiter is still an early evening object, now receding into evening twilight. It will become visible at 41° above your north-western horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 23:29.

Saturn recently passed behind the Sun at solar conjunction. From Windhoek, it is not observable.

Other Occurrences:
In March evenings Crux will be high in the south, with Canopus in the south-west and Arcturus prominent in the northern sky. Scorpio will start to rise after midnight in the south east.

A Lunar eclipse occurs on Friday, 14 March. It will not be visible from Windhoek since the Moon will have set beneath the western horizon at the time. The Partial solar eclipse on Saturday 29 March is visible from Namibia.



The March equinox marks the first day of autumn for anybody living in the southern hemisphere, and the first day of spring for anybody living in the northern hemisphere. On the day of the equinox, everywhere on Earth has almost exactly 12 hours of day and night, as the Sun's annual journey through the constellations of the zodiac carries it across the celestial equator.

The word equinox is derived from the Latin words "aequus" (equal) and "nox" (night).

Equinoxes occur because of the Earth's polar axis which is tilted at an angle of 23.5° to the plane of its orbit around the Sun.

The direction of the Earth's spin axis remains fixed in space as it circles around the Sun, while the Earth's sight line to the Sun moves through the constellations of the zodiac.

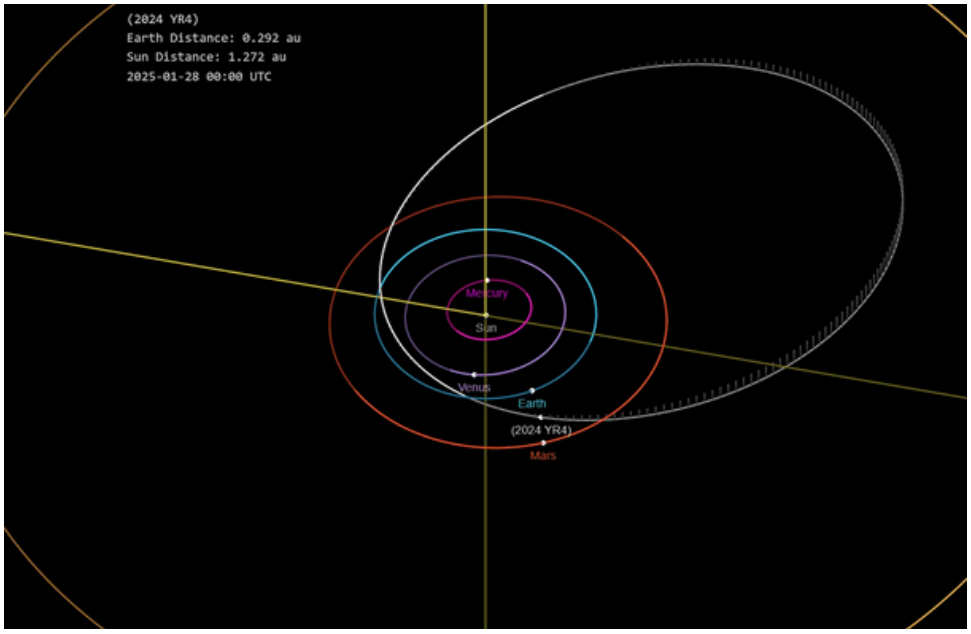
As a result, sometimes the Earth's north pole is tilted towards the Sun (in June), and sometimes it is tilted away from it (in December). This gives rise to the Earth's seasons:

Asteroid (2024 YR4) of the Month
by "Doomsday Prophet" Simon van der Lingen

Anyone that follows astronomy news will be familiar with 2024 YR4, the rather boring name of an asteroid that might just catastrophically rendezvous with us on 22nd December 2032. 2024 YR4 was picked up by ATLAS telescope 27th December 2024. Examination of slightly older imagery was able to determine its position a few days earlier and a tentative 3.99-year orbit plotted. The provisional orbit crosses Earth's orbit in two places every year – not a problem as long as Earth is not there at the same time. A quick check of future orbits showed that Earth and 2024 YR4 would be disturbingly close as the orbits crossed in December 2032. Since only a small part of the asteroid's orbit had been observed, an approximate orbit was determined and it was calculated that the likelihood of a collision was about 1.2%, so there was a 1 in 83 chance of a collision. Continued observation allowed more precise calculation of the orbit, but changed the likelihood of collision to 2.3%, or 1 in 43. Low enough, but hardly comforting. We also know quite accurately the plane on which the asteroid is orbiting, meaning that if it impacts Earth, we know at least the latitude along which it might land. Good news (for us), it is nowhere near Windhoek!

The name 2024 YR4 is not really a name at all, but only the label bestowed by the NASA Minor Planet Centre when the space-rock was first seen. 2024 gives us the year of discovery; Y indicates that it was discovered during the second half of the last month of the year, and R4 means that it is the 117th body to be discovered during that 2-week interval. The IAU (International Astronomy Union) is the body charged with officially naming all space objects and is presumably eagerly awaiting your suggestions.

We know that 2024 YR4 is between 30 and 100m across, hardly a planet-killer, but certainly capable of causing significant damage on a local scale. The Chicxulub impact, leading to the extinction of the dinosaurs 66 million years ago, is believed to have been between 10 and 13km across; even then, the effect on the earth's dominant life-form was due more to the change in vegetation as a result of world-wide climate changes caused by clouds of dust and smoke than the actual impact. It is more useful to consider the effect of four impactors of more comparable size. The meteor responsible for the Roter Kamm crater 3.7 million years ago was probably between the size of a pickup and 100m which left a crater 130m deep and 2.5km wide. The Hoba meteorite, about 3 x 3 x 1m landed near Grootfontein about 88,000 years ago and seems not to have left a visible crater at all. The Chelyabinsk meteor, which exploded 30km above the Russian town of the same name,



Plot of 2024 YR4 orbit as at 27th January 2025 (Wikimedia Commons)

was about 20m wide and shattered windows in six cities, injuring 1,500 people but killing no one. The famous Tunguska meteorite exploded perhaps 5-10m km above the ground in 1908, again leaving no impact crater but decking about 2,000 square kilometres of Siberian forest. Again, no fatalities recorded, probably because of the very low population density in that part of Russia. While size and speed are critically important in determining likely damage, the angle at which the meteorite strikes the atmosphere, the composition of the meteorite and the geology of the impact site (should it reach the earth) are all important. Obviously, the human geography of the impact site is also important. Apart from the Hoba meteorite, we also can't be certain of the size of the examples given – the size of each impactor is really just an estimate, based largely on the destruction caused.

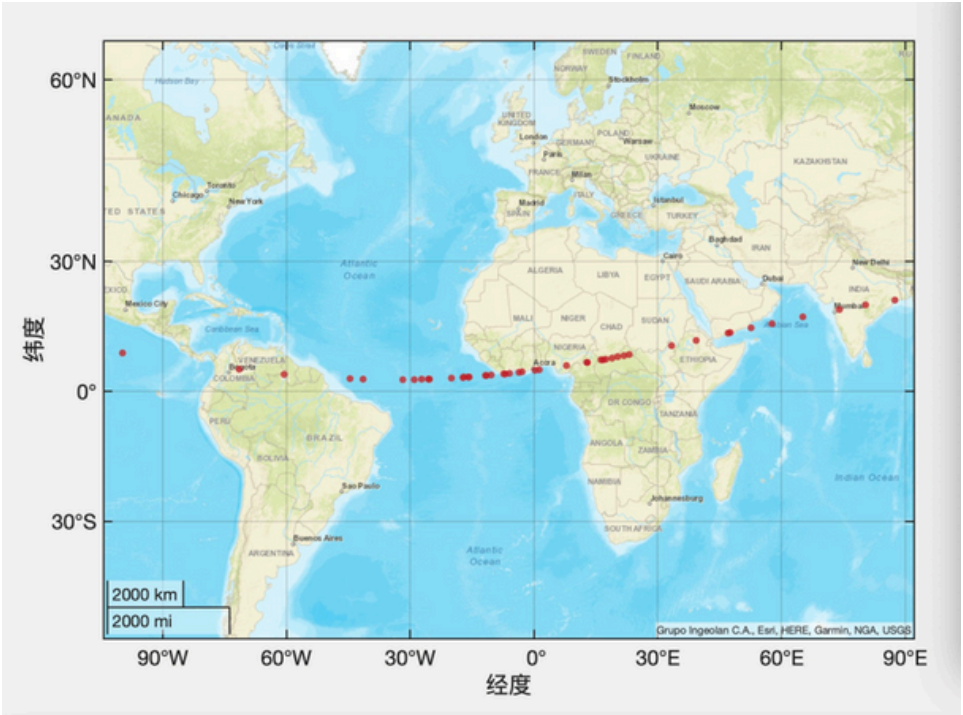
We have an estimate of the asteroid's size, its approximate orbit and likelihood of impacting Earth in the near future, and a track across the Earth where it could impact. There is no likelihood of an impact next time it crosses our orbit, but there is a lot that we can do during the next seven years.

Firstly, repeated measurements of the asteroid's position will enable us to better compute the orbit, and improve our confidence in the likelihood of impact.

Almost certainly, updating the orbital path will reduce the likelihood of collision to zero. The problem with this approach so far is that the asteroid is heading away from us and tracking a small, dark object becomes increasingly difficult for Earth-bound telescopes. Time has been reserved on the James Webb Space Telescope in March and again in May 2025 to check the asteroid's position. JWST is a big telescope, optimized for IR rather than visible light, so is well suited for finding small, dark objects like this. Accurate positions in March and two months later would enable quite precise calculation of the asteroid's orbit, and a much more definite calculation of the chances of impact.

It needs to be said, however, that even if perfectly calculated, and taking into account gravitational perturbations from the nearest planets, the orbit might change slightly if the asteroid is unduly influenced by other asteroids that it might come close to. Any such perturbations would be tiny, but if the forecast path is close enough to Earth, might re-inject unwelcome un-certainty into the forecast track. We should in any case continue looking for troublesome space rocks. This asteroid was detected by a NASA Telescope in Chile, named ATLAS, an acronym for Asteroid Terrestrial–impact Last Alert System. While credit must go to the telescope and astronomers for detecting the asteroid, it is a sad fact that it was found two days after its nearest approach to Earth, and that the other telescope system dedicated to looking for dangerous space-rocks (pan-STARRS, Panoramic Survey Telescope and Rapid Response System) in Hawaii) didn't see it at all. In all fairness, that nearest approach brought it to within 890,000km, nearly three times the Earth-Moon distance from us.

Should repeated measurements confirm that the risk is meaningful, we could try to divert the asteroid before it gets here. This is not as far-fetched as it may sound. In December 2022, NASA deliberately smashed a 610kg



Impact Risk Corridor for 2024 YR4

impactor into an asteroid called Dimosphos, , technically a moonlet of the bigger asteroid Didymus to see whether they could significantly alter the trajectory of Dimorphos around Didymus. The DART Mission (Double Asteroid Redirection Test) was far more successful than anticipated, reducing Dimorphos' orbit around Didymus by 32 minutes, far more than the 72 seconds that was anticipated. Dimorphos is about 130m wide, so it is significantly larger than 2024 YR4, so the same size impactor would have correspondingly more effect on the orbit. An early impact would allow the change in orbit to have the biggest effect. Planning for the mission started August 2018, but the planning and engineering phase of the programme could likely be reduced from the 39 months required for the DART project.

Finally, assuming that future recalculation of 2024 YR4's orbit show that Earth is in fact safe, a mission to the asteroid would seem to offer significant scientific benefits. Missions by JAXA (the Japanese Aerospace Exploration Agency) and NASA to recover material from asteroids Ryugu and Bennu both yielded unexpected information on the abundance of water in the early solar system and formation of organic chemicals including amino acids essential to the development of life. A rendezvous with a third asteroid would undoubtedly be valuable.

n summary, the detection of an asteroid likely to come close to Earth and possibly impact in December 2032 is concerning but will very likely prove to be quite safe. Thanks to an earlier mission, we know that we could likely nudge the asteroid into a safer path if necessary. The European Space Agency is offering regular updates on the website below:

https://blogs.esa.int/rocketscience/2025/02/04/asteroid-2024-yr4-latest-updates/

Credits
SkyChart: Cartes du Ciel / Wikipedia
Data: https://in-the-sky.org / ASSA Sky Guide 2025
Pictures: Wikipedia