New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 25 Issue 2 — March 2017 *When Printed, this Newsletter costs VAS at least £1*

Society News

Photography galleries on the website

I'm working with Simon Plumley at the moment publishing some members photographs on our website www.wightastronomy.org, there's a bit left to do but please keep an eye on our progress.

If you have any pictures of your own, send them, with a description, to me at the email on the right.

Keep VAS Tidy

Following the completion of building work and the fitting of additional storage units in the observatory, it should be much easier to keep the place tidy.

Please put equipment/tools/books etc away after you have used them. It helps everyone in the long run, ok, and don't forget, there is a vacuum cleaner down there and it loves to be used. We need to get rid of all the dust before starting to clean some of the telescopes!

Dark Skies/Stargazing Event

We are hoping to hold a Stargazing/Dark Skies Event sometime in March. The observatory and pavilion will be open to the public and it would be great to have a bunch of keen volunteers available to help with the organisation.

We will need helpers for:

- General site safety
- Refreshments
- Telescope supervision
- Car Park marshals
- Observatory information guides
- etc etc

If you think you can help, please contact a committee member and we'll keep you fully informed.

Brian Curd
Editor New Zenith.

VAS Website: wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

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Tel: **01983 872875** or email: **editor@wightastronomy.org**

Material for the next issue by the 6th of the month please.

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	Members Only and by arrangement Telescope and night sky training. Please contact Martyn Weaver 07855 116490
Thursday	Members (19.30hrs) and Public (20.00hrs). Informal meeting and observing

VAS Website: wightastronomy.org

Contents this Month

PLEASE NOTE:
All monthly meetings are now held at the Newchurch Pavilion next to the Observatory

2017 Monthly Meetings

Date	Subject	Speaker
Please check **wightastronomy.org/meetings/** for the latest information		
24 Feb	Binocular Astronomy	Richard Flux
24 Mar	Astro-Photography	Simon Plumley
28 Apr	Radiation protection in space (for manned missions)	Dr Elizabeth Cunningham
26 May	Mapping orbits around black holes and neutron stars	Dr Diego Altamirano
23 Jun	"It's not all rocket science" - progression of The Needles 'Black Knight Rocket' site	Mike Kelleway
28 Jul	Pseudoastronomy: Planet X, Zetans, and Lost Civilisations	Stephen Tonkin
25 Aug	Annual General Meeting and Citizen Science	Chris Lintott
22 Sep	TBA	Graham Bryant
27 Oct	TBA	TBA
24 Nov	TBA	TBA

Observatory Visits Booked

Tue 7 March	Isle of Wight WI Federation

Just one booking for March so far but I have other interested parties choosing dates at the moment.

I am restricting visits to Mon, Tues and Wed wherever possible.

Please phone me for the current situation (number on the front page)

It would be appreciated if members could avoid using the observatory at these times.

VAS Contacts 2016/17

President	Barry Bates president@wightastronomy.org
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NZ Distribution	Graham Osborne
Others	Mark Williams, Nigel Lee & Stewart Chambers

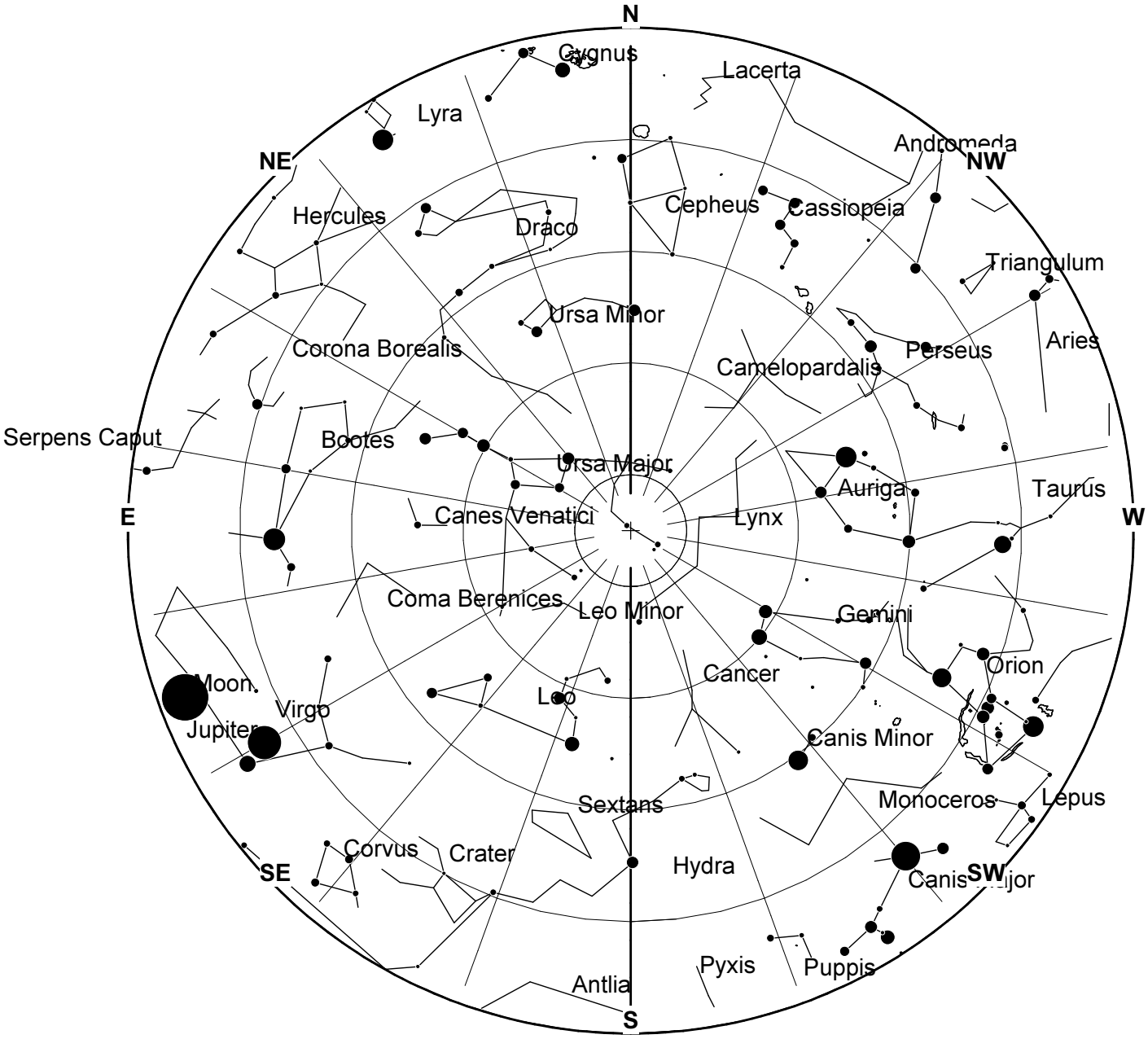
Important

Members using the observatory MUST enter a line or two in the Observatory Log Book.

On several occasions, lights, heaters and the Meade LX200 have been left on!

When leaving, please ensure all is secure and all lights, heaters and telescopes are TURNED OFF.

March 2017 Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 March 2017

***Jupiter** is the 5th planet from the Sun and the largest in the Solar System. It is a giant planet with a mass one-thousandth that of the Sun, but two and a half times that of all the other planets in the Solar System combined. Jupiter and Saturn are gas giants; the other two giant planets, Uranus and Neptune are ice giants.*

Jupiter is primarily composed of hydrogen with a quarter of its mass being helium, though helium comprises only about a tenth of the number of molecules. It may also have a rocky core of heavier elements, but like the other giant planets, Jupiter lacks a well-defined solid surface. Because of its rapid rotation, the planet's shape is that of an oblate spheroid (it has a slight but noticeable bulge around the equator). The outer atmosphere is visibly segregated into several bands at different latitudes, resulting in turbulence and storms along their interacting boundaries. A prominent result is the Great Red Spot, a giant storm that is known to have existed since at least the 17th century when it was first seen by telescope.

March 2017 Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
			
28th	5th	12th	20th

Vernal Equinox

The spring equinox, the moment when the Sun crosses the equator on its way north, and day and night are of equal length is on March 20 at 10:25.

Planets

Mercury - Mercury makes a favourable appearance in the evening sky. The table shows altitude and azimuth at 18:30. It should be visible into the first week of April, but it will be fading fast by then making it a challenge against the still bright sky. Between the 19th and 21st Venus can be used as a guide as it slides by, Mercury can be found about a hand's width to the left of the much brighter Venus.

Date	Az	Alt		Date	Az	Alt
15 Mar	267	4		25	268	14
17	267	5		27	269	16
19	267	8		29	269	17
21	268	11		31	270	18
23	268	12		2 Apr	271	18

Azimuth and altitude for Mercury at 18:30 UTC

Venus - Venus ends its apparition as the Evening Star. It will steadily sink towards the setting sun becoming more of a challenge to spot in the bright twighlight sky. In the last week of the month if it is clear at sunset and sunrise it may be possible to see the planet as both Evening Star and Morning Star. This is because Venus passes about 9° above the Sun. At the North Pole, just as the Sun is rising for this year it would be possible to see Venus for 24 hours a day.

Mars - Still clinging on to the western sky as from our perspective it is slowly sliding towards the Sun and getting more difficult to see. It is now well past being in a position for any serious observation being so low down and now so far away. It is only a few arc seconds in diameter so will take a very large aperture and stable atmosphere to see any detail at all.

Jupiter - Now well placed for observation; it is close to opposition rising at a little after 2100 at the start of the month and 1900 at the end. Jupiter is in the constellation of Virgo, quite close to the bright star Spica which it outshines by over 2 magnitudes. Like Venus, Jupiter is easy to find, there is no other star that comes close to it in brightness. If you have a telescope take the opportunity to observe it his year, it is steadily heading to more southerly declinations making it much more difficult to observe. It will not be this good for another 5 years.

Saturn - Saturn is for those who stay up all night or are early risers. It can be seen low down in the southeast a few hours before sunrise. It is in the constellation of Sagittarius in a part of the sky devoid of bright stars, making Saturn easy to identify. The nearest bright star is Antares almost a hand span to the right.

Uranus & Neptune - Neither planet is visible this month. Neptune is in conjunction with the Sun and Uranus is too close to the evening twighlight to be easily visible.

Deep Sky

M35 Open Cluster RA 6h 9m Dec 24° 20' mag 5.5

A large bright cluster in which Lord Ross counted three hundred stars. Some of the brighter members form a V shape pointing almost to the centre of the cluster and snaking up the other side is a long curved chain like a very shallow S. A little to the south west in the same low power telescopic field is NGC2158, a small triangular shaped cluster.

M36 Open Cluster RA 5h 37m Dec 34° 10' mag 6.5

This is a young cluster of bright blue stars their light dimmed by its 4100 light year journey across the winter Milky Way. While it is easy to find, this cluster is not very impressive.

M37 Open Cluster RA 5h 52m Dec 32° 32' mag 6.0

The most impressive of the Auriga clusters it is the brightest and most colourful. Particularly striking is the magnitude 9 red star at its heart. Careful observation reveals dark dust lanes through the centre of the cluster.

M38 Open Cluster RA 5h 29m Dec 35° 52' mag 7.0

This is a good binocular object when viewed under dark skies. Through a telescope with patience the Greek letter Pi shape mentioned in Burnham's atlas can be discerned.

Peter Burgess

Open Clusters

Star cluster NGC 3572 and its surroundings.
Credit: ESO/G. Beccari

An open cluster is a group of up to a few thousand stars that were formed from the same giant molecular cloud and have roughly the same age. More than 1,100 open clusters have been discovered within the Milky Way Galaxy, and many more are thought to exist. They are loosely bound by mutual gravitational attraction and become disrupted by close encounters with other clusters and clouds of gas as they orbit the galactic center. This can result in a migration to the main body of the galaxy and a loss of cluster members through internal close encounters. Open clusters generally survive for a few hundred million years, with the most massive ones surviving for a few billion years. In contrast, the more massive globular clusters of stars exert a stronger gravitational attraction on their members, and can survive for longer. Open clusters have been found only in spiral and irregular galaxies, in which active star formation is occurring.

Young open clusters may not be contained within the molecular cloud from which they formed, illuminating it to create an H II region. Over time, radiation pressure from the cluster will disperse the molecular cloud. Typically, about 10% of the mass of a gas cloud will coalesce into stars before radiation pressure drives the rest of the gas away.

Open clusters are key objects in the study of stellar evolution. Because the cluster members are of similar age and chemical composition, their properties (such as distance, age, metallicity and extinction) are more easily determined than they are for isolated stars. A number of open clusters, such as the Pleiades, Hyades or the Alpha Persei Cluster are visible with the naked eye. Some others, such as the Double Cluster, are barely perceptible without instruments, while many more can be seen using binoculars or telescopes. The Wild Duck Cluster, M11, is an example.

More at: ***https://en.wikipedia.org/wiki/Open_cluster***

Another Hubble repair mission could be on the way

Preliminary reports suggest the Trump administration may team up with Sierra Nevada to bring new life to an old telescope.

The Hubble Space Telescope, launched in 1990, has provided a wellspring of information about our universe over the last 27 years. Some of those discoveries required five upgrades to the system.

And now, according to a Wall Street Journal report, there could be a sixth. According to the report, the servicing would provide an “insurance policy” in case the James Webb Space Telescope, which will perch itself far from low-Earth orbit (and even beyond the Moon) at a stable point called L2.

With the space shuttle program ending in 2009, there isn’t a vehicle to complete the mission. Yet. But Sierra Nevada, a private spaceflight company, has worked for years on a miniature space shuttle called the Dream Chaser, based on older designs generated in the early days of NASA. Right now, the craft is only cleared for automated flights and may resupply the ISS as soon as 2019. The project would require a human-piloted variant relying on infrastructure that already exists in the ship’s design.

According to the WSJ report, the possibility is currently in the (very) preliminary stages. It would represent a public-private venture that would drive down federal government costs by teaming up with private spaceflight companies, a model that is expected to be utilized in the administration in general.

Along with the Webb telescope, NASA has two telescopes based on modified versions of the Hubble design donated by the National Reconnaissance Office. One such mission, the Wide Field Infrared Survey Telescope, will be utilized as an exoplanet and dark matter hunter to be launched in the mid-2020s. Plans for the other telescope have not yet been announced.

See: ***http://astronomy.com/***

Monitoring Climate Change from Space - Part 4

In previous chapters, we've discussed the types of data that can be collected, methods of collecting the data, satellite missions and the instruments they carry.

This chapter will look at what is being studied and what the collected data can tell us.

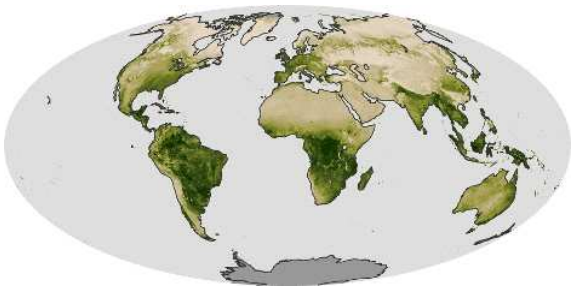
Looking at the land

The land surface takes up 30% of the global surface. We have a particular reason for wanting to understand and measure the land surface, in particular that part we interact with, as this is part that we live on, the part that provides our food, predominately, and our shelter.

The vast, sometimes remote, and often highly heterogeneous areas of the land surface we need to observe are often difficult to study from the ground alone. EO satellites provide us with global coverage, but also a highly detailed view, allowing us to collect data repetitively over remote land areas on the planet. We can use different EO measurement approaches to assess a wide range of parameters of the land surface repetitively, enabling us to identify and quantify changes in parameters such as albedo, net primary productivity and canopy height, allowing us to build a much more precise understanding of the Earth system as a whole.

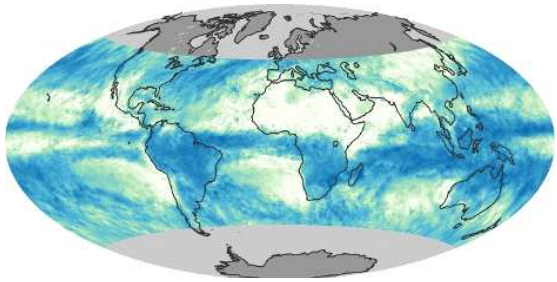
Radiation is measured from the earths surface in a range of different wavelengths. Vegetarian reflects strongly in the near infrared, but in the visible part of the spectrum, vegetation absorbs strongly, as vegetation uses chlorophyll to drive photosynthesis. This contrast between near infrared and the red part of the spectrum is something that is very particular to vegetation and is shown on a vegetation index map.

Vegetation



On these maps, vegetation is pictured as a scale, or index, of greenness. In places where foliage is dense and plants are growing quickly, the index is high, represented in dark green. Regions where few plants grow have a low vegetation index, shown in tan. The index is based on measurements taken by the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite. Areas where the satellite did not collect data are grey.

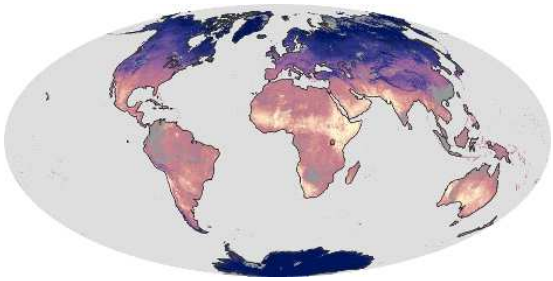
Total Rainfall



One of the most important ingredients for plant growth is water. In many ecosystems, particularly grasslands and cropland, seasonal plant growth occurs in perfect synch with the rainy season. In times of drought, vegetation in these ecosystems grows poorly, if at all. Abundant rain leads to a burst of green.

The rainfall maps show total monthly rainfall in millimetres as recorded by NASA's Tropical Rainfall Measuring Mission (TRMM) satellite. High rain totals are represented in dark blue, while small rainfall totals are shown in white. High-latitude regions, where TRMM does not record rainfall, are grey.

Land Surface Temperature



Temperature is one of the three major influences on global patterns of plant growth. Along with available sunlight and water, temperature determines whether the land will support dense forests, grassland, or nearly barren desert. In areas where vegetation is dense, the land surface temperature never rises above 35° Celsius. The hottest land surface temperatures on Earth are in plant-free desert landscapes.

Land surface temperature is a measurement of how hot the land is to touch. This image depicts average monthly land surface temperature in degrees Celsius as measured by the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite. The warmest temperatures are pale yellow, while the coldest temperatures are dark blue. Moderate temperatures are depicted in shades of pink and purple. Regions where land surface temperature measurements were not possible are grey.

Measuring Biomass

Measurements of vegetation biomass are vital for providing information about the current and potential future state of the terrestrial part of the carbon cycle.

There are numerous methods that can be used to estimate how much carbon is stored in biomass, such as optical data or reflectance in the near infrared.

LIDAR is very recent form of data collection, which just measures canopy height, which is useful as you can work out via equations how much biomas is present depending on the canopy height. However, LIDAR coverage is patchy.

Remote sensing from satellites can give us a global perspective and a consistent method on how much biomass is present, and how that's changing over time. Radar sensors can see through clouds, which is important for tropical regions. Accurate ground based measurements are used to validate the EO measurements, and both measurements are used together to get a sense of how much carbon is stored and how much is emitted from land use change, and how much is being sequestered.

Looking at the Ocean

Satellite data can provide a host of critical information about the oceans and remote sensing offers a number of different ways of gathering data.

- Scatterometers provide information about wind speed and direction at the surface of the ocean.
- Hydrometers, radiometers and microsounders measure sea surface temperature.
- Altimetry measures sea surface topography from which we derive ocean currents, and also measure rises in sea levels
- Synthetic aperture radar tells us about the roughness of the surface between the ocean and the atmosphere
- Multispectral imagery measures ocean colour, which gives information about phytoplankton
- Space gravimetry measures changing mass of the ocean

Many new missions from ESA, including Envisat and Cryosat satellites, routinely measure sea level rise, which are able to measure the sea surface height to an accuracy of 2cm, compared to previous missions for which measurements accuracy was in the order of several decimetres.

High precision satellite altimetry shows us that sea levels are rising at a rate of about 3.3mm per year. Previously measurements were taken using tide gauges with less accuracy.

There are two main causes for sea levels rising. One is ocean warming, causing the sea water to expand, and the second is land ice melting.

Sea levels are not rising uniformly, as in some regions, such as Western Pacific, Indian Ocean and North of Australia sea level is rising at a rate four times higher than the average. The Philippine region sea level has risen by 25cm since the '90's.

Measuring Phytoplankton

Microscopic marine phytoplankton floating in the top hundred meters of the ocean are individually not significant, but they are collectively the most influential organisms on Earth.

They form the basis of the marine food chain, and up on land we could not live without them as they perform half of all photosynthesis, breathing out oxygen into the atmosphere. They also absorb a large amount of carbon dioxide generated by human activity, mitigating the greenhouse effect. Despite their tiny size they can be observed from space: as well as tracking pollution and oil slicks, the MERIS spectrometer on Envisat was sent to monitor global phytoplankton distribution by detecting chlorophyll pigments in seawater.

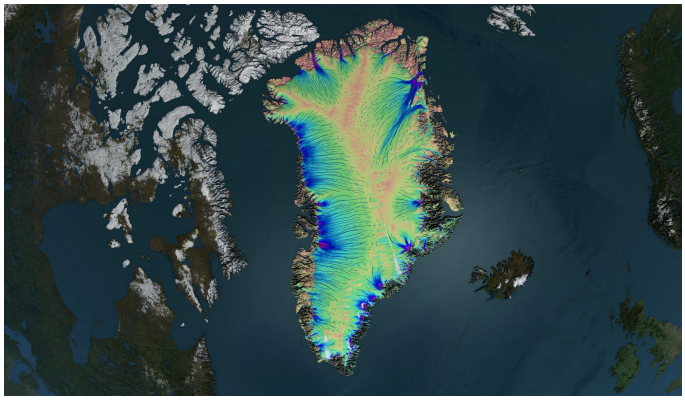
Looking at the Ice

There are several different classes of Earth observation sensors which can be used to look at ice.

- Altimetry, measures the shape of the ice, and how it's changing over time
- Synthetic Aperture radar, measures ice sheet motion and speed of flow
- Gravimetry, measures ice sheet weight, by measuring changes in the mass of the Earth

Cryosat and Cryosat-2 are the first ESA satellites dedicated to looking at polar ice sheets.

These new satellites can determine the shape of the ice sheet with greater accuracy, and determine how much ice is here compared to 10 or 20 years ago. The new satellites also show much more detail on the roughness and steepness of the terrain around the edges of the ice sheet.



A high resolution still image showing the velocity flow over Greenland.

Greenland looks like a big pile of snow seen from space using a regular camera. But satellite radar interferometry

helps us detect the motion of ice beneath the snow. Ice starts flowing from the central ridge, and increases in speed toward the coastline where it is channelized along a set of narrow, powerful outlet glaciers.

The colours represent the speed of ice flow, with areas in red and purple flowing the fastest at rates of kilometres per year.

Sea Ice

Sea ice typically covers millions of square kilometres of the arctic ocean and southern ocean, during their respective winter seasons. Unlike icebergs, which are chunks of ice that have broken off the edges of ice shelves or glaciers as they reach the sea edge, sea ice is seawater that is frozen. It contains little salt, as most of it is rejected as it forms. The thickness of the sea ice plays a central role in polar Climate because it moderates the heat transport by insulating the relatively warm ocean from the cold polar atmosphere.

Cryosat-2 will provide New and authoritative data on fluctuations in Arctic and Antarctic sea ice.

So, hopefully this article has gone some way in describing some of the tasks and methods of collecting data from the Earth Observation satellites.

The final article will look at monitoring the coastal zones and major climate events such as El Niño and Hurricanes.

Then, to round things up, the article will look at the future trends of EO satellites.

Glossary of Terms

Biomass - is organic matter derived from living, or recently living organisms. Biomass can be used as a source of energy and it most often refers to plants or plant-based materials that are not used for food or feed. Wikipedia

Albedo - is simply the reflectance of the earths surface. It describes how much of the sunlight arriving at the surface is reflected back into space, showing how much is available to heat up the earths surface or atmosphere.

Carbon Sequestration - a process of capturing carbon dioxide for long term storage. This can be removing carbon from the atmosphere for storage in a reservoir to defer global warming.

Net Primary Productivity - How much carbon is being grown and stored in different parts of the earth at different times of the year.

Elaine Spear

Group wants Pluto to be a planet again...

Alan Stern, principal investigator of the New Horizons mission, is ready to make Pluto a planet again ... along with Ganymede and hundreds of other objects.

In 2006, science text books were changed and the hearts of millions broken when the International Astronomical Union decided to give Pluto a new classification: dwarf planet. The logic was to make it fit more with a group of new large objects discovered in the outer solar system, one of which (Eris) is nearly the same size as Pluto. That didn't prevent outcry.

Indeed, when I attended the New Horizons flyby in 2015, Dava Sobel revealed how the vote might have gone: Pluto and Charon would have been regarded as a double planet, Eris would become a full planet, and Ceres would regain its planetary status. Ceres, from its discovery in 1801 to about the 1850s, was regarded as a planet, as were Vesta, Pallas, and a handful of the other asteroids. As more objects accumulated in that region of the solar system, these small bodies were relegated to minor planet status. Much the same thing happened with Pluto and the Kuiper Belt with each passing discovery.

So what did the IAU declare a planet? It had to orbit the Sun (excluding moons), be in a roughly spherical shape (excluding asteroids), and clear its field of debris (excluding the dwarf planets). Had Pluto stayed a planet, and the other large Kuiper Belt Objects come with it, we might have hundreds of planets. To be a dwarf planet, the first two conditions had to be met but the object has to have "failed" at the third. Mike "Pluto killer" Brown currently lists 10 objects as dwarf planets in name or deed, another 20 as more-than-likely, and a total of 148 objects as likely to satisfy the conditions of a dwarf planet.

But Alan Stern, principal investigator of the New Horizons mission, says there's a better way. In a paper put forth by Stern and others, the definition would be quite simple: "A planet is a sub-stellar mass body that has never undergone nuclear fusion and that has sufficient self-gravitation to assume a spheroidal shape adequately described by a triaxial ellipsoid regardless of its orbital parameters."

More at: ***http://www.astronomy.com/news/***

Dim Star Has Seven Earth-Size Planets

Astronomers have found seven likely rocky planets around a cool red dwarf, all of which have the potential for liquid surface water.

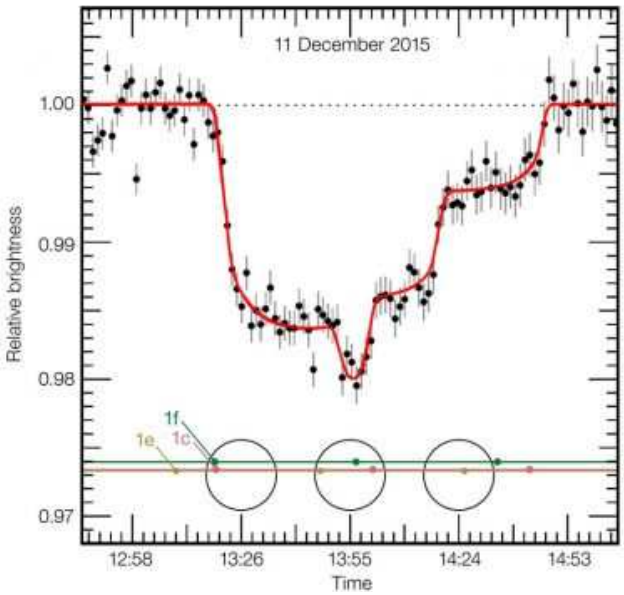
Artist's concept of what the sky might look like from one of the seven known terrestrial planets in the TRAPPIST-1 system. ESO / M. Kornmesser

The star TRAPPIST-1 is an unassuming, M8 red dwarf star. It lies 39 light-years away in the constellation Aquarius. With a diameter only one-tenth that of our star, the dwarf puts out less than a thousandth as much light as the Sun.

Last year, Michaël Gillon (University of Liège, Belgium) and colleagues announced that a trio of small exoplanets orbits this pipsqueak star (although the third world was of dubious reality). Now, after an intensive follow-up campaign, the team has discovered that there are actually seven planets, not three. All are likely rocky. Three lie in TRAPPIST-1's putative habitable zone — the region where, given an Earth-like composition, liquid water could be stable on the surface. But all, with enough hand-waving, might have a chance at liquid water.

The astronomers detected the exoplanets using the transit technique, which catches the tiny dip in starlight when a planet passes in front of its host star from our perspective. The discovery roller-coaster began when the team found that what it had thought was a combined transit of planets #2 and #3 was in fact the crossing of three planets.

The observers next assailed TRAPPIST-1 with an impressive flurry of ground-based observations. But the big breakthrough came with the Spitzer Space Telescope, which observed the star for 20 days. These data caught 34 clear transits. The team was then able to combine their ground- and space-based observations and slice and dice them to determine that the signals likely came from seven different planets.



This plot is a light curve, showing how the brightness of the faint dwarf star TRAPPIST-1 varies as three of its planets pass across its face in a triple transit on December 11, 2015. Data come from the HAWK-I instrument on ESO's Very Large Telescope. All three planets are probably rocky, and e and f are in the star's habitable zone.

ESO / M. Gillon et al.

Only six of those are firm detections, however. Number 7, or planet h, is iffy in its specs: The team only detected a single transit for it, and astronomers prefer to see three transits before calling something a candidate planet. Expect astronomers to haggle over this one in months ahead.

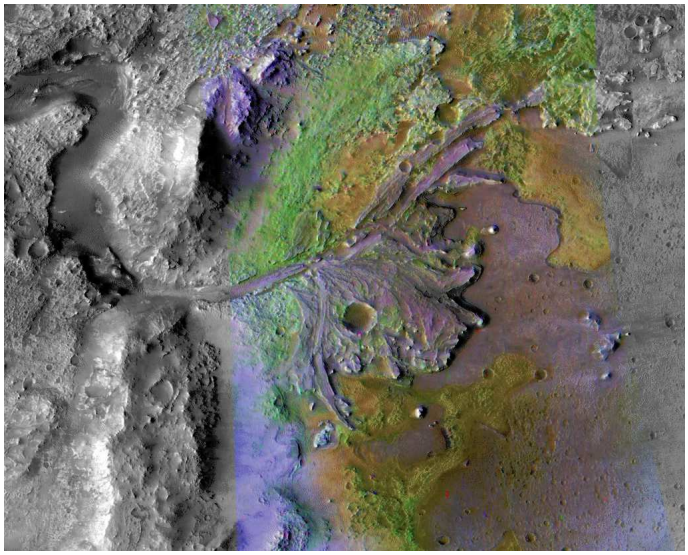
Mini Solar System?

Let's assume for now that all seven exoplanets are real. All their orbits would easily fit inside Mercury's circuit around the Sun. Their years range from 1.5 to 12 Earth days long, with the period of outermost h being anywhere between 14 to 35 days. The smallest two worlds are about three-fourths as wide as Earth, the largest 10% wider. The biggest orbit is less than 20% as large as Mercury's.

One of the wonderful things about this system is that the exoplanets' orbits are resonant with one another. This means that their orbital periods are rough integer multiples of one another — for example, in the same span of time that the innermost planet whips around the star eight times, the second planet takes five laps, the third three, and the fourth two. This setup gravitationally links the planets together and can lead to tiny shifts in their positions. Based on these shifts, the team could calculate the planets' gravitational influences on one another, and hence their approximate masses and densities. All are consistent with being rocky, the team concludes in the February 23rd Nature.

More at: ***http://www.skyandtelescope.com/***

Scientists narrow list of landing sites for NASA's next Mars rover



The delta inside Jezero Crater offers one of the best locations on Mars to look for the remains of ancient microbes, according to scientists. Jezero Crater received the most votes during a ranking of potential destinations for NASA's Mars 2020 rover last week.
Credit: NASA/JPL-Caltech/MSSS/JHUAPL

A rover NASA plans to launch to Mars in 2020 will likely explore one of three locations selected last week by a scientific advisory group, which picked candidate landing sites that were once homes to ancient lakes and hot springs.

"We're looking for a site that's ancient — around 4 or so billion years old — because that's when we think Mars had water flowing and a more clement environment," said Jack Mustard, a professor at Brown University who sits on the Mars landing site selection board. "We need to be able to characterize the habitability of that environment and look for preserved biosignatures. And in addition to the science on the ground, we need to find the right samples to return later."

The six-wheeled robot, similar in appearance and capability to NASA's Curiosity rover currently on Mars, will look for signs of past Martian life, assess the habitability of the environment, and measure the chemical, mineral and organic make-up of rocks, with an emphasis on hunting for biosignatures, the natural relics left behind by alien microbes.

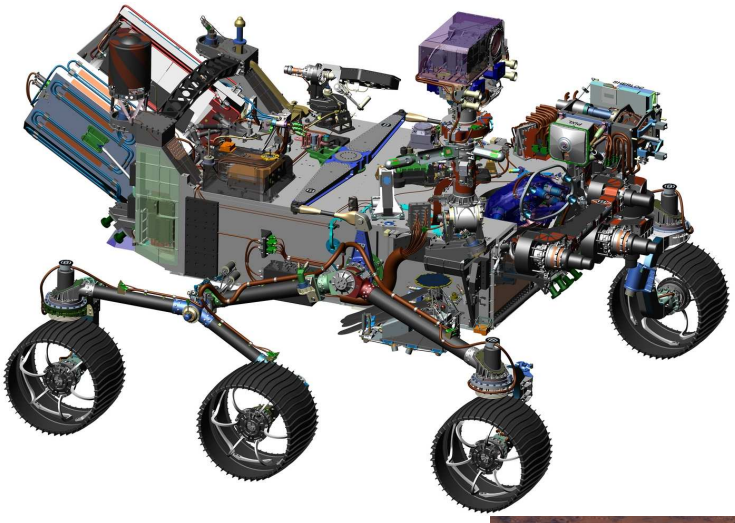
Its other chief objectives will be to collect at least 30 test tube-sized core samples for possible retrieval and return to Earth on a future mission, and test a new device to generate oxygen from carbon dioxide in the Martian atmosphere, validating a tool future missions could employ to produce breathable air, water and rocket fuel.

Scientists met last week in California to narrow a list of eight potential destinations selected in 2015. Acting on the advice of the 172 researchers, NASA settled on three finalists Saturday, setting the stage for a final decision by top agency managers in 2018 or 2019.

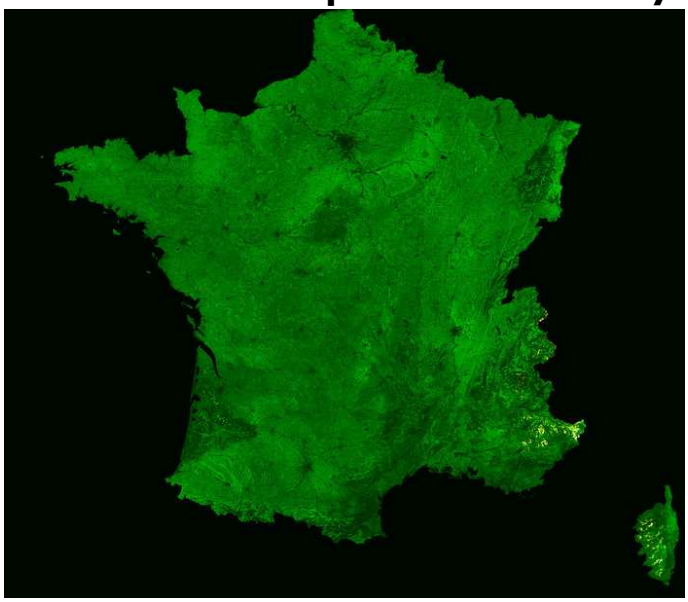
The robotic mission, officially named Mars 2020 for now, will launch in July 2020 aboard a United Launch Alliance Atlas 5 rocket and reach the red planet in February 2021, descending through the atmosphere with the assistance of a heat shield, parachutes and braking rockets before cables unreel to place the rover on the surface.

The "sky crane" descent system is based on the technology demonstrated with the landing of Curiosity on Mars in August 2012.

The shortlist of landing sites includes the Columbia Hills, a range of heights in 4-billion-year-old Gusev Crater where NASA's Spirit rover landed in January 2004.



EESA Affirms Open Access Policy



France, as seen by Proba-V, licenced under Creative Commons CC BY-SA 3.0 IGO

20 February 2017 - ESA today announced it has adopted an Open Access policy for its content such as still images, videos and selected sets of data.

For more than two decades, ESA has been sharing vast amounts of information, imagery and data with scientists, industry, media and the public at large via digital platforms such as the web and social media. ESA's evolving information management policy increases these opportunities.

In particular, a new Open Access policy for ESA's information and data will now facilitate broadest use and reuse of the material for the general public, media, the educational sector, partners and anybody else seeking to utilise and build upon it.

"This evolution in opening access to ESA's images, information and knowledge is an important element of our goal to inform, innovate, interact and inspire in the Space 4.0 landscape," said Jan Woerner, ESA Director General.

"It logically follows the free and open data policies we have already established and accounts for the increasing interest of the general public, giving more insight to the taxpayers in the member states who fund the Agency."

ESA, international organisations and Creative Commons

In conjunction with many other intergovernmental organisations (IGOs) such as the UN Educational, Scientific and Cultural Organisation, the World Intellectual Property Organisation and the World Health Organisation, who have recently adopted similar Open Access policies, ESA has decided to release more contents under the Creative Commons IGO licencing scheme, with the Open Access compliant Creative Commons Attribution-ShareAlike 3.0 IGO or, in short, CC BY-SA 3.0 IGO licence as the standard.

CC IGO licences were designed for use by intergovernmental organisations and allow, in the case of CC BY-SA IGO, for example, images to be widely used on Wikipedia and its media repository Wikimedia Commons.

Over the past two years, ESA has trialled use of the CC BY-SA IGO licences and released images from the popular Rosetta comet-chasing mission, sets of Mars images as well as other imagery under that credit.

Creative Commons is a global non-profit organisation that enables sharing and reuse of creativity and knowledge through the provision of free legal tools. It continues to be a major partner and facilitator with ESA and the other international organisations in using and further developing the licences.

Marco Trovatello, who follows the project for ESA, believes that "Free and open access to ESA's knowledge, information and data are a cornerstone regarding our link with the larger public and user communities and will thus contribute to societal benefit."

The ESA digital agenda

"The recognition of the value of information ESA holds on behalf of its member states and the appropriate management are key instruments of ESA's Space 4.0 approach to reinforcing collaboration with industry, science and member states," notes Gunther Kohlhammer, who as Chief Digital Officer oversees the ESA Digital Agenda for Space and ESA's information management policy, the large projects that make ESA fit for a fully digital future.

What is Open Access?

Generally speaking, Open Access stands for free and unrestricted online access to research results and findings. Usage rights are often granted via Creative Commons Licences. There is not one, but various statements and definitions of Open Access, such as the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, the Budapest Open Access Initiative or the Bethesda Statement on Open Access Publishing.

Further information

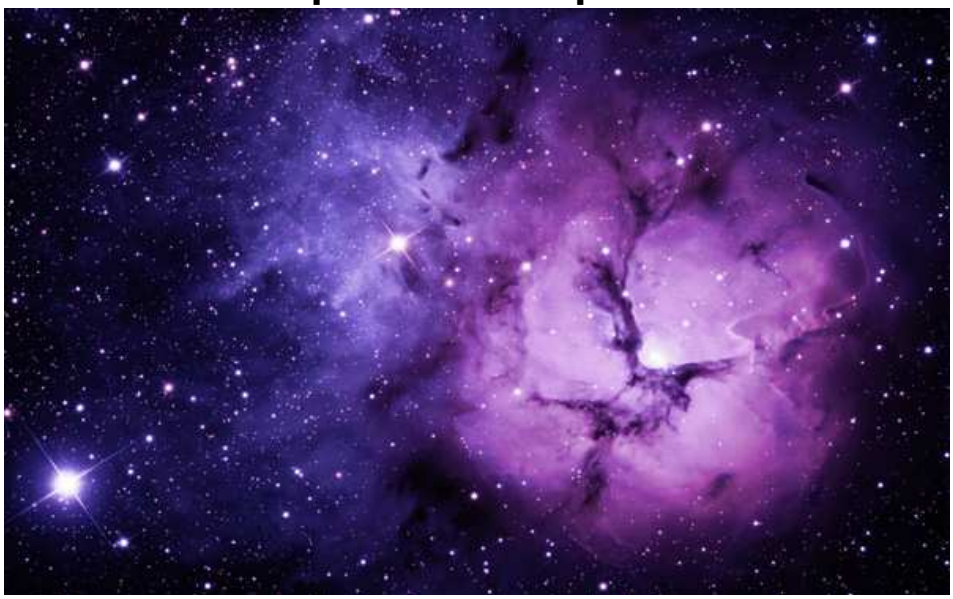
A website pointing to sets of content already available under Open Access, a set of Frequently Asked Questions and further background information can be found at http://open.esa.int

More information on the ESA Digital Agenda for Space is available at ***http://www.esa.int/digital***

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Give Your Computer Desktop a Makeover



The rather strangely named website **hongkiat.com** has some great space pictures like the one above available for free download. Most are offered in multiple resolutions so you'll probably find something to suit your monitor.

Space and galaxy pics are at:

http://www.hongkiat.com/blog/ww-space-galaxy-wallpapers/

I was up all night wondering where the sun had gone … then it dawned on me

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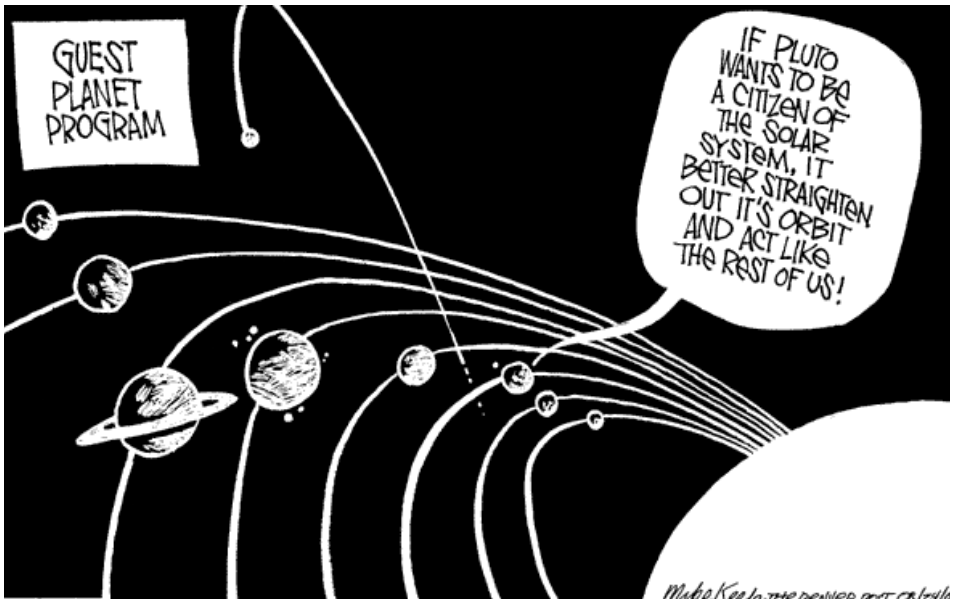

Observatory

When visiting the VAS observatory, for your own safety, please bring a torch. Also, please make sure you close and lock the car park gate if you are the last to leave - if you need the combination to the lock, please contact a member of the committee.

Articles Needed

New Zenith needs letters, articles, reviews or pictures related to astronomy. Contributions to the Editor at the email or postal address on the front page.

"I'm sure the universe is full of intelligent life. It's just been too intelligent to come here"
Arthur C. Clarke

"Facts are meaningless. You could use facts to prove anything that's even remotely true!"
Homer Simpson

"You are 87% water; the other 13% keeps you from drowning"
P. E. Morris

"We haven't the money, so we've got to think"
Ernest Rutherford

"Facts are stupid things"
Ronald Reagan