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Issue Number 6
June 2010

Curiosity

The bightest recorded comet was the Ikeya-Seki (C/1965 S1) discovered in 1965 by the astronomers Kaoru Ikeya and Tsutomu Seki that reached magnitude -7. The cometa was so bright it could be seen even during the day.

Astronomy Calendar

June 1st: Day 152 of the gregorian calendar.
Observations: Ceres, the first asteroid to be discovered now made part of the minor planets, is just below the Lagoon Nebula Sagittarius, and is expected to be seen from a good observation place (after midnight). Unfortunately the moonlight might interfere with your observations. Lunar occultation of Zelinda at 02h (UT) not seen from Europe.

June 2nd: Day 153 of the gregorian calendar.
History: In 1966, Surveyor 1 becomes the first american probe to land on the Moon.
In 1983, the Venera 15 probe, a double mission (coupled with Venera 16), was launched with the mission to explore Venus.

EDITORIAL

This month the highlight newsgoes to the Eratosthenes Project That is going to involve groups all around the world.

A highlight is for ESO's offer to EAAE members of an ALMA Booklet.

On the "First Astronomical Observations" section the Eratosthenes experiment os explained to allow you understand how the observation pf the shadow of the Sun allowed the determination of Earth's perimeter.

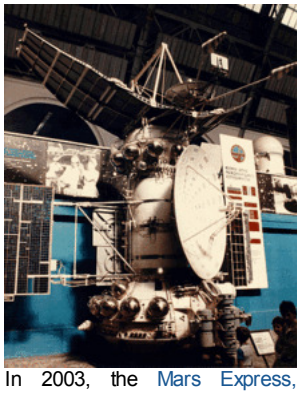
This month's challenge for "Advanced Astronomical Observations" is M57, the Ring Nebula in the constellation of Lyra .

On the "Astronomy Software Tools" section we present the Analemma website, a website that explains all about the apparent motion of Sun along the year..

We also have a word puzzle in Students Corner and we have selected a beautiful astronomical picture of Abell2218 for this month.

We wish you all clear skies during the next month.

The EAAE Webteam



In 2003, the Mars Express, probe transporting the british "lander" Beagle 2, was launched by the the russian rocket Soyuz-Fregat from Baikonur at 17:45 GMT.
Observations: Try to take a picture of M13.

June 3rd: Day 154 of the gregorian calendar.
History: In 1965 Gemini 4, the first crewed mission of several days was launched.

On this same day Edward White made the first human spacewalk the took him about 21 minutes.

June 4th: Day 155 of the gregorian calendar.
History: In 780 B.C. a solar eclipse was registered for the first time in China.

Observations: Last Quarterat 22h13 (UT).

June 5th: Day 156 of the gregorian calendar.
History: In 1783 the Montgolfier brothers made their first flight on a hot air baloon.

Observations: Jupiter is starting to appear in the first part of the night.

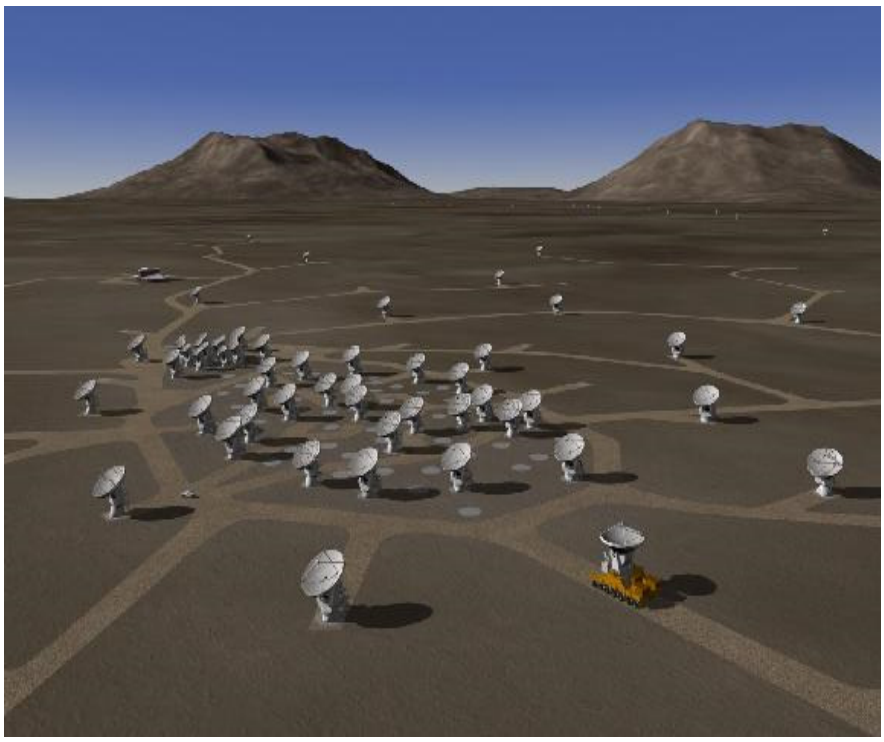
June 6th: Day 157 of the

EAAE News

ESO offers printed booklet "In Search of our Cosmic Origins" to EAAE members

Get a free, high-quality printed booklet of the ALMA educational sheets,

High on the Chajnantor plateau in the Chilean Andes, the European Southern Observatory (ESO), together with its international partners, is building the Atacama Large Millimeter/submillimeter Array (ALMA) — a state-of-the-art telescope to study light from some of the coldest objects in the Universe. This light has wavelengths of around a millimetre, between infrared light and radio waves, and is therefore known as millimetre and submillimetre radiation.



Artist's Concept of Completed ALMA
Credit: *ALMA/ESO/NRAO/NAOJ*.

Light at these wavelengths comes from vast cold clouds in interstellar space, at temperatures only a few tens of degrees above absolute zero, and from some of the earliest and most distant galaxies in the Universe. Astronomers can use it to study the chemical and physical conditions in molecular clouds — the dense regions of gas and dust where new stars are being born. Often these regions of the Universe are dark and obscured in visible light, but they shine brightly in the millimetre and submillimetre part of the spectrum.

Millimetre and submillimetre radiation opens a window into the enigmatic cold Universe, but the signals from space are heavily absorbed by water vapour in the Earth's atmosphere. Telescopes for this kind of astronomy must be built on high, dry sites, such as the 5000-m high plateau at Chajnantor, one of the highest astronomical observatory sites on Earth. To find out more about ALMA, see http://www.eso.org/public/teles-instr/alma.html.

ESO has produced some educational worksheets about the ALMA project, to accompany the planetarium show "In Search of Our Cosmic Origins".

You can find out more about the material and the planetarium show at http://www.eso.org/public/outreach/eduoff/materials.html and http://www.cosmicorigins.org/ .

The material is freely available to download, and ESO are also offering to send a high quality printed booklet of the sheets to EAAE members.

If you would like to receive a copy, please fill your personal address or your institution's address on your profile as EAAE member the EAAE webpage (http://www.eaae-astronomy.org) until June 30th, 2010. Only members that have and address to where the booklet can be sent will be able to receive it.

EAAE ERATOSTHENES PROJECT - June 21st, 2010

gregorian calendar.
History:In 1971 Soyuz 11 was launched.

June 7th: Day 158 of the gregorian calendar.
Observations: Try to make a picture of Saturn with your telescope.

June 8th: Day 159 of the gregorian calendar.
History: In 1625, the italian astronomer Giovanni Cassini was born.

Cassini was the first to describe Jupiter's bands and spots, he discovered four moons of Saturn and the Cassini division on Saturn's rings (between rings A and B).
In 1975, Venera 9 (USSR) was launched.
In 2004 ocurred the last Venus transit an event the hadn't ocuured for over 120 years.

June 9th: Day 160 of the gregorian calendar.
History: In 1812, the german astronomer Johann Gottfried Galle, that later on became the first astronomer to observe Neptune was born.

Observations: This month you can observe Venus. If you have a telescope try to see the phases change.

June 21st is coming. At the Summer Solstice teachers all around the World will measure the shadow of a vertical stick at their location in order to obtain a global measurement of Earth's perimeter (see Eratosthenes Project's webpage) as Eratosthenes did 2200 years ago.

A videoconference connecting schools all around the World will be held using the Elluminate platform. All information about the videoconference can be found on the webpage http://www.eaae-astronomy.org/home/index.php?option=com_content&view=article&id=68&Itemid=70.

Any school interest to participate in this video conference should make its registration at the Eratosthenes Project webpage.

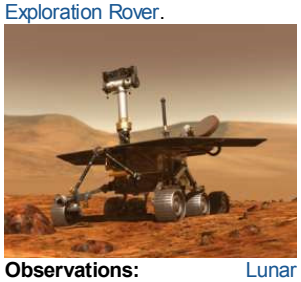
It happened last month

Last Month's highlights from EAAE News Blog

EAAE News

- Train like an astronaut
- 'First light' as SOFIA completes observation flight
- M31: Nearby Black Hole is Feeble and Unpredictable
- Star-forming galaxies like grains of sand
- NASA's Swift Survey finds 'Smoking Gun' of Black Hole Activation
- Herschel reveals new stars in a stellar cocoon
- Hubble finds star eating a planet
- Big Mystery: Jupiter Loses a Stripe
- A beautiful view of M83
- Unique Eclipsing Binary Star System Discovered
- Astronomers Find Nine New Planets and Upset the Theory of Planetary Formation
- A Rare Meeting of Planets and Spaceships
- Asteroid Caught Marching Across Tadpole Nebula
- Sun-watching Proba-2 keeps small eye on Earth
- European competition seeks best SATNAV ideas
- Volcanic ash in Meridiani Planum
- X-ray Discovery Points to Location of Missing Matter
- Herschel finds a hole in space
- Most distant galaxy cluster revealed by invisible light
- Herschel's HIFI follows the trail of cosmic water
- Herschel unveils rare massive stars in the act of forming
- Herschel reveals galaxies in the GOODS fields in a brand new light

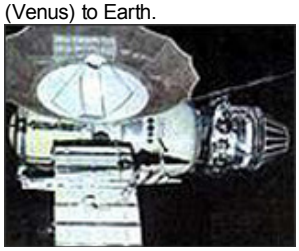
June 10th: Day 161 of the gregorian calendar.
History: In 2003 the Spirit Rover was launched and NASA's Mars Exploration Rover.



Observations: Lunar occultation of Thisbe at 15h (UT).

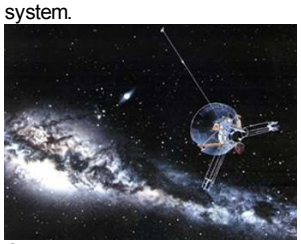
June 11th: Day 162 of the gregorian calendar.
History: In 1723, the german astronomer Johann Georg Palitzsch was born.

June 12th: Day 163 of the gregorian calendar.
History: In 1967 the Venera 4 probe was launched. It would become the first probe to bring samples from another planet (Venus) to Earth.



In 2004, a 1.3 kg meteorite hits a house in Ellserslie, New Zeland.
Observations: New Moon at 11h15 (UT).

June 13th: Day 164 of the gregorian calendar.
History:. In 1983 the probe Pioneer 10 becomes the first human artefact to leave the solar system.



Observations: In the Lyra constellation use your telescope to try to spot M57 the Ring Nebula.

June 14th: Day 165 of the

FIRST ASTRONOMICAL OBSERVATIONS

Summer Solstice and the Eratosthenes Experiment

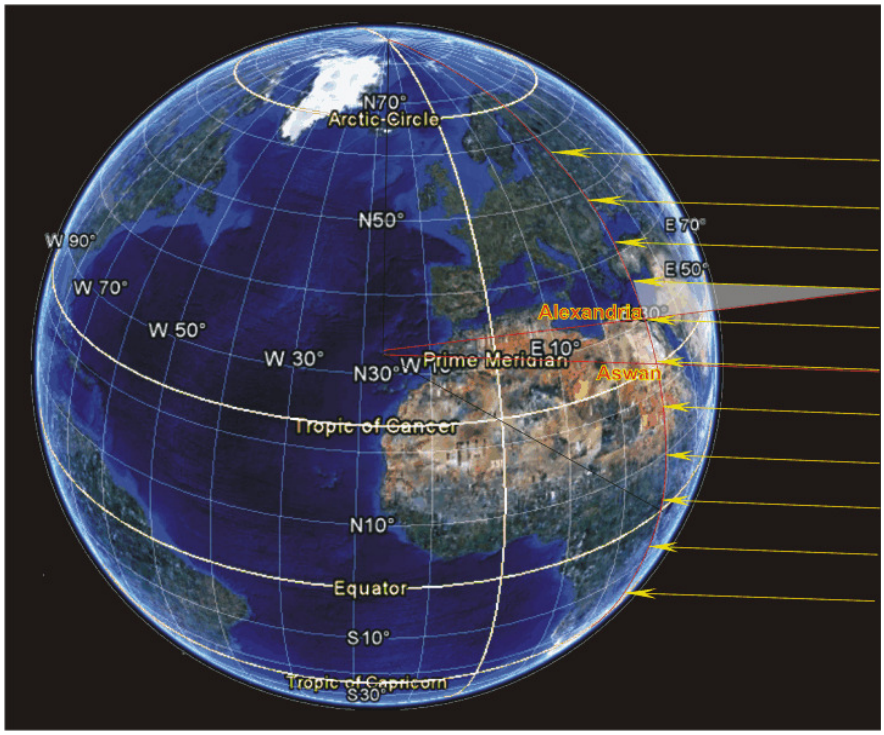
This month's big event is the Eratosthenes Project. On June 21st, Summer begins. On this day the Sun is above the Tropic of Cancer and this allows us to reproduce the Eratosthenes Experiment.

What is it all about?

Eratosthenes studied in Alexandria and claimed to have also studied for some years in Athens. In 236 BC he was appointed by Ptolemy III as librarian of the Alexandrian library, the center of science and learning in the ancient world, succeeding to Apollonius of Rhodes, in that post. He was the third chief librarian of the Great Library of Alexandria.

As chief librarian he read many documents and found out that at the Ancient Egyptian city of Swenet (known in Greek as Syene, and in the modern day as Aswan) that is located near the tropic of Cancer on June there is a well where on certain day of the year the sunlight goes down to the bottom of the well. He knew that in Alexandria there was no day that the great Obelisk did not produce shadow and he measured the shadow angle on the day the Sun was directly above the well in Aswan. He needed to know the distance from the well in Aswan to Alexandria and there several different versions of how he found out its value. The most popular one is that he send a slave to measure it in footsteps. The value that he used in his calculations was 8000 *stadia* (1 egiptian *stadium* is about 157.5 m, though the exact size of the stadium is often a theme of discussion).

With this information he measured the circumference of the Earth without leaving Egypt by assuming that Earth was a sphere and that the Sun rays are parallel when they arrive to Earth.



Eratosthenes assumed that Earth is a sphere and that the solar rays are parallel when they reach Earth.

If this was true then the angle (α) that the shadow made on the top of the obelisk in Alexandria would be the same as the diffrence in latitude between the two places.

gregorian calendar.
History: In 1967 the mission Mariner 5 (USA) was launched.
Observations: Lunar occultation of Europa at 14h (UT) not seen from Europe.

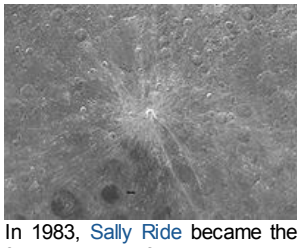
June 15th: Day 166 of the gregorian calendar.
History: In 2000, scientists discover sugar in space.
Observations: Venus 3.9°N of Moon at 07h (TDT). Moon at Perigee at a distance from Earth of 365937 km. Lunar occultation of Fortuna at 02h (UT) not seen from Europe. Lunar occultation of Nephthys at 06h (UT) not seen from Europe. Lunar occultation of Ariadne at 22h (UT) not seen from Europe.

June 16th: Day 167 of the gregorian calendar.
History: In 1963, Valentina Tereshkova becomes the first woman in space aboard the ship Vostok 6.

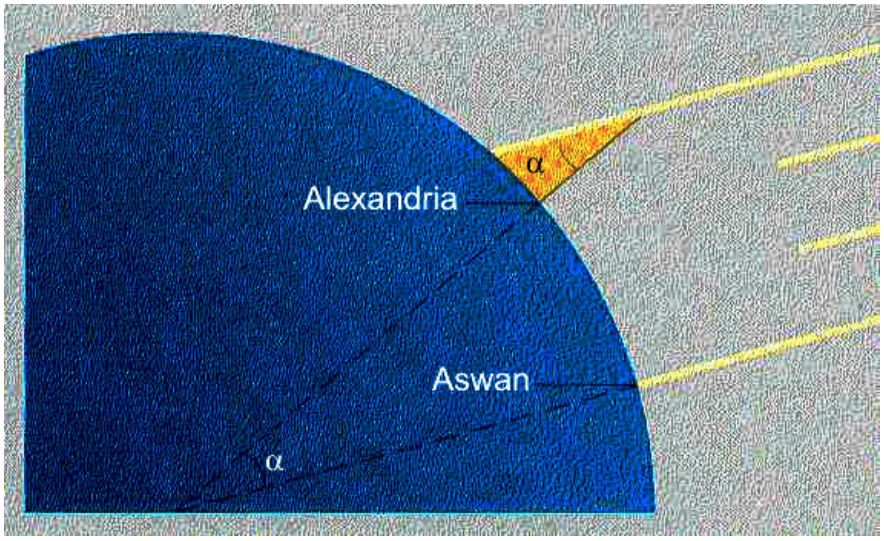
In 1999, occured the closest approach ever of the asteroid 1685 Toro to Earth (0.757 UA).
Observations: Lunar occultation of Hygiea at 22h (UT) not seen from Europe.

June 17th: Day 168 of the gregorian calendar.
History: In 1909, A. Kopff descovered the asteroide Hagar (682).
Observations: Lunar occultation of Pomona at 23h (UT) not seen from Europe.

June 18th: Day 169 of the gregorian calendar.
History: In 1178, 5 monks of Canterbury assist to the formation of what probably is crater Giordano Bruno.



In 1983, Sally Ride became the first american female astronaut in space.



Eratosthenes used a simple formula that relates the proportionality proportionality of distance on the meridian (*d*) and the difference in latitude (α) to the relation between the perimeter (*P*) and the angle of the circle (360º):

$$\frac{d}{P} = \frac{\alpha}{360^\circ}$$

The shadow angle at the top of the obelisk measured by Eratosthenes was 7.2º, so he calculated that the Earth was about 252000 stadia.

$$P = \frac{8000 \text{ stadia} \times 360^\circ}{7{,}12^\circ} = 252808 \text{ stadia}$$

If we assume the Egyptian stadium this is about 39 817 km (252808 stadium x 157.5 m/stadium) which has an error of less than 1% when compared to the accepted value of the meridional perimeter of Earth that is 40 007.86 km.

Eratosthenes' experiment was one of the most important experiments in antiquity and his estimate of the earth's size was accepted for hundreds of years afterwards. It was, in fact, the most accurate estimate until Man was able to go to Space.

Every astronomer must try to verify Eratosthenes by himself at least one time. Try to do it on June 21st. Don't forget to send EAAE your results.

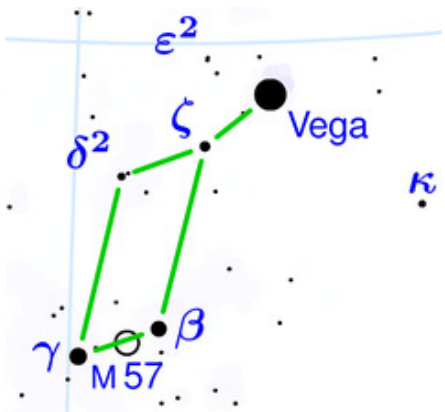
Clear skies.

ADVANCED ASTRONOMICAL OBSERVATIONS

M57 - The Ring Nebula

For this month we have selected a not very difficult view.

M57 is located in Lyra, south of its brightest star Vega.M57 lies about 40% of the angular distance from β Lyrae to γ Lyrae and can be easily found with a telescope by placing the center finderscope right between them.



June 19th: Day 170 of the gregorian calendar.
History: In 1976, probe Viking 1 started to orbit Mars after 10 months of mission.
Observations: First Quarter at 04h30 (UT).

June 20th: Day 171 of the gregorian calendar.
History: In 1990, asteroid Eureka was discovered.

June 21st: Day 172 of the gregorian calendar.
History: In 240 a.C. it was around this day that Eratosthenes "measured" Earth's perimeter.

In 2004, SpaceShipOne becomes the first private space ship to fly in space.
In 2006, the recently discovered moons of Pluto are oficially called Nix and Hydra.
Observations: Summer Solstice at 11h29 (TDT). Join the Eratosthenes Project and help to measure Earth's Perimeter. You can get your results during the next four days. The measurement differences won't be big durin this period.

June 22nd: Day 173 of the gregorian calendar.
History: In 1675 the Royal Observatory of Greenwich was founded.

The Lyra constellation and M57.
Credit: Wikipedia.
(Click on the image to see a bigger image)

M57 was discovered by Antoine Darquier de Pellepoix in 1779.

Recent research has confirmed that it is, most probably, actually a ring (torus) of bright light-emitting material surrounding its central star and we are seeing it from near one pole. Viewed from the equatorial plane, the Ring Nebula would resemble something like the Dumbbell Nebula M27 or the Little Dumbbell Nebula M76.We happen to

M57 is best seen through at least a 20 cm (8-inch) telescope, but if you are observing from a really dark place, smaller telescopes will let you see the ring. With larger instruments one can see some more details on the edges of the ring, and some faint nebulosity inside the disk. The central star would need a very large telescope, but if you have a CCD camera you can probably make an image of it.

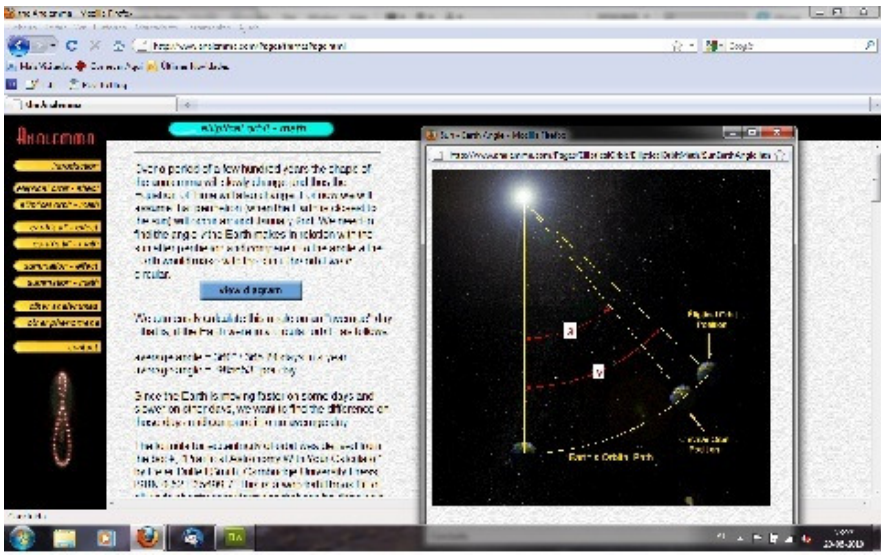
Links:
Ring Nebula-Wikipedia
M57-SEDS

ASTRONOMY SOFTWARE TOOLS

Analemma

Analemma is a website and not in fact a software.

Nonetheless it is a complete website that helps make calculations about the Sun's position in the sky and therefore a very nice tool explore with students. The Sun's position in the sky changes along the year even at the same day time. In fact its path at the same hour along the year draws an image that looks like an eight and that is called analemma.



A screenshot of the Analemma website.

The analemma is due to the difference in time between what your watch reads and the position of the sun (clock time vs. sun time). This difference is related to the *Equation-of-Time*. If you are in the northern hemisphere and the Sun's position is to the east of where your watch indicates it would be, the Equation-of-Time is negative. If the sun is to the west, the Equation-of-Time is positive.

The Analemma website teaches students all about this. A very useful site.

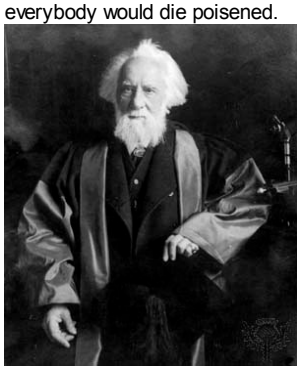
Have fun exploring it.

Link:
Analemma website

In 1978 James Christy, from the US Naval Observatory in Flagstaff, Arizona, discovered Pluto's satellite called Caronte.
Observations: Lunar occultation of Dembowska at 16h (UT) not seen from Europe.

June 23rd: Day 174 of the gregorian calendar.
Observations: Trey to spot comet C/2009 R1 Mc Naught.

June 24th: Day 175 of the gregorian calendar.
History: In 1881, Sir William Huggins makes his first spectral picture of a comet (1881 III) and discovers the emission of cyanogene (CN) at ultraviolet wavelengths. This discovery induced mass hysteria, when Earth passed the tail of the Halley Comet 29 years later when people thought that everybody would die poisened.



In 1938, a 450 ton meteorite hits Earths near to Chicora, Pennsylvania, USA.
Observations: Lunar occultation of Urania at 12h (UT) not seen from Europe.

June 25th: Day 176 of the gregorian calendar.
History: In 1997, MIR colides with the spaceship Progress.
In the same year, the Galileo probe passes the jovian moon Calisto at a distance of 415 km.
Observations: Lunar occultation of Ceres at 19h (UT) not seen from Europe.

June 26th: Day 177 of the gregorian calendar.
History: In 1730 Charles Messier was born.

STUDENTS CORNER

ASTRONOMY WORD PUZZLE

Figure out what words the clues represent. Then find the words in the grid. Words can go horizontally, vertically and diagonally in all eight directions. Two letter words might have more than one option but the valid option doesn't overlap any other selected word.

R O T U L P M N V C P L G T V
Q S T R M A O K O E A L N T X
N E M M E I P R T D N G L M C
H D Z C R T I O E N Q U E E R
O E D O V O S M R N K R S A T
T M M W N L O U E U C V W R E
S I Z O L R T B L U E R T T L
I N I K D A U M R C P E T H E
L A R N S L Q Y A M O T G Y S
A G A E A S O N O R C I U T C
C R G C H P H O B O S P R I O
Z N E N U T P E N E E U A T P
A P O L L O A B R S L J N A E
G N O M O N N E G I E C U N D
E T N O R A C N W W T V S B D

Words:
Jupiter
Saturn
Apollo
Venus
Earth
Orion
Cronos
Andromeda
Telescope (twice)
Weather
WISE
LMC
SMC
Nebula
Pluto
Neptune
Uranus
Europa
Ganimedes
Calisto
Io
Gnomon
Titan
Phobos
VLT
Mercury
Caronte
Ceres
Cluster
Orion
Mars

To confirm the solution click here.

PICTURE GALLERY

Abell2218- Credit: Andrew Fruchter (STScI) et al., WFPC2, HST, NASA

Observations: Full Moon at 11h30 (UT). Partial Lunar Eclipse with a magnitude of 0.527 at 11h40 (TDT).

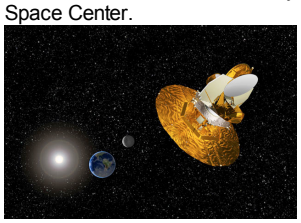
June 27th: Day 178 of the gregorian calendar.
Observations: Still have time to take a picture of Mars. At lower latitudes Scorpio starts to rise in the begining of the night.

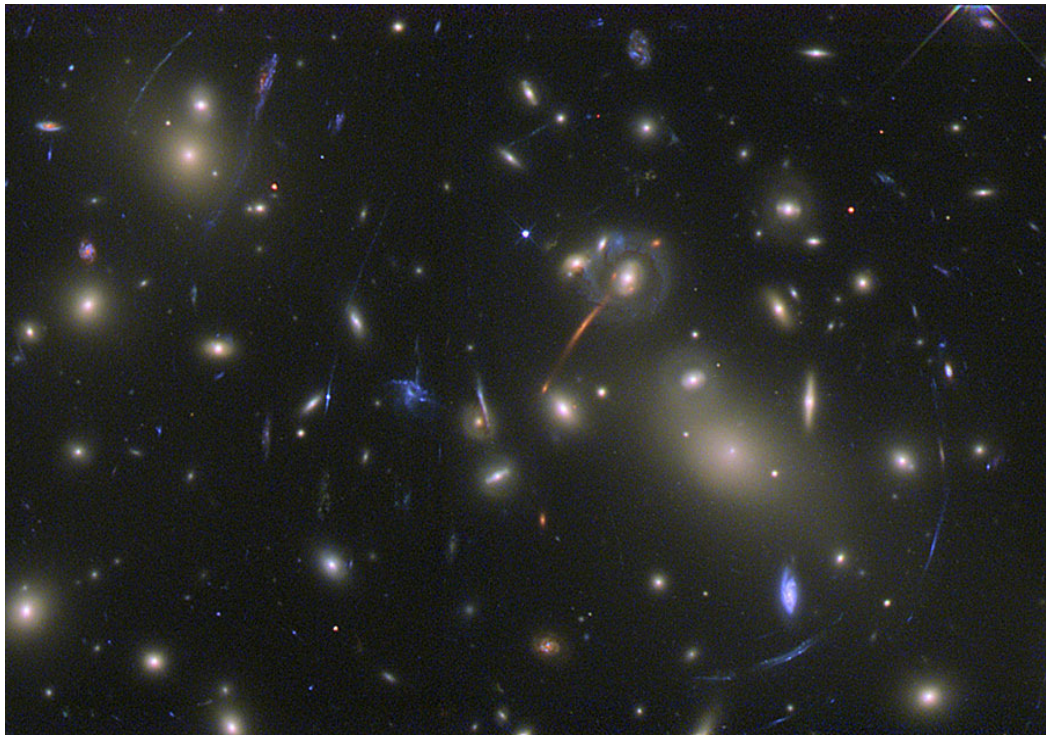
June 28th: Day 179 of the gregorian calendar.
History: In 1911, rocks from the meteorite Nakhla felt near to Alexandria, Egypt.

It was discovered later that these 40 meteorites most probably came from Mars.
Observations: Mercury will be at Superior Conjunction at 12h (TDT).

June 29th: Day 180 of the gregorian calendar.
History: In 1961 the first nuclear satellite (Transit 4A) was launched.
Observations: Take the night to try to make a nice picture of Saturn with your telescope.

June 30th: Day 181 of the gregorian calendar.
History: In 1908, the great impact of Tunguska (Siberia) occured.
In 2001, WMAP (Wilkinson Microwave Anisotropy Probe) was launched from Kennedy Space Center.





(click on the image to see a bigger version)

This astonishing image presents **Abell 2218**. The cluster of galaxies Abell 2218 is itself about three thousand million light-years away in the northern constellation of the Dragon (Draco).The strange filaments are background galaxies that have been gravitationally lensed. Gravity can bend light, allowing huge clusters of galaxies to act as telescopes, and distorting images of background galaxies into elongated strands. The Abell 2218 galaxy cluster is so massive and so compact that its gravity is able of bending light from the galaxies behind it magnifying them like a lens. The power of this massive cluster lensing has allowed astronomers to detect a galaxy at the distant redshift of 5.58.

2010 - EAAE - European Association for Astronomy Education. Edited by Alexandre Costa. The contents of the links were active at the date of the publication of this newsletter, but some of them cannot be taken as granted to work in the future. Please don't answer to this e-mail.

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