

DISCOVER THE WONDERS ABOVE

STARGAZING LIVE
CALENDAR 2014

BBC

bbc.co.uk/stargazing



STARGAZING LIVE
CALENDAR 2014

DISCOVER THE WONDERS ABOVE

We hope you enjoy your BBC Stargazing Live calendar throughout the year. Each month has suggestions for what to look for in the night sky along with fantastic photographs and facts to inspire you to find out more.

You'll be able to see many of the features that we mention in the calendar by looking up to the night sky. However, using binoculars or a telescope will often give you a better view and we've noted when they're required.

Visit bbc.co.uk/stargazing to find more guides and content to help you get started. We have also included links to further sources of information in the calendar. (Please note that the BBC is not responsible for the content of external sites).

Happy stargazing for 2014!

YOUR STARGAZING LIVE TEAM



Professor Brian Cox



Dara O Briain



Liz Bonnin



Mark Thompson





JANUARY

EARTH

In early January, Earth will be nearly 5 million kilometres closer to the Sun than it will be in early July.

THE GAIA MISSION

will help test theories about our galaxy, the Milky Way, by measuring around one billion of its stars. This is still less than 1% of all the stars in the Milky Way.

IRON

The iron in your blood comes from the stars. Iron (and other heavy elements) are created and spread through space when a star dies in a supernova explosion.

THE UK'S SPACE SECTOR

contributes £9.1 billion a year to the economy and directly employs almost 29,000 people.

IT'S THE BEST MONTH

to observe Jupiter this year

VENUS

is the hottest planet in our Solar System, with an average temperature of 462°C. The surface pressure on [Venus](#) is equal to what you'd experience 1km under the sea.

MON	TUES	WED	THURS	FRI	SAT	SUN
Visit bbc.co.uk/stargazing to find events near you.		1	2	3	4	5 Jupiter is currently opposite the Sun so it appears larger and brighter than usual.
6	7 Stargazing Live BBC Two 8pm	8	9	10	11	12
13	14	15	16 Astronomy Photographer of the Year Competition opens. See Mark Thompson's Space Photography Guide	17	18	19
20	21	22	23	24	25	26
27	28 The Moon and Venus appear close together just before sunrise	29	30	31	1	2



FEBRUARY

1 SAT Crescent Moon	2 SUN	3 MON
4 TUES	5 WED	6 THURS
7 FRI	8 SAT	9 SUN
10 MON	11 TUES	12 WED
13 THURS	14 FRI	15 SAT
16 SUN	17 MON	18 TUES
19 WED The Moon, Mars and star Spica will form a triangle as they rise tonight.	20 THURS	21 FRI
22 SAT	23 SUN	24 MON
25 TUES	26 WED	27 THURS
28 FRI	1 SAT	2 SUN

Find the thin crescent Moon low in the west-southwest at around
18:00 GMT
and see if you can spot the elusive planet Mercury below it.

QUESTION
It's predicted that in 4 billion years our Milky Way galaxy will collide with the larger Andromeda galaxy. What do you think will happen?

Despite its thin atmosphere, Mars has dust devils, whirlwinds that can be 20km high and can circulate sand at speeds greater than 100km per hour. Watch the Stargazing Live film [Short guide to Mars](#).

THE MILKY WAY GALAXY

The bright centre of the Milky Way galaxy is 27,000 light years away. The best views of it are from the Southern Hemisphere. In the UK, the Milky Way is best seen during the winter and summer when it passes high across the sky. Find the best place to stargaze near you using the [Dark Sky Discovery](#) sites.

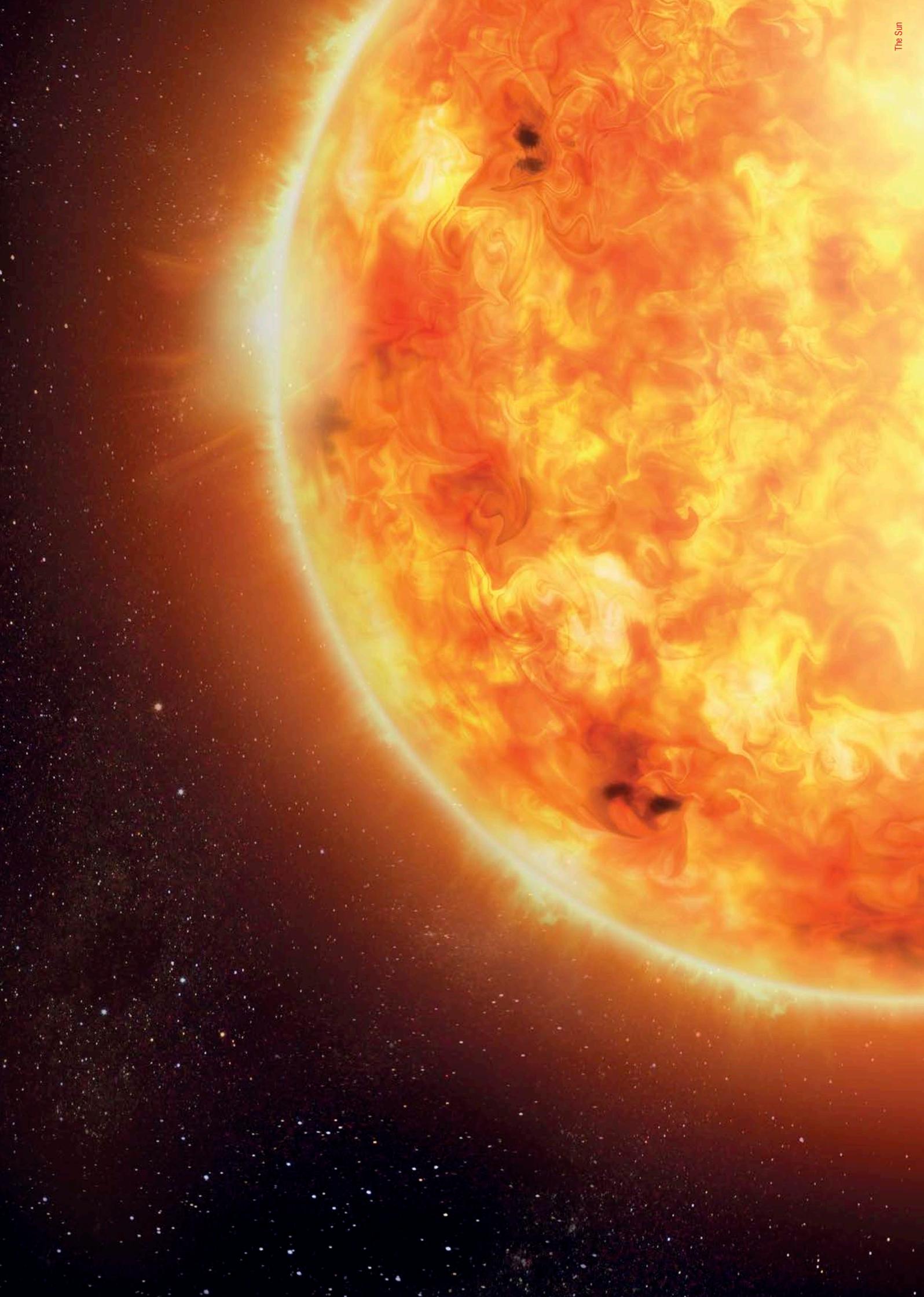
ONE LIGHT YEAR

measures just under 10 million million km. Find out more about astronomical distances with [BBC Science](#)

WEIGHTLESS CONDITIONS

aboard the [International Space Station \(ISS\)](#) occur because the station and astronauts are all falling towards Earth at the same rate. The ISS doesn't hit the ground because, as it travels forward, the Earth's surface curves away below it.

ANSWER
Both spiral galaxies will eventually become one giant elliptical galaxy (nicknamed Milkdromeda). Individual star collisions are unlikely due to the vast distances between them.



MARCH

ENERGY

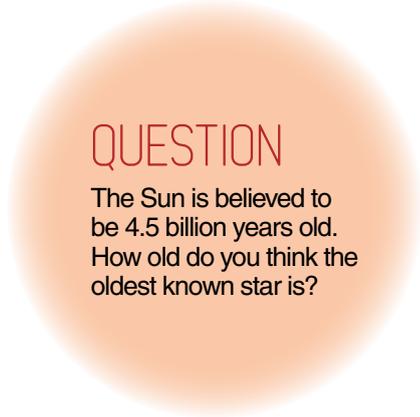
changes direction randomly for the first part of its journey after leaving the Sun's core. It's estimated that it takes anywhere from tens to hundreds of thousands of years for it to finally emerge from the Sun's surface.

THE ORION SPACECRAFT

will be the first since Apollo 17 in 1972 with the ability to carry astronauts beyond low Earth orbit. An uncrewed test flight is planned this year.

STARS

Some stars that we can see now may have already exploded and been destroyed, but they are so distant that the light from the explosion hasn't reached us yet. See the [Stargazing Live Short guide to the stars.](#)



QUESTION

The Sun is believed to be 4.5 billion years old. How old do you think the oldest known star is?

EQUINOX

The Sun moves from the southern to the northern half of the sky. Day and night are of equal length several days before at the equinox.

ANSWER

The Methuselah Star (HD 140283) is believed to be 14.5 billion years old, almost 3 times the age of the Sun. The star is in the constellation of Libra the Scales and you can see it with binoculars.

SAT	SUN	MON	TUES	WED	THURS	FRI
1	2	3	4	5	6	7
National Astronomy Week						
8	9	10	11 Jupiter is at its highest point in the night sky for many years. It takes 11.86 years to orbit the Sun and it will be 2025 before it reaches this point again.	12	13	14 National Science and Engineering Week 14 - 23 March.
15	16	17	18	19	20 Spring Equinox 16:57 GMT	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4



1 TUES	2 WED	3 THURS
4 FRI	5 SAT	6 SUN The crescent Moon sits below the bright planet Jupiter this evening.
7 MON	8 TUES Mars is opposite the Sun so it will be visible all night and at its highest, due south, around 01:00 BST.	9 WED
10 THURS	11 FRI	12 SAT
13 SUN	14 MON	15 TUES
16 WED	17 THURS	18 FRI
19 SAT	20 SUN	21 MON
22 TUES	23 WED	24 THURS Astronomy Photographer of the Year Competition closes.
25 FRI	26 SAT	27 SUN
28 MON	29 TUES	30 WED

Jupiter's four largest moons can be seen through a small telescope or with binoculars, if you have a steady hand.



MARS

Through a telescope it's possible to see Mars' frozen north polar cap, its bright deserts and dark features caused by exposed rock.



QUESTION

What's the average size of a rock that produces a meteor trail?

-248°C

The lowest recorded temperature in the Solar System is in the permanently shadowed regions of Hermite, a crater on the Moon.

SATELLITES

The night sky is constantly criss-crossed by artificial satellites. They usually appear as single, moving dots of light without a trail. The International Space Station is one of the brightest. Find the location of the ISS using [NASA's Spot the Station](#).

SAGITTARIUS A*

It's thought that a [black hole](#), known as Sagittarius A*, lies at the heart of our galaxy. It's estimated to be 44 million km wide, with a mass 4 million times greater than the Sun.

ANSWER
It's usually the size of a grain of sand. A bright fireball would typically be caused by a rock the size of a grape or golf ball.



MAY

LIGHTNING STORMS

on Jupiter and Saturn create soot (carbon). As this falls through the planets' atmosphere, it gets compressed into [hailstones of diamond](#).

VOYAGER 1

The planetary probe [Voyager 1](#), launched in 1977, is now beyond our Solar System and in interstellar space. It's the furthest manmade object from Earth.

GALAXIES

Light from a distant galaxy can be bent by gravity from a foreground object such as another galaxy or cluster of galaxies. Called gravitational lensing, this can help improve measurements of the more distant galaxy. Find out how you can improve our knowledge of the universe by taking part in [citizen science projects](#).

EARTH AND MOON

The Earth and Moon orbit their common centre of gravity (or barycentre) which is 1,707km below the Earth's surface.

QUESTION

The average Earth-Sun distance is called an Astronomical Unit (AU). How far away do you think the Solar System's outermost planet Neptune is in AU?

ANSWER.
Neptune is around 30 AU from the Sun

This year a new, and possibly intense, meteor shower may be visible, peaking towards dawn. Its meteors will appear to come from the constellation Camelopardalis, the Giraffe.

Look at the crescent closely and you'll see a dimly lit outline of the Moon's full disc. This effect, called earthshine, is caused by sunlight reflecting off the Earth and back onto the Moon.

MON	TUES	WED	THURS	FRI	SAT	SUN
28	29	30	1	2	3	4 Evening Crescent Moon
5	6	7	8	9	10 Best time to view Saturn this year. It lies due south at 01:00 BST. 	11
12	13	14	15	16	17	18
19	20	21	22	23	24 Meteor Shower predicted	25
26	27	28	29	30	31	1



JUNE

1 SUN	2 MON	3 TUES Jupiter Triple Shadow Transit. 
4 WED	5 THURS	6 FRI
7 SAT Gibbous Moon	8 SUN	9 MON
10 TUES	11 WED	12 THURS
13 FRI	14 SAT	15 SUN
16 MON	17 TUES	18 WED
19 THURS	20 FRI	21 SAT June Solstice 11:51 BST
22 SUN	23 MON	24 TUES
25 WED	26 THURS	27 FRI
28 SAT	29 SUN	30 MON

QUESTION

If it takes a jet aeroplane 48 hours to go around the Earth, how long would it take to go around the Sun?

JUPITER

Three of Jupiter's moons will cast shadows onto the planet's disc at the same time.

20.00 BST

'Gibbous Moon' is the name given to the phase of the Moon between half illuminated and full. This evening you may be able to spot Mars just above the Moon in the southwest as the sky starts to get dark. Read the Stargazing Live [Guide to the Moon](#).

SOLSTICE

At this moment the Sun's apparent movement against the background stars reverses direction from north to south.

JUPITER'S GREAT RED SPOT

is a giant oval storm several times the size of the Earth. It's shrinking in width but not in height and by 2040 it may actually become circular.

SUNJAMMER

Scientists are developing a new spacecraft called [Sunjammer](#). It has a 38x38m solar sail which uses the pressure of sunlight to move through space.

DISTANT GALAXY

Z8-GND-5296 is believed to be the most distant galaxy ever found. It's so far away that the light we get from it left the galaxy just 700 million years after the Big Bang. It's creating new stars around 100 times faster than the Milky Way. Read the BBC's guide to the [Universe through time](#).

ANSWER

About seven and a half months.



Galaxy NGC 4449. NASA, ESA, A. Aloisi (STScI/ESA), and The Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration

JULY

SUPERNOVAE

and the active cores of distant galaxies emit cosmic radiation. Although the exposure to this harmful radiation is negligible for low Earth orbit astronauts, it's a real problem for long-term missions like travelling to Mars.

STARS

The brightest star currently known is R136a1. It's estimated to be 8,700,000 times more luminous than the Sun and is 165,000 light years away from Earth.

QUESTION

Zodiac means 'circle of animals' and contains the main constellations that the Sun appears to pass through during a year. Which Zodiacal constellation is the odd one out?

NOCTILUCENT CLOUDS

This month rare [noctilucent clouds](#) might be seen a couple of hours after sunset low in the northwest, or a couple of hours before sunrise low in the northeast.

These ice crystal clouds are formed in the extreme cold of the mesosphere 76-85km above Earth's surface. Higher than normal clouds, these can have an electric blue, rippled appearance.

In reality it's no bigger than when it's high in the sky. Known as the Moon illusion, this effect has puzzled great thinkers for centuries.

ANSWER
Libra, the Scales – it's not an animal.

MON	TUES	WED	THURS	FRI	SAT	SUN
30	1	2	3	4	5	6
7	8	9	10	11	12 The low full Moon will appear huge when close to the horizon.	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3



AUGUST

QUESTION

Which astronomical objects can cast noticeable shadows on Earth?

This can produce more than 80 meteors per hour. A bright Moon will interfere with the display this year. Read more about asteroids, meteors and meteorites in this [BBC guide](#).

1 FRI	2 SAT	3 SUN	4 MON
5 TUES	6 WED	7 THURS	8 FRI
9 SAT	10 SUN	11 MON	12 TUES Peak of the Perseids Meteor Shower.
13 WED	14 THURS	15 FRI	16 SAT Jupiter and Venus appear to line up in front of the Beehive Cluster in Cancer.
17 SUN	18 MON	19 TUES	20 WED
21 THURS	22 FRI	23 SAT	24 SUN
25 MON	26 TUES	27 WED	28 THURS
29 FRI	30 SAT	31 SUN	1 MON

The Beehive Cluster of stars is approximately 6 million times further away from Earth than Jupiter.

METEOR SHOWERS

occur when Earth passes through streams of dust spread around the orbit of a comet. About 15,000 tonnes of space dust enters Earth's atmosphere each year.

STARS

The furthest star just visible to the naked eye is V762 Cassiopeiae which is 16,308 light years away. See the BBC guide to [how telescopes work](#).

SPACESUIT

A spacesuit applies a constant pressure on an astronaut's body. Without it, the vacuum of space would cause their blood to boil.

ANSWER

The Sun, Moon and Venus. In places with really dark skies such as deserts or on mountain tops, Jupiter and even the core of the Milky Way can also cast shadows.



Moon Silhouettes: Mark Gee, Royal Observatory Greenwich's Astronomy Photographer of the Year

SEPTEMBER

QUESTION

Which surface on Earth has a similar reflectivity to the Moon?

THE MAVEN MISSION

aims to discover why Mars has lost most of its atmosphere to space. It's expected to enter the orbit of Mars this month.

CASSINI

The [Cassini spacecraft](#) has provided amazingly detailed images of a strange and constant hexagonal jetstream near Saturn's North Pole. Wind speeds on this gas giant planet can reach 1,800km per hour.

BILLIONS OF STARS

On average, every observable galaxy in the Universe contains hundreds of billions of stars. If each galaxy were a grain of salt, there would be enough grains to almost fill an Olympic sized swimming pool.

ANSWER

The Moon's average reflectivity is 12%, about the same as a worn tarmac road.

The full Moon at this time of year rises at similar times over several nights, giving more light at the traditional time of the harvest.

Day has equal length to night at the autumn equinox which occurs a few days after the equinox.

MON	TUES	WED	THURS	FRI	SAT	SUN
1	2	3	4	5	6	7
8	9 Harvest Moon.	10	11	12	13	14
15	16	17	18	19	20	21
22	23 Autumn Equinox 03:29 BST.	24	25	26	27	28
29	30	1	2	3	4	5



Green Energy: Fredrik Eriks. Royal Observatory, Greenwich's Astronomy Photographer of the Year.

OCTOBER

NORTHERN LIGHTS

The Sun releases streams of high-energy particles known as solar wind. Under the right conditions, the solar wind can create a spectacular [aurora](#) display when it interacts with Earth's magnetic field.

MAGNETIC FIELD

The [Magnetospheric Multiscale Mission](#) scheduled to launch this month will use four identical spacecraft to study the physics of the Earth's magnetic field in space.

NEUTRON STAR

A [neutron star](#) is formed when a giant star collapses. A teaspoon of super-dense neutron star matter would weigh about ten times more than all the people on Earth.

An Orionid meteor is a small piece of Halley's Comet vaporizing in Earth's atmosphere.



Comet 2013 A1 Siding Spring has a close encounter with Mars, possibly passing less than 38,000km above its surface. It may be possible to see this very low down in the southwest sky about 1.5 hours after sunset.

ANSWER

Displays occur on Jupiter, Saturn, Uranus and Neptune. Weak aurorae have also been detected on Mars and Venus.

MON	TUES	WED	THURS	FRI	SAT	SUN
29	30	1	2	3	4 World Space Week	5
6	7	8	9	10	11	12
13	14	15	16	17	18 Comet near Mars	19
20	21 Peak of Orionid Meteor Shower.	22	23	24	25	26
27	28	29	30	31	1	2



Radio Galaxy Centaurus A: ESO.

NOVEMBER

A BLACK HOLE

is an object so massive that not even light can escape its gravity. A black hole 10 times as massive as our Sun would have a radius of just 30km.

ROSETTA MISSION

This month the [Rosetta Mission](#) will attempt to place a lander on the surface of a comet (67/P Churyumov-Gerasimenko). Earlier this year the spacecraft was woken from a 957 day hibernation in deep space in preparation for the attempt.

LARGEST GALAXY

The elliptical galaxy IC 1101 is the largest currently known, estimated to be 6 million light years across and containing 100 trillion stars. It lies in the constellation of Virgo.

QUESTION

Why do stars twinkle?

ANSWER

Because some of the light coming from them is disturbed as it passes through the Earth's turbulent atmosphere.

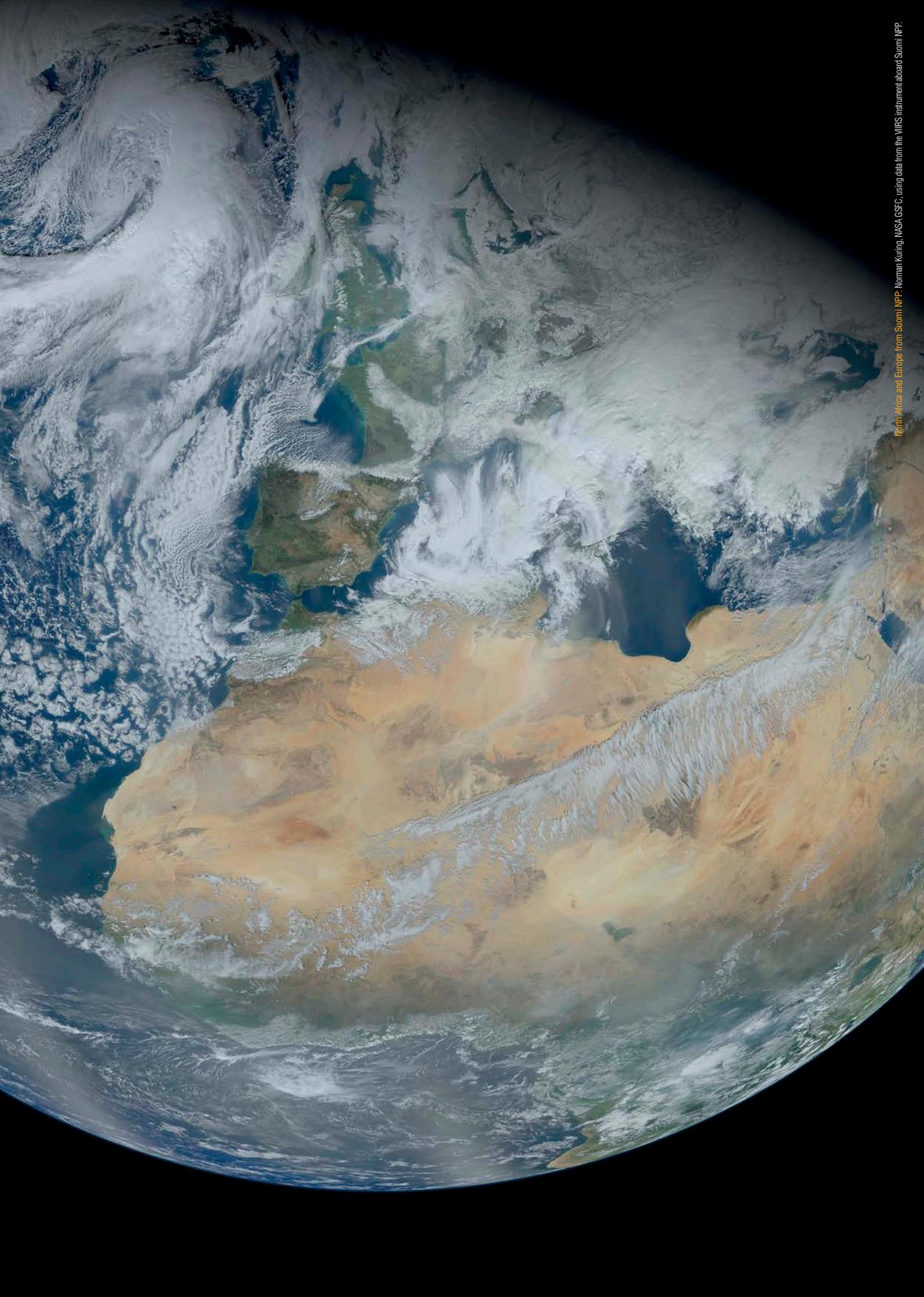
The air temperature in front of a meteor particle can rise to more than

4,000°C

MON	TUES	WED	THURS	FRI	SAT	SUN
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Peak of Leonid Meteor Shower

The last quarter Moon is close to brilliant Jupiter. Both can be seen rising in the east just after midnight on the 13th.



North Africa and Europe from Suomi NPP. Norman Kurig, NASA, GSFC, using data from the VIIRS instrument aboard Suomi NPP.

DECEMBER

QUESTION

You can use the Pole Star, Polaris, to determine which way is north. What else can it tell you about your location?

COLDEST PLANET

At -224°C [Uranus](#) is the coldest planet in our Solar System. Although Neptune is further away from the Sun it generates 2.61 times more energy than it receives, keeping it slightly warmer.

DAWN

NASA's [Dawn](#) spacecraft, launched in 2007, is scheduled to reach dwarf planet Ceres in 2015. Ceres is in the asteroid belt between Mars and Jupiter.

EARTH

The rate that the Earth spins slows by a tiny amount each year. Around 900 million years ago, an Earth day was 18 hours long and there were 486 of them in a year.

At this time, the Sun's apparent motion south against the background stars comes to a halt and it starts moving north again. In Australia, the Sun reaches its highest point in the sky at the December solstice.

The Geminids come from an asteroid called 3200 Phaethon. Most meteor showers originate from comets.

ANSWER

The height of Polaris above your horizon in degrees is equal to your latitude on Earth. If you were at the North Pole, Polaris would be overhead (height = 90° , latitude = 90°) and at the equator it would be on the horizon (height = 0° , latitude = 0°).

MON	TUES	WED	THURS	FRI	SAT	SUN
1	2 See if you can spot the dim planet Uranus immediately to the lower left of the Moon's disc at 00:40 GMT. 	3	4	5	6	7
8	9	10	11	12	13 Peak of the Geminid Meteor Shower	14
15	16	17	18	19	20	21 December Solstice 23:03 GMT.
22	23	24	25	26	27	28
29	30	31	1	2	3	4

BBC

STARGAZING LIVE
CALENDAR 2014

BBC
TWO