

FAS Newsletter

Federation of Astronomical Societies

<http://www.fedastro.org.uk>

FAS CONVENTION

19th October 2013 - Cambridge

2013 FAS Convention will be held on Saturday 19th October at the Institute of Astronomy, Madingley Road, Cambridge, commencing at 9.30 am.

The programme is:

Dr Samuel George - *University of Birmingham* "Magnetic Fields in the Universe"

Break

Andrew Robertson "Building a large (600mm) Dobsonian Telescope"

Lunch - telescope tours

Prof. Andrew Coates - *Mullard Space Science Laboratory, UCL* "Mars exploration – and the ExoMars mission"

FAS AGM

Break

Early Career Researchers:

Tamela Maciel - *Cavendish Laboratory, University of Cambridge* "Jets from AGN".

Mark Burke - *University of Birmingham* "How do we hunt Black Holes"

Break

Dr Robin Catchpole - *University of Cambridge* "Climbing the Distance Scale ladder to the Edge of the Universe"

5.30 Close

Tickets will cost £5 for attendees from FAS member societies, £7 to anyone else. There's a booking form available on the FAS website, so please download that and post to the address shown, your ticket(s) will then be guaranteed. Multiple tickets can of course be booked on a single form. Tickets will be numbered and will be entered into a free prize draw, and the winners' society will get a year's free subscription to the FAS, including PLI.

This year there will be three break periods, giving attendees more chance to browse our excellent trade stands. We see the return of Astronomia, Space Rocks, Astronomica, Cambridge University Press and Aurora Books, and we are particularly pleased to welcome Ian King Imaging for the first time.

The BAA will also be present and we expect some local societies to have stands.

NATIONAL ASTRONOMY WEEK 1st-8th March 2014

The main subject for NAW 2014 will be mighty Jupiter, the biggest, most dynamic planet in the solar system and aptly named after the lord of the ancient gods. In early March 2014, this greatest of planets will be high in the night sky, forming a striking cross-shaped pattern with the bright stars Betelgeuse, Sirius and Procyon.

Jupiter can be seen in the night sky for most of the year, except for a couple of months when it passes behind the Sun as seen from Earth. About every 13 months Jupiter comes to opposition, when we see it opposite the Sun in the sky and it is therefore visible throughout the night. The last opposition occurred on 3 December 2012 and the next one will occur on 5 January 2014, two months before NAW.

So why isn't NAW being held in January 2014? The reason is that at that time Jupiter will be highest in the sky at midnight, but most people prefer to observe well before that. By early March, it is high in the evening sky and actually reaches its greatest elevation above the horizon of over 60 degrees. And its apparent size and brightness will only be a tiny bit smaller than at opposition. Besides, March tends to be a bit warmer for observing than January as any hardened astronomer will tell you!

The particular week has also been chosen because the Moon will be visible as a crescent – not so bright that it will interfere with observing fainter objects, but providing a fascinating view even from the light-polluted skies that many people have to put up with.

See full report by John Axtell, the FAS representative on the NAW on Page 3.



Jupiter, photographed by Damian Peach

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President's Spot

Hi All

I'll start this time with re-iterating the plea I made in the last issue of the Newsletter.

Due to several long standing council members stepping down at the next AGM we will have several vacancies on council for the next year.

These vacancies are:-

- **Membership Secretary** - Responsible for processing new membership applications and managing the annual renewals using the FAS membership database. They also provide information from the database to other Council post holders for their duties, as per the data protection document.

- **Webmaster** - Maintains the FAS website, updating as required. Moderates the FAS Yahoo Group. Maintains the all FAS societies e-mail listing (from MARS) and acts as data protection officer.

- **Handbook Editor** - Updates the contents of the FAS Handbook on an annual basis. Arranges the printing of the Handbook and distributes the copies to member societies.

- **Meetings Organiser*** - Organises the Annual Convention of the FAS at a venue agreed by FAS Council, including arranging for the speakers and the Traders for the event. With help from other Council Members runs the annual convention on the day.

If anyone would be interested in filling any these posts please get in touch.

As requested by a few societies we've been working on Child Protection Guidelines for which should be issued shortly. I'd like to thank Richard Sargent and Graham Bryant for all their efforts on getting this document together.

The National Astronomy Week 2014 is arranged for the first week in March (1st to 8th) to coincide with the apparition of Jupiter this year & also the star count initiative from the Campaign to Protect Rural England. Don't forget to put these dates in your calendar and arrange some public events to piggyback on the national publicity that will occur. The FAS is financially supporting NAW2014 along with the SPA and British Association of Planetaria (BAP).

See www.astronomyweek.org.uk for more details.

If you've not already done so, don't forget to put the Convention Date in your diary for 19th October 2013 at the Institute of Astronomy, Cambridge. We've arranged a great day out including an interesting set of speakers and the telescope tours will be making a welcome return this year during the lunch break. Of course the traders will also be present – trying to separate you from you're your hard earned money! Tickets are selling fast for this event - see the Convention page on the FAS website for more details.

That's all for now.

Gary Gawthrop, FAS President

** at the time of writing one person has volunteered for this post*

APOLOGIES

As several readers have pointed out - some more critically than others!! - I made the schoolboy error of mixing up my Earl Haig with my Lord Kitchener, in the appeal for new blood to join the FAS Council.

I have done my 100 lines - *'In future do not mix up the Peers!!'*

NOTICES

The FAS Council are proposing some significant changes to the FAS Constitution. The proposed changes will be put forward at the next AGM on 19th October 2013 at the IoA, Cambridge. The details of these proposals will be distributed to all societies separately. They will also be enumerated in the e-version of this Newsletter.

Please study them against the current version of the Constitution which can be found on the FAS website here:

(<http://fedastro.org.uk/docs/fasconstitution2010.pdf>)

In addition to the significant changes the FAS Council is also proposing some wording tidying up of some other items in the FAS Constitution. Details of these will also be found as above.

The major changes are summarised here:

1. **Criteria for membership of the FAS.** This gives a list of requirements that must be met by any and all applying societies/groups.
2. **Removal of Regional Groups.** This has been discussed previously and refers to the fact that, with very few exceptions, the concept of Regional Groups has never worked satisfactorily.
3. **Winding up of the FAS.** This is a complete rewording of the section regarding the, hopefully unlikely, event of the FAS having to be wound up. This rewording should clarify the procedure for such an event.

The minor changes cover 14 items and are designed to remove some anomalies and to reflect the way the FAS and societies interact in the electronic age.

As mentioned above, the full details of these proposed changes will be sent to the nominated contact in each member society. So if you want to see all the detail in advance of attending the AGM please check with your society Secretary / Treasurer.

The full details are to be found on pages 12 & 13.

FAS Child Protection Guidelines

The FAS is putting the finishing touches to and will shortly be issuing its Child Protection Guidelines document to all member societies.

The aims of these guidelines are as follows:

- To provide information to astronomical societies in light of changing legislation and the general raising of awareness of Child Protection and Safeguarding issues in society.
- To provide society officers, members and their volunteers with guidance on procedures that they should, and in some circumstances must adopt, in the event that an astronomical society suspects a child is experiencing harm, or where they consider a child may be at risk of harm.

The document aims to set out some facts and salient requirements that current regulations will place on astronomical societies and their members in respect to the involvement of children in an astronomical society setting. In doing so it is hoped that astronomical societies can be more confident in involving young people in their society and astronomy as a whole.

National Astronomy Week 2014

The first National Astronomy Week was held in 1981 and they have been held every five or six years since then. They are always timed to celebrate some important astronomical event. The first was to celebrate the bicentenary of the discovery of Uranus, and the last was subsumed into IYA2009 but was geared to the anniversary of Thomas Harriot's telescopic observation of the Moon in July 1609. Four years have now passed and planning is well underway for the next NAW, and the FAS is involved in that planning. The organising committee meets at RAS Burlington House and includes representatives from RAS, BAA, SPA, The Observatory Science Centre at Herstmonceux, various Planetariums, and of course the FAS Council.



The next NAW is being planned for 1-8 March 2014. The idea is to get all astronomy societies and other groups working together to bring astronomy to the public. In recent years this has been splendidly achieved by BBC Stargazing Live, but the timing of that series is governed by BBC schedules rather than what astronomical objects are suitably placed for observation.

Next year's high declination of Jupiter will provide an excellent focus for NAW 2014. The planet will be higher in the sky than at any time since 2002, and the next occasion won't be until 2026. Jupiter is of course very bright, easy to find and makes an impressive sight through even a small telescope. It's always a favourite with the public who visit public outreach events. Jupiter is at opposition in January and by March it will still be high up and will be ideally placed in the early evening – the time when we usually mount public sessions.



The organising committee is exceedingly grateful to the STFC which has provided a significant portion of the funding necessary to organise and run the event. Further grants have been made by SPA and the British Association of Planetaria and I'm delighted to report that the FAS Council has donated £500 from our Education Fund.

At the time of writing grant applications are also being considered by RAS and BAA. The funding is to help coordinate all the efforts and to provide support via a website. The part-time coordinator will be based at Herstmonceux and the initial website is already in place at www.astronomyweek.org.uk, along with Facebook and Twitter accounts (@NAW2014). The website contains a growing body of background material which we hope to augment in the next few months.



The current priority is the development of a dynamic section of the website which will enable participating societies to upload and maintain their own information about their events, and which will also enable potential attendees to identify suitable events by date and location.

FAS member societies are strongly encouraged to arrange observing sessions during NAW.



Readers will have noticed that

(Continued on page 8)

OBITUARY

David Edward 'doc' Sutton

The FAS council was saddened to hear of the passing of David 'Doc' Sutton.

At the age of just 16 David joined the Fleet Auxiliary leaving in the mid-1960 when he got married. After his navy days he became psychiatric nurse and this is where the nickname 'Doc' comes from.

During the 1970s he was a member of the now defunct Sussex Astronomical Society and helped many newcomers. He later joined the Worthing Astronomical Society and served on its committee. He became a member of Worthing Astronomers who he helped with advice while they were setting up. He served on the FAS council as treasurer and assistant treasurer during the 1990s.

Doc received the Eric Zucker award in 2006 for his services to astronomy and after his retirement from council, he was always interested in the progress of the FAS.

Outside of astronomy David was a keen cricketer, joining Arundel Cricket Club in 1982, he continued on in as a scorer until 2011. He was the first to admit he was "not an easy bugger to get on with" but always had time for people with the same goals.

Our thoughts go to his former wife Christa and their children Paul and Yvonne and their families.



Andrew Salmon (1962 – 2013)

Andy was a former member of FAS Council. He was a regional representative on behalf of the West Midlands Federation of Astronomical Societies (WeMFAS).

Apart from personal connections with a many societies and individuals, Andy was a long-serving and highly valued committee member at Birmingham Astronomical Society. He also founded the Midlands Spaceflight Society in 1990.

The science of the stars and space proved to be an inspiration to Andy all through his adult life. He worked tirelessly to share this fascination with the cosmos with the public and he became skilled at finding ways to demonstrate and explain complex ideas.

Before the phrase "public understanding of science" came into general use, Andy was hard at work in that field within the West Midlands and beyond. Working by himself or with a range of societies Andy created exhibitions, organised meetings and gave talks and presentations. Anyone who spent time with Andy at a show or lecture went away with a little of his enthusiasm and a desire to learn more.

Local radio stations would call on Andy, often at short notice, for an expert voice on astronomy and space news stories. Andy was a regular contributor for JAS/SPA and researched and wrote articles for other amateur journals, culminating in his co-authored book "MarstalkOne".

Andy might best be remembered as a great communicator. He wore his intellect lightly: he worked in computing after gaining a 1st class degree. He studied geology to better understand the planets and learnt Russian to converse with the new friends he made. But he made the biggest impression on people with his ability to make friends, his generosity and his enthusiasm.

Andy lived his life in Smethwick, West Midlands. Later in life he discovered a taste for travel and crossed the globe to see solar eclipses, aurorae at both poles and observatories on mountain tops and city centres.

After a decade-long fight with Multiple Sclerosis, Andy passed away on 6th June. He remained a kind, caring, gentle man to the end.

Dave Evetts



BOOK REVIEW

Strange New Worlds – the search for alien planets and life beyond our solar system by Ray Jayawardhana Princeton University Press ISBN: 9780691142548 £12.00

The title of this book sets the pace. Ray Jayawardhana has a Star Trek mission enthusiasm for seeking out new planets outside of our solar system and to boldly go, not in a starship, but by using the latest in observing technologies and techniques to glimpse a strange mix of the weird and wonderful “zoo” of planets some thousands of light years away. The author is no distant armchair commentator but an experienced researcher and astronomer at University of Toronto and is at the cutting edge of extrasolar planet research and discovery.

Professor Jayawardhana writes in a very clear and compelling story- telling way using simple mono illustrations, charts, graphs, diagrams and photos to illustrate his explanations. He beds the search over many years in the real world of real fallible people with their emotional reactions to their discoveries and disappointments together with the all too human frailties of pride, kudos and ambition.

He starts off our Trek by relating the early speculation by ancient astronomers and philosophers about the possibility of other worlds out there. Are we alone and special or are we part of a vast multitude of planets or even other “Earths”?

Jayawardhana discusses discoveries by people like Herschel, Huygens and Messier looking at nebulae and dust clouds to the discoveries of Fraunhofer, Doppler and Bunsen decoding the spectra from our Sun whose accumulated discoveries and insights propelled the current techniques of studying stars to determine the existence of planets orbiting around them.

It seems that from as long as about 160 years ago various astronomers prematurely pronounced on new planets having been seen or at least evidence existed to demonstrate this. This “now you see it, now you don’t” carried on until the 1970s and 80s and with all the false starts and disappointments the search for extrasolar planets became an astronomical embarrassment.

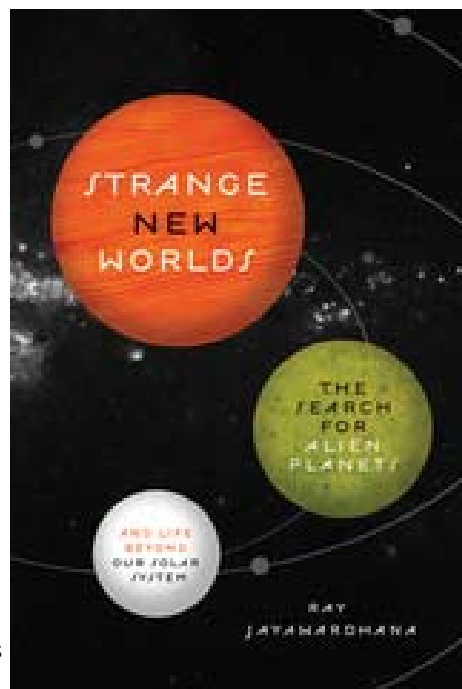
Then in 1995, using Doppler shift and spectrography, astronomers announced the first evidence of an extrasolar planet around 51 Pega- si. After this first breakthrough discovery the floodgates opened and the other new techniques of transiting light drop, astrometry and gravitational lensing allowed many hundreds of other planets to be discovered and more recently, using telescopes with adaptive optics, to be actually imaged. Jayawardhana talks of the future of planet searching and discovery using the current Kepler mission and upcoming “ginormous” state-of- the-art new scopes.

In the final two chapters Jayawardhana discusses the next focus of researchers and its repercussions; finding planets with habitable zones with solid surfaces and water and how we can detect what makes up an atmosphere of a distant planet.

There is a very useful glossary of the terms used in the book and a bibliography for further focused study.

In this excellent book Jayawardhana has captured the thrill of the planet chase with clear explanatory detail but keeps the human and personal aspect of the search at the heart of the storytelling

Glynn Bernallick
Kernow Astronomer



The Cosmic Tourist

Authors: Sir Patrick Moore, Brian May and Chris Lintott
ISBN: 9781847326195 Price: £25.00

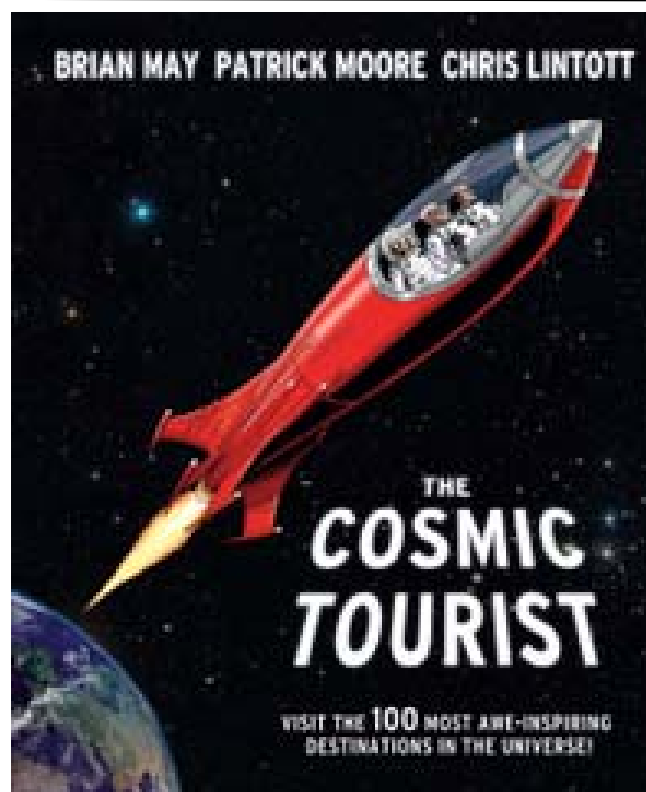
This book is a follow on to the very successful ‘BANG!’ , by the same impressive list of authors. It must also be about the last book in the amazing authoring career of Sir Patrick. For that alone it should be treasured.

Superficially the style of this book seems to be designed to appeal to the younger element, with its cartoon image on the front cover, and the text written as though you were taking a trip through the solar system and beyond. At first glance this approach may well put off the more traditional reader. But please don’t let it put you off.

You start of, reasonably enough, on Planet Earth and are then taken on a journey to the Moon, the Sun all the planets and many of their moons before venturing out into the milky way galaxy and thence to the ‘Echoes of the Big Bang’.

All this may sound rather trite and predictable, but each part of this mystical journey is accompanied by super quality photographs and

(Continued on page 5)



The New Astronomy Guide: Star Gazing in the Digital Age

By Sir Patrick Moore & Pete Lawrence

ISBN: 9781780970646 Price: £20.00

Even if you are only a very occasional watcher of Sky at Night, you will be aware that the main skill Pete Lawrence brings to us amateur astronomers is astrophotography. It will come as no surprise, therefore, to find that photographing things celestial plays a significant part in this book. However the book goes well beyond that skill.

Co-authored with the late Sir Patrick Moore, this book tries to do many things.

The first chapter covers those earthly phenomena that are often overlooked in other publications. From Green Rim, Red Rim and Green Flash to Zodiacal Light it is nice to see the various atmospheric sights being covered well. These are things most of us do not look out for often enough.

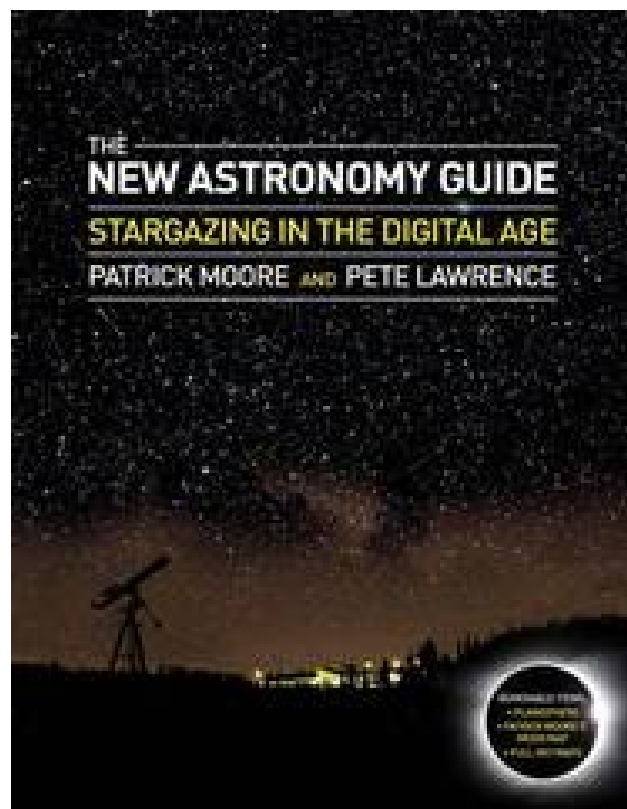
The next two chapters cover Astronomy with your camera and Choosing and using a Telescope. Whilst these are probably of particular interest to the early-stage astronomer, there will doubtless be the odd item of interest to those more experienced.

The solar system is next in line, with details of the Sun, planets and their moons - including ours of course. Then chance alignments, comets and meteors/meteorites take centre stage. In each case, in addition to giving considerable technical detail, the techniques of imaging are also covered.

This is followed by a couple of fairly long chapters dealing with deep sky objects - galaxies, nebulae and the like, and also includes techniques for capturing star trails.

Finally there is a full star atlas. This consists of well presented star charts of Winter, Spring, Summer and Autumn for the Northern Hemisphere followed by the same for the Southern Hemisphere. I think the latter is put in there just to show those of us in the North what we are missing!!

Finally inside an envelope in the back cover are two separate fold-out charts. The first is a double sided map of the



Northern Hemisphere Constellations and on the reverse that for the Southern Hemisphere.

The other item is a large reproduction of Sir Patrick's Moon Map. This is the one he prepared in 1969 to commemorate the Apollo missions and space exploration in general.

This book is large in size, very slightly less than A4, which allows for some photographs to be displayed in considerable detail. I suppose it is targeted at the beginner and 'improver', there is still a lot that can be gained by those more experienced.

A book to grace most bookshelves.

Simon Bassett

(Continued from page 4)

considerable technical detail. At each stop in the journey you are informed the light-distance you are from Earth.

As one would expect, or at least hope, the information is pretty up-to-date and the images have been selected with care, with those of Mars being particularly interesting.

The treatment of both Jupiter and Saturn and their moons is reasonably comprehensive and most people will be enchanted by the photographs used.

Some people will be inclined to call this a coffee table book, due to its size and colourfulness, and I suppose it is, but in this case that title should not be considered at all derogatory. It is on the large size, which does of course allow for the images to be seen at their best.

As well as being easy on the eye, there is an impressive amount of technical detail, especially for the newcomer to astronomy, because much of the technical stuff is clearly explained. For example there is a section on the Delta Cephei and its place in establishing the standard candle, which many amateur astronomers and not only beginners, may find useful.

A book which was in fact better than the first impression given by the cartoon on the cover or the mock up of the authors as astronauts.

Worth having

Frank Johns

HEADS UP

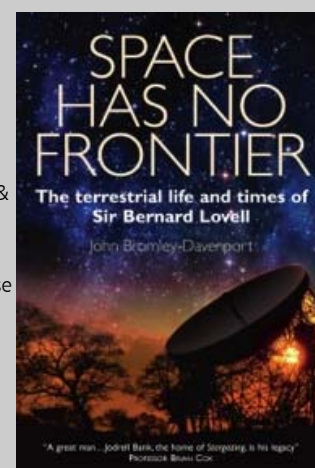
We have been advised that a book about the life and times of Bernard Lovell is due to be published in October this year. This will be subject of a review once a copy has been received.

Space Has No Frontier
The terrestrial life and times of
Bernard Lovell
by John Bromley-Davenport
Bene Factum Publishing - Hardback &
ebook - October - £20.00

If you want further information please
contact:

lucy.dundas@flint-pr.com

or call Lucy: 0203 463 2085



2013 Perseids - There is more than one way to observe them

Rugby And District Astronomical Society

With the departure of Geoffrey Freestone for pastures new R&DAS annual Perseid meteor shower observing session on Monday 12th August was held at Barby cricket club. Local societies including Coventry & Warwickshire Astronomical Society were invited and a dozen or so of their members attended the successful evening. The waxing Moon made a brief appearance at dusk, as did a few braver members of R&DAS (that had come off second best whilst cycling or iceskating) equipped with crutches, pins and in my case a sling, the field began to look like the set of MASH!

It wasn't only meteors that were on the programme with two ISS passes were observable during the evening at 2124 and 2300. Many observers brought cameras along to photograph the meteors so the ISS passes were also captured, although I found this problematic because I had left the lens cap on! Around 2200 I was on a pizza run into Rugby for those in need of refreshment. On arrival back from the takeaway, the field had filled with many more chairs, sun loungers and tripods donning DSLR cameras, awaiting the night's spectacle after dusk.

Consequently, the weather provided perfect viewing conditions with a clear Milky Way viewable across the sky down as far as the horizon in the West and many Perseid meteors every hour in all directions, including the occasional fireball



Meteor near Cassiopeia - Mark Edwards C&WAS

with magnitudes in excess of -5.

Alongside this, observers were able to take a peek at double stars, clusters, the 'coathanger' asterism and the Moon through a pair of binoculars and a Celestron 4SE telescope R&DAS had brought along, taking full advantage of the ideal conditions.

After 22:30, there was also the interesting sounds of meteor pings and Doppler shifts caused by aeroplanes overhead, coming from the back of John Walker's vehicle as he had brought his latest radio antenna and rig along.

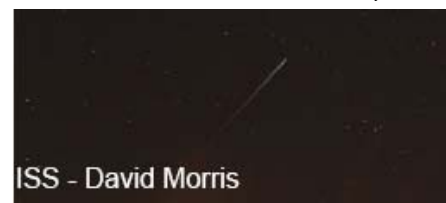
For the few enthusiastic members who remained into the early hours of the morning, the frequency of the showers increased, with Dave Riley keeping a running record which when analysed showed an estimated ZHR of 46 between 2200 and 2300 to 127 between 0200 and 0300. The evening wound down with a magnitude -6.8 Iridium flare at 02:41 although many were tucked up in bed before then.

Overall the event was one of our most successful and well-attended observing evenings with over two-dozen observers on the night. Thank-you to all who attended the evening and making it such a hit.

by Sarah Meek



Iridium Flare - David Morris



ISS - David Morris

Kernow Astronomers Go Digital

For a number of years now, the club has held a BBQ on the eve of the Perseid meteor shower, and the weather on most of these occasions has generally been poor, involving what we call *Keyhole Meteor Watching* through gaps in the cloud - and often there aren't many gaps!!

This year one of our group suggested that we try recording this year's storm using Meteor Scatter techniques by way of a suitable receiver, a Yagi antenna and a computer.

Various sites on the net suggested the French GRAVES radar would provide the best frequency to tune into and being 1100 Km away, the signal can only ever be received when its bouncing off the ionised trail of a meteor that passes between the transmitter



Figure 1

and us here in Cornwall.

The receiver used was the inexpensive FunCube Dongle (Figure 1). The size of a USB memory stick, the unit can receive any frequency between 64Mhz and 1700 Mhz and proved ideal for tuning to the GRAVES frequency of 143.050 Mhz.

To feed the receiver with a signal, a Yagi antenna was built using some scrap timber and copper plumbing pipe to a design found on the net. The width and spacing of the tubes

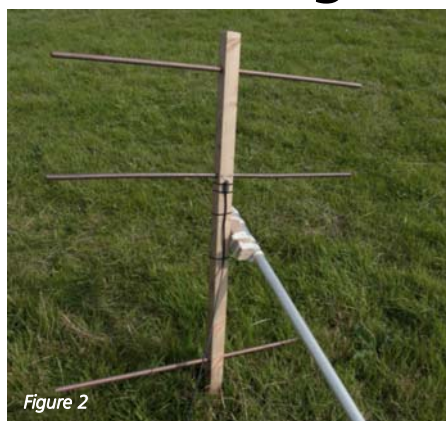


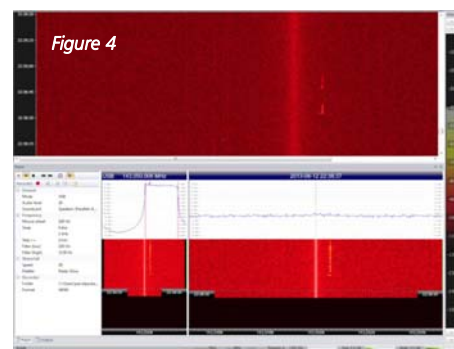
Figure 2

are arranged to match the transmitted frequency of 144Mhz (Figure 2). The design is more sensitive in one direction so the antenna is pointed towards the South of France and at an angle of about 45 degrees (Figure 3).



Figure 3

To display the data, SDR Radio v2.0 software was used. This captures the output of the receiver as a WAV file, which can then be played back to allow post capture processing of the recorded echoes.



This can be displayed at a waterfall plot with frequency along the Y axis and Time of the X axis. (Figure 4) Further examination of the echos can be made to determine the speed of the meteor and depending on its shape its direction of travel towards or away from the receiver.

The night of the BBQ was completely clouded out, but the equipment was fired up and left running for a few days. The graph (Figure 5) shows a counts per hour over the recorded period

From what we have read, the 'L' and reversed 'L' shaped echos suggest travel away from and towards our line of sight to the transmitter as well as the a lingering ion trail spanning well over a minute.

(Continued on page 7)

Shropshire AS Visit Jodrell Bank

As the Sun beamed down, a trickle of SAS members started to gather on the car park of **Jodrell Bank**, the home of the 76metre Lovell radio telescope that has been part of the Cheshire landscape for over 50 years.

The main topic of conversation was “how did you avoid the congestion on the M6?”

Steve Sz wajkun set up stall in the foyer of the new Discovery Centre to check and collect monies from the twenty-nine members who had signed up for the visit.



Jodrell Bank began in 1945 when **Bernard Lovell** came to the area to observe cosmic rays. A ‘quiet’ observing site was required and the little-known place called Jodrell Bank, 20 miles south of Manchester, was the ideal location. Today, Jodrell Bank is a leading radio astronomy facility. It had been a while since some members had visited this fascinating site while there were also a number of first-timers.

Inevitably a significant portion of the party ensconced themselves in the coffee shop, which was frequently visited through-



out the afternoon, although there are many picnic tables scattered around the well manicured site that were also put to good use.

You can walk around the structure and view the telescope from many angles, on the enticing observational pathway where you can find out more about the telescope, and the history of Jodrell Bank, all presented on a series of information boards.



The often-missed **Jodrell Bank Discovery Centre Gardens** include the **Galaxy Gardens**, **Space Playground** and **Arboretum**. Whether you prefer a leisurely walk, a picnic or an adventure off the beaten track, there is something for everyone, providing the weather is fine.

The **Space Pavilion** provided the younger members of the party – I think we were all there – with hands-on experiences and ideas addressing big questions such as:

How did the universe begin? What is a black hole?
We listened to the wonders of the universe, the sound of the Big Bang and found out more about the Lovell Telescope.



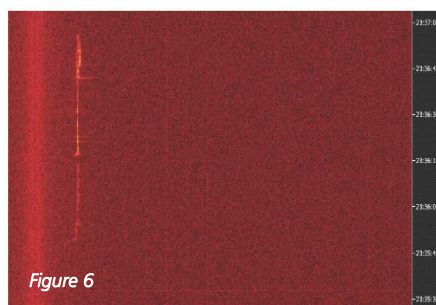
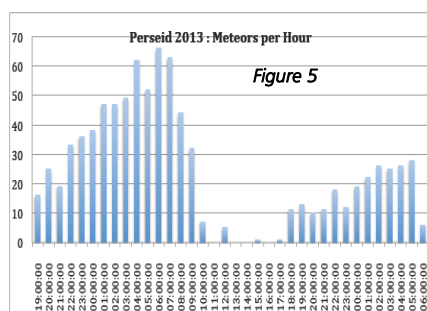
The highlight of the day for many was the excellent talk provided by **Mark Purver** from **Manchester University** who kept us in order while providing informative answers to the many probing questions. The main focus of the talk was a history of the site together with current research. More information about Jodrell Bank and its work can be found on their excellent and very informative website:

<http://www.jb.man.ac.uk/visitorcentre>

There followed another visit to the coffee shop – mandatory before the remains of a sun-soaked party rejoined the queue on the M6 heading back to Shropshire.

Steve Sz wajkun

(Continued from page 6)



This (Figure 6) is a plot of the more extreme

echoes recorded.

There is still so much to learn, especially as none of us were ‘Radio’ literate at the start, but with minimal outlay, it has proved to be fairly straightforward to get results and it’s hoped that we might be able to do a little bit of science with this data as well as recording some hopefully useful data.

We will now try to refine these techniques on other meteor showers. At the very least it will give us something ‘technical’ to do whilst staring at the normally cloudy sky.

Nick Tonkin

Hull and East Riding AS now 60 - Is a pension due?

An astronomical society has flourished in Hull since the 1920's when it formed part of the Hull Literary and Philosophical Society. The advent of the Second World War brought about its demise. It was reborn in 1953 as the Hull and East Riding Astronomical Society and utilised a small observatory in Kingston High School under the patronage of the founder Dr Cameron Walker.

The observatory was built through the efforts of Dr Walker and the families of the pupils of Kingston High School. People donated bricks and various building materials and labour. The British Astronomical Society lent the society two telescopes, a three inch Cooke refractor and a five inch refractor.



Dr Cameron Walker retired as Headmaster around 1960/61. Eventually the observatory was closed for repairs but was reopened by Mrs

Cameron Walker in June 1979. Dr Walker had died in October 1978 aged 82.

The observatory was finally closed less than three years later due to problems with vandalism. At one point the school hall was set on fire. Sadly it was the end of an era.

During the first 30 years of HERAS many activities and meetings took place. Regular meetings were held and one lecturer in the late 1950's was Patrick Moore before he was famous. The society met at various venues, firstly at Kingston High School, then at the Technical College in Queens Gardens then at the YPI in George Street and then on Chanterlands Avenue North and then at Wyke College before returning to Hull University where the Society now meets from September to June.

During the sixties and seventies the Society produced an excellent newsletter/magazine called "The Asteroid". "The Asteroid" contained details of the HERAS meetings and any astronomy related trips the members had been on and details of what could be seen in the night sky.

I would like to thank Nichalai Swetez and Peter Jennings for their help with this article.

Helen Marshall



Are we at Solar Max in 2013?

You've probably seen and heard the reports and programmes about the current Solar Max. I've seen large prominences through the society solar scope. I've read reports predicting large aurora displays. But where are the sunspots?

Image 1 was taken last week 7th July showing a cluster of sunspots and a smaller cluster lower down to the right.

The following weekend there were less sunspots visible.

Does this constitute a Solar Max?

I don't know the answer and if anyone does then please write an article in response to explain what is happening please!

As an example I have included some solar images from Image 2 -2004 and Image 3 - 2005 as a comparison.

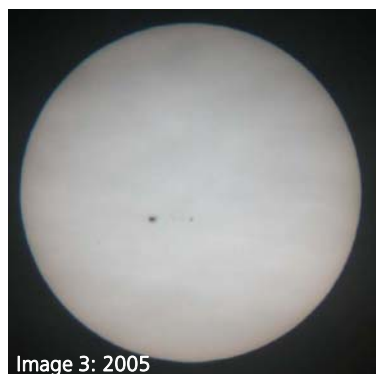
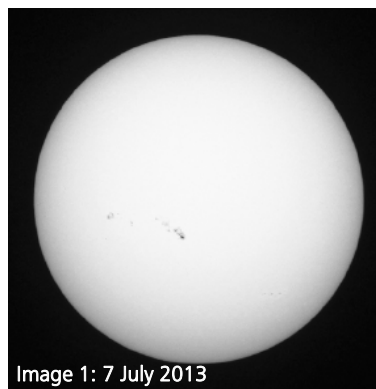
Was 2005 / 2005 a Solar Max period? There

doesn't appear to be many more sunspots in 2013 then in 2004/5!

Images were taken in White light through a Borg 77mm refractor with a Canon DSLR.

By Steve Southern

Liverpool AS



(Continued from page 3)

the 'week' actually includes two Saturdays – the 1st and 8th. This is deliberate; to give event organisers the choice of a New Moon or a 1st quarter Moon. The former is clearly better for showing deep sky objects as well as Jupiter, but the Moon is always a very popular 'wow' object for the public.

The Campaign to Protect Rural England and Campaign for Dark Skies will also hold their annual Star Count (of stars in Orion) to coincide with the beginning of NAW, so many societies will no doubt wish to incorporate this activity into any events they might plan for the first weekend. NAW also provides the rare opportunity to see Vesta and Ceres in the same binocular field of view, with Mars nearby. For the more adventurous there will be a project to replicate Roemer's first measurement of the speed of light by timing the eclipses of Jupiter's satellites.

Once your society has planned its events then please load them on to the NAW website which will have that functionality 'ere long. If you think of any particular innovative wheeze for the evening then please do let me know, and then I can pass this on to the NAW team for publicity purposes.

Let's all get planning!

John Axtell FRAS

FAS Membership Sec and FAS rep to
NAW Committee

Observing the Persied

by Brendan Martin

The Perseid meteor shower is with us this month, although it is only classed as fairly favourable it is still worth looking out for. The peak for the shower is on the 12th/13th in the U.K. where you can expect up to 80 per hour, but, the nights preceding should not be ignored, for best results I would suggest escaping the city lights into the countryside if possible. Because of the effect of perspective, meteors in a shower appear to come from a particular area of the sky. We call this area the radiant. The Perseid radiant is in the constellation of Perseus, just below the familiar 'W' of the constellation of Cassiopeia. In August this can be seen reasonably high in the north-eastern sky later in the evening.



The Perseids were the first meteor shower to be connected with a comet when astronomer Giovanni Schiaparelli noted the similarity between their orbit and that of Comet Swift-Tuttle which was observed in 1862. Swift-Tuttle orbits the Sun about every 135 years. Its last perihelion (the point where it is closest to the Sun) was in 1992 and the next is in 2126. The debris trail is thickest nearer the comet, so the Perseids were highly active in the early 1990s with several hundred meteors per hour at the annual maximum. As the Earth crosses Swift-Tuttle's orbit it sweeps up some of the debris released by the comet on previous orbits. This burns up in the atmosphere as a meteor, but the particles in the

Perseids are much too small to reach the ground as a meteorite.

If you are going out to observe the meteor shower here are a few tips on how to enjoy them comfortably: take a comfortable chair, preferably a folding sunbed type so you can lay right back, wrap up warm (it can get cold through the night even in summer), a blanket would be usefull if you are lying down as the cold can creep up on you, but be aware that it can also get damp through the evening even when clear.

Courtesy: LAS Newsletter



The Perseid Meteor Shower Image Credit :- Astronomy Picture of the Day

Astronomy in Devon August 2013

David Forshaw

We were with four eclipse chasing friends in Exmouth. It was the night of the 12th. We had just arrived from visiting our son in Berkhamsted, having zoomed up to the top (or thereabouts) of the Shard the previous Friday.

But now the Perseids beckoned. The sky seemed clear, so off all six sped to a dark site near Buddleigh Salterton to see what we could see. The time was approx. 10.30. It was a little chilly and we were disturbed by the lights of several cars, the occupants of which seemed to have the same idea as ourselves. Setting my camera on a tripod for 30" exposures at f5.6 and ISO 3200 and a wide angle lens of 18mm. I expected to get at least one or two meteors. Unfortunately not! We saw plenty of them, all streaming from the radiant over the two hour period, I suppose around 25 -30, some very bright, and others quite dim. Not immediately apparent, when looking at my so-called pics, there was a thin high cloud covering the sky, giving an orangey tint to the frames. There was a real wow moment however, when, directly overhead, the ISS sailed across the sky, bright as a button, until the earth's shadow blocked it out. Others among you must have seen it and probably timed it accurately (which I didn't). All were breathing satisfaction as we hove back to Exmouth.



Fortified by this experience, we had heard of the Norman Lockyer Observatory, situated above Sidmouth, but a ¾ hour drive away. So on the Wednesday the six of us thought we would have a nosey because we discovered that the afternoon of the 14th was open to visitors.

The weather was not promising and sure enough we landed there in the mist, so all thoughts of solar observation (Locker's favourite occupation) evaporated.

However two stalwarts, Mac and John entertained us for two hours, giving us a toy-ridden display of the workings of the solar system, showing us the main telescopes that Lockyer used and finishing off with a planetarium show. So, in the end, the weather didn't matter so much.



Now concentrating on the man Lockyer proved to be most illuminating. He was the Founder and Director of the Solar Physics Observatory in South Kensington between 1885 and 1913 and of the present observatory from 1913 to 1920 where he was the pioneer in the investigation and interpretation of the chemistry of the sun and stars and in the science of astronomical physics.

- He was also the founder and editor of the acclaimed journal 'Nature' which still persists today. He was its editor between 1869 and 1919.
- Through spectroscopy he discovered helium on the sun (and so named it after the Greek word for the sun helios)
- He was the founder of the system of stellar classification based on ascending and descending temperatures in orderly celestial evolution.
- He also revealed the astronomical significance of Stonehenge and other ancient monuments.



We found a plaque of his achievements, erected on the site by his relatives and friends.

We were shown in some detail the two main telescopes that he used, one, still operational, being the Lockyer 6 inch refracting telescope, built in 1863 and rebuilt by Thomas Cook in 1871. Lockyer used the telescope to measure the sun's surface temperature and in 1863 showed that the sun was largely made of hydrogen.

The other telescope, named the Kensington Telescope (1884), also a refractor, comprises a 10 inch main viewing tube and a camera fitted with an objective prism. The instrument was and is still used to study star spectra leading Norman Lockyer to propose that stars had a life cycle of change. This telescope marks the start of modern astrophysics research.

Following this fascinating insight into Lockyer's work we were presented with a planetarium show in a building which housed a machine which once stood in the Greenwich Observatory.

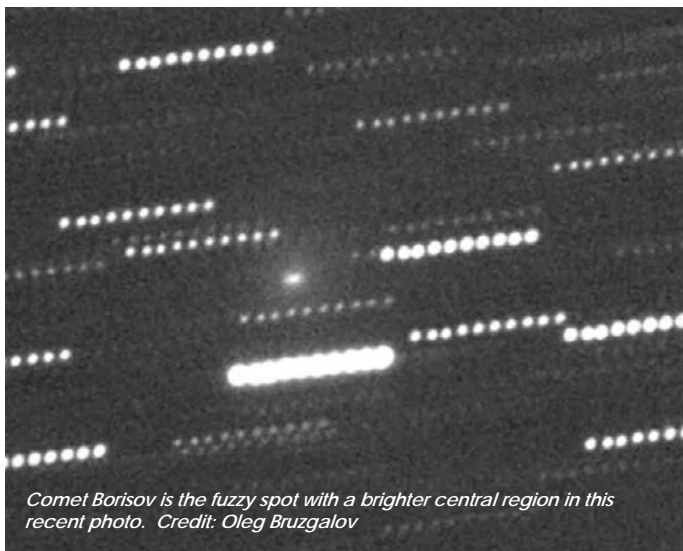
Despite the weather this proved to be a most enlightening afternoon jaunt.

Courtesy - LAS Newsletter

Amateur Astronomer Discovers Comet C/2013 N4 (Borisov) During a Star Party

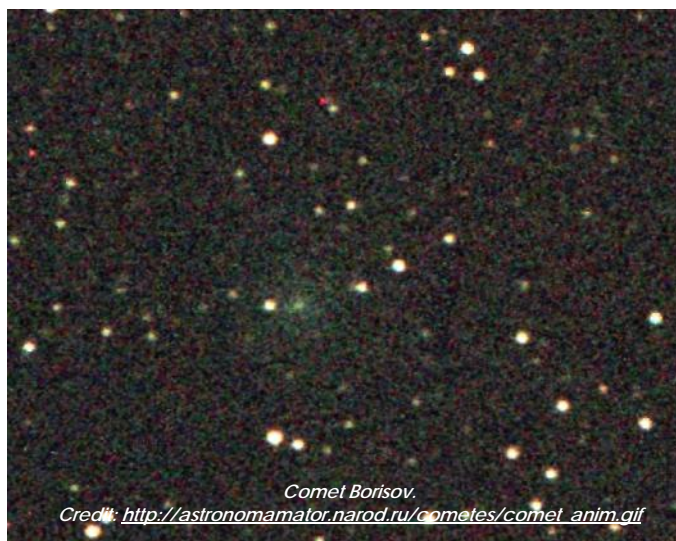
Gennady Borisov, who lives in Nauchnyi in Crimea, Ukraine, discovered the comet C/2013 N4 on July 8 during a star party. Borisov, 51, is a professional optician. He's shown here with his two telescopes.

Ukrainian amateur astronomer Gennady Borisov discovered a brand new comet on July 8 near the bright star Capella in the constellation Auriga. The comet was confirmed and officially christened C/2013 N4 (Borisov) on July 13. At the time of discovery, Borisov was attending the Russian-Ukrainian "Southern Night" star party in Crimea, Ukraine. He nabbed the comet – his first – using an 8-inch (20-cm) f/1.5 wide field telescope of his own design equipped with a CCD camera.



Comet Borisov is the fuzzy spot with a brighter central region in this recent photo. Credit: Oleg Bruzgalov

The new comet is on the faint side, appearing as a small, fuzzy patch of 13th magnitude with a brighter center. To see it you'll need at least a 10-inch (25-cm) telescope and the fortitude to rise in the wee hours before dawn. The reason for the early hour is Borisov's location in Auriga, a constellation that doesn't clear the horizon until shortly before the start of morning twilight. Faintness and low altitude will combine to make Comet Borisov an enticing if challenging object for amateur astronomers.



In July C/2013 N4 was traveling through Auriga not far from the easy-to-spot naked eye star Beta and will slowly brighten as it approaches perihelion – closest point to the sun – on August 20 at a distance of 113.5 million miles (182.7 million km). Unfortunately its elongation or separation from the sun will be slowly shrinking in the coming weeks, causing the comet to drop lower in the sky as it approaches perihelion. Our fuzzy visitor misses Earth by a comfortable 192.5 million miles (310 million km) on August 11. It's likely Comet

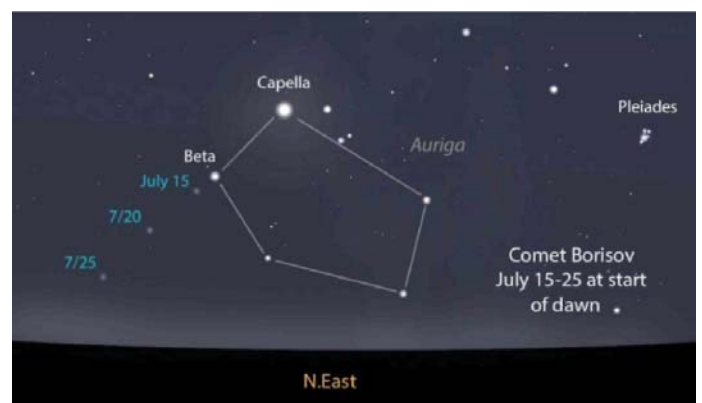


Gennady Borisov with his two telescopes. Credit: Oleg Bruzgalov

Borisov won't get much brighter than 12th magnitude. Astronomers are still working out the details of its orbit, so it's possible brightness predictions could change in the near future

Aside from how prominent or not Gennady's comet will become, the most amazing thing is that he beat the automated surveys to the punch. These days nearly all comets and many asteroids are found by professional astronomers using robotic telescopes hooked up to sensitive cameras and computers. Large areas of the sky are covered each clear night. If a fuzzy, moving object is detected by the computer, astronomers are alerted, follow-up observations are made and the new object receives a letter, number and the survey's name. That's why there are a plethora of comets in the past 15 years with names like LINEAR (Lincoln Near-Earth Asteroid Survey), Pan-STARRS (Panoramic Survey Telescope & Rapid Response System), LONEOS (Lowell Observatory Near-Earth-Object Search) and others.

By dint of persistence, a smart plan and a keen eye, Gennady Borisov has made his mark in the sky. For that he deserves a well-deserved congratulations and round of applause!



C/2013 N4 (Borisov) tracks through northern Auriga not far from Capella in the coming nights. Positions are shown every 5 days at 3 a.m. CDT. The comet is faint and will require a more detailed chart and telescope to see. Created with Stellarium

Amateurs who wish to plot the comet on a star map using a star charting software program can get Comet Borisov's orbital elements HERE. To follow the latest developments, check out Leonid Elenin's blog. You might recall it was Elenin in 2010 who discovered famed comet C/2010 X1 (Elenin), blamed for everything from earthquakes to future world catastrophes. Instead, the comet proved so friable, it disintegrated as it approached the sun. Let's see how Comet Borisov fares.

By Bob King

Courtesy: LAS Newsletter

Proposed Changes to the FAS Constitution

The FAS Council are proposing the significant changes tabulated below to the FAS Constitution. The proposed changes will be put forward at the next AGM on 19th October 2013 at the IoA, Cambridge. Please bring them to the attention of your committee and society members and study them against the current version of the Constitution which can be found here (<http://fedastro.org.uk/docs/fasconstitution2010.pdf>) on the FAS website.

In addition to the significant changes below the FAS Council is also proposing some wording tidying up of some other items in the FAS Constitution. Details of these are on the following page.

Affected Section in Current Constitution	Proposed Change to Constitution	Reason for Proposed Change
3.1	<p>Replace the whole of the current wording of paragraph 3.1 with the following new text:</p> <p>“Membership shall be open to all Astronomical Societies fulfilling the following criteria:</p> <p>a) The society is run by a committee or council or otherwise clearly recognisable group of named, electable office holders and members, and that an election meeting is run on a democratic basis.</p> <p>b) The society arranges regular meetings for its members.</p> <p>Societies applying for membership must use the guidance provided on the FAS website to demonstrate compliance with the above criteria to the satisfaction of the FAS Council.”</p>	<p>The FAS Council considers there are at least two reasons why it is necessary to formally set these criteria:</p> <ol style="list-style-type: none"> 1. Since the current Constitution was set the advent of the internet, e-mail and social media mean that there are new (on-line) ways people can form groups to share an interest in Astronomy. Whilst welcoming these developments the FAS Council strongly believes that the federation has always been and should continue to be of astronomical societies that satisfy the criteria opposite. The Constitution needs to enshrine these criteria for the clarity of current members and groups considering applying for membership. 2. Once a society is accepted for membership it is almost a formality that they can have PLI if they pay for it. But with PLI comes a responsibility for that group to be a properly run organisation to help ensure that care is taken at society events to reduce the chances of an accident (and then a claim). These membership criteria help confirm the applicant society is likely to exercise this duty of care to its members and the public attending their events.
6 & 9	<p>Deletion of the whole of section 9 of the Constitution, covering Regional Groups (and re-numbering of the following sections).</p> <p>Deletion of references to Regional Group representatives in section 6.</p>	A full explanation of the reasons for this proposed change has been given in a Briefing note separately issued to Member Societies.
10.6	<p>Replace the whole of the current wording of paragraph 10.6 with the following new text:</p> <p>“A Member Society failing to pay its annual subscription by the end of eight weeks after the due date shall be suspended from membership of the Federation until such time as the arrears and the current annual subscription are paid”.</p>	At present a brand new applicant gets eight weeks to pay before being timed out of membership whereas an existing no-paying member gets a free 12 months. The FAS Council consider this a gross disparity that needs correction. The proposed change would make 10.6 consistent with existing Para 10.2b Remember that societies are reminded about payments and invited to pay early in January, so even with this proposed change they would still have until the end of May to pay, which is a generous period of time.
14.1 b	<p>Replace the whole of the current wording of paragraph 14.1 b with the following new text:</p> <p>“Any assets shall be wholly distributed (after costs) to the individual member societies that comprise the Federation”.</p>	<p>In the hopefully unlikely event of the FAS having to be wound up the current Constitution refers to independent trustees being appointed and disposing of the FAS assets in line with “charitable aims similar to those of the Federation”.</p> <p>The FAS Council has difficulty in imagining what such a disposal scheme could be that was also fair to FAS members.</p> <p>The aims of the FAS are to help its member societies and so if it had to be wound up Council members consider the greatest final act of help the FAS could make would be to share the assets fairly amongst the member societies (after costs). Hence Council wishes to build that change into the constitution.</p>

For details of the 2013 FAS Convention and AGM please visit the FAS website.

Proposed Wording Tidying Up of FAS Constitution Items

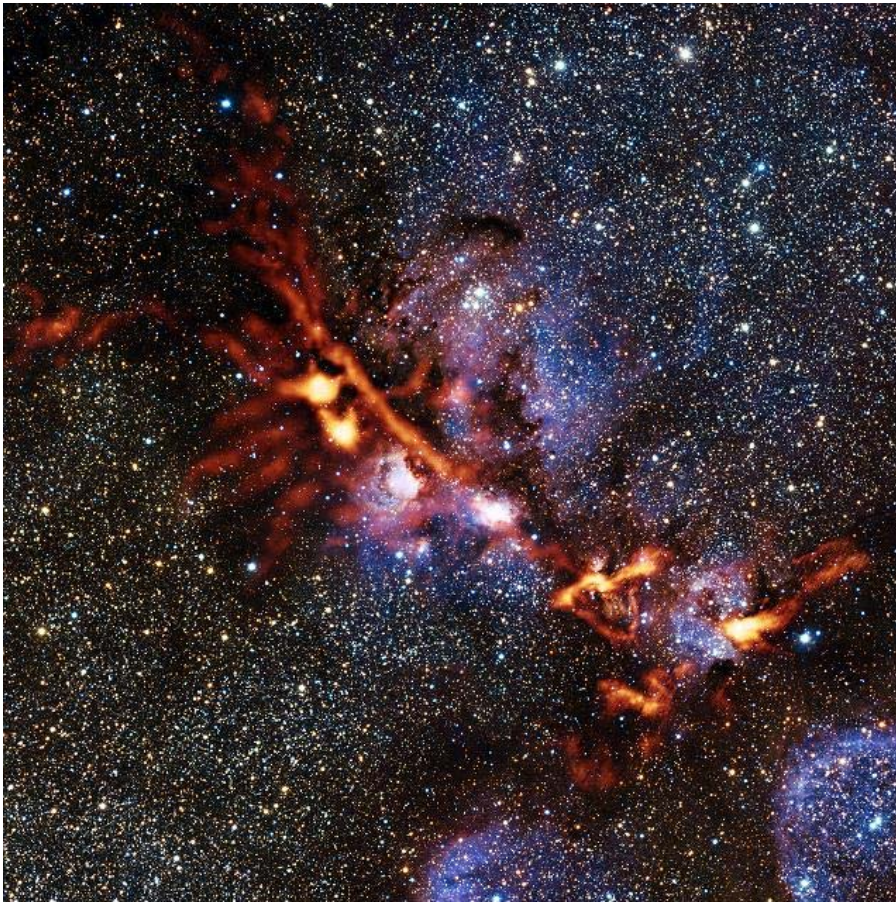
In addition to the four main changes to the FAS Constitution being proposed by the FAS Council. This note describes some minor changes that Council would also like to make to tidy up the wording of some items in the Constitution.

They are as follows:

1. Old Item 6 *Council of the Federation* moved up to become New Item 4 – logic being that the Council should be defined before the officers. As a result Old Item 4 *Officers of the Federation* renumbered as New Item 5, and Old Item 5 *Election of Officers* renumbered as New Item 6.
2. Age eligibility criterion (18+) added in at start of New Item 5, and removed from Old Item 5.4.
3. Old Item 4.1a deleted as unnecessary repetition of what is clear from old items 4.1 b and c.
4. New Item 5.1d added, defining the Chair in the absence of the FAS President.
5. Old Item 5.1b (the candidate's presence at AGM) dropped as unfair in terms of weather, travel, illness, etc. affecting ability to attend.
6. Old Item 5.10 – wording simplified to read “The officers shall take their posts after their election until the next Annual General Meeting.” Instead of “The officers shall take their posts after their election and remain in post until the next Annual General Meeting or earlier resignation”.
7. Old Item 5.11 (powers of Council) dropped as it duplicated Old Item 7.1.
8. Old Item 7.2 – wording simplified to read “Decisions by Council are binding on Member Societies”.
Instead of:
“7.2a. If the Federation Council performs an act on behalf of the Federation and a Member Society does not agree with it then this act cannot be overturned.
7.2 b. In practice there is always the facility for a Member Society to question the Federation Council at the Annual General Meeting or an Extra Ordinary General Meeting”.
9. Old Item 7.3a – Add “as determined by Council” to the end of this item. Wording of 7.3b simplified to read “Disciplinary action and any action resolved by the Council will be final”.
Instead of:
“Disciplinary action may entail withdrawal of membership and privileges from the Federation and any action resolved by the Council will be final”.
10. Old Item 8.3 – ‘Presiding Officer’ replaced by ‘President’
11. Old Item 10 Finance – all constituent items rearranged and renumbered into a more logical sequence.
12. Old Item 11.1 (timing of AGM) – wording improved to read “The Annual General Meeting of the Federation shall be held each year, normally in the autumn”. Instead of:
“At least one General Meeting, the Annual General Meeting of the Federation shall be held each year, normally in the autumn”.
13. Old Item 11.6 (quorum) – wording improved to read as follows:
10.6 A quorum at all General meetings shall be
10.6a. 10% paid-up Member Societies with voting rights are present at an Annual General Meeting. Or
10.6b. 20% paid-up Member Societies with voting rights are present at an Extra-Ordinary General Meeting”. Instead of:
“11.6 A quorum will be established
When at least 10% paid-up Member Societies with voting rights are present at an Annual General Meeting. Or
When at least 20% paid-up Member Societies with voting rights are present at an Extra-Ordinary General Meeting”.
14. Old Item 12 (Voting) – ‘Presiding Officer’ replaced by ‘President’

New Camera Aboard APEX Gets First Light

by Tammy Plotner on September 25, 2013



This image of the star formation region NGC 6334 is one of the first scientific images from the ArTeMiS instrument on APEX. The picture shows the glow detected at a wavelength of 0.35 millimetres coming from dense clouds of interstellar dust grains. The new observations from ArTeMiS show up in orange and have been superimposed on a view of the same region taken in near-infrared light by ESO's VISTA telescope at Paranal. Credit: ArTeMiS team/ Ph. André, M. Henne-
mann, V. Révère-
t al./ESO/J. Emerson/
VISTA Acknowledg-
ment: Cambridge
Astronomical Survey
Unit

Exactly what is ArTeMiS? The camera provides wide field views at submillimeter wavelengths. When added to APEX's arsenal, it will substantially increase the amount of details a particular object has to offer. It has a detector array similar to a CCD camera – a new technology which will enable it to create wide-field maps of target areas with a greater amount of speed and a larger amount of pixels.

Like almost all new telescope projects, both personal and professional, the APEX team met up with “first light” problems. Although the ArTeMiS Camera was ready to go, the weather simply wouldn't cooperate. According to the news release, very heavy snow on the Chajnantor Plateau had almost buried the building in which the scope operations are housed! However, the team was determined. Using a makeshift road and dodging snow drifts, the team and the staff at the ALMA Operations Support Facility and APEX somehow managed to get the camera to its location safely. Undaunted, they installed the ArTeMiS camera, worked the cryostat into position and locked the instrumentation down in its final position.

However, digging their way out of the snow wasn't all the team had to contend with. To get ArTeMiS online, they then had to wait for very dry weather since submillimeter wavelengths of light are highly absorbed by atmospheric moisture. Do good things come to

those who wait? You bet. When the “magic moment” arrived, the APEX team was ready and the initial test observations were a resounding success. ArTeMiS quickly became the focus tool for a variety of scientific projects and commissioned observations. One of these projects was to image star-forming region NGC 6334 – the Cat's Paw Nebula – in the southern constellation of Scorpius. Thanks to the new technology, the ArTeMiS image shows a superior amount of detail over earlier photographic observations taken with APEX.

What's next for ArTeMiS? Now that the camera has been tested, it will be returned to Saclay in France to have even more detectors installed. According to the researchers; “The whole team is already very excited by the results from these initial observations, which are a wonderful reward for many years of hard work and could not have been achieved without the help and support of the APEX staff.”

Original Story Source: [ESO Public News Release.](#)

Courtesy: Universe Today

Voyager 1 Magnetic Data Surprise Intrigues Researchers

Sep. 24, 2013 — A University of Alabama graduate student and a recent UAH doctoral graduate are exploring surprising data from Voyager 1's crossing of the heliopause into the interstellar medium of our galaxy.

Most surprising to the scientists is why a dramatic shift in the magnetic field that they had modeled and were expecting after the craft left the dominant influence of the Sun's heliosphere did not occur, even though the plasma density surrounding the craft changed as expected.

Eric Zirnstein, University of Alabama physics graduate student and NASA Earth and Space Science Fellow in Heliophysics, and May UAH doctoral graduate Brian Fayock, who now does data analysis for NASA, are comparing data from different sources with models they have created to try to understand what's happening.

Imagine a bubble of gas underwater -- the surface between the gas bubble and the water corresponds to the heliopause. The heliopause separates regions of different gases. In the case of the Voyager 1 crossing, the heliopause separates material created by the sun from material that surrounds the stars throughout the galaxy. Because the sun is moving through the interstellar medium, it creates a bow wave as well. Outside the heliosphere, there is a 40-fold increase in plasma density.

Recently, NASA announced that measurements of the effects on Voyager 1 of a March 2012 coronal mass ejection indicated that it had ventured beyond the heliopause, to begin its venture out into interstellar space. At the heliopause, the influence of the solar wind is no longer great enough to push back the gas and plasma created by other stars. When Voyager 1 will be completely beyond the influence of the sun is unknown.

The milestone means the craft has become the first human-made object to venture into interstellar space. It's now about 12 billion miles from the sun, in a transitional region immediately outside the solar bubble. As modeled and expected, the density data from Voyager 1 did show a density change, but apparently the predicted magnetic shift has not happened.

"Scientists expected the magnetic field to change when Voyager crossed that boundary, but it didn't," Dr. Fayock said.

Based on work by Doyle T. Hall in 1992, Dr. Fayock has created a model that describes how light is reflected by neutral hydrogen atoms coming from the interstellar medium and drifting through the heliosphere. Neutral particles from space travel through the electrons and ions in the solar boundary and swap electrons with the plasma inside the boundary to generate another highly energized hydrogen atom called an energetic neutral atom (ENA).

"My work involves helping to constrain the global structure of the heliosphere," he said. "I simulate scattered radiation fluxes."

Based on the flux densities, Dr. Fayock's model maps out the heliosphere and its features, like where the heliopause area is expected to be.

Both Voyager 1 and 2 have ultraviolet spectrometers that have been measuring the Lyman-alpha photons that come directly from the neutral hydrogen atoms. When Voyager data is compared to Dr. Fayock's models, there is a close correlation.

"As the model gets farther from the sun, things start to change based on the location of the heliopause," he said. "If in fact Voyager 1 has crossed already, then our model puts the heliopause a little too far out."

His models extend out 900 astronomical units from the sun, and so far 40 astronomical units have been compared to collected data.

"The impact of the work Brian is doing is significant," said Dr. Gary Zank, heliophysics professor and director of the Center for Space Plasma and Aeronautic Research (CSPAR). "Voyager is still returning ultraviolet backscatter data and there's only one other group in the world -- in France -- who are using it. Brian's work in the U.S. is unique. He has developed the only model in perhaps 15 years that attempts to analyze what data Voyager is returning. Brian's insight is tremendously valuable. He is the only one working on this and modeling it in the U.S."

To better understand UAH graduate student Zirnstein's work, you first need to think of Voyager 1 as more like a mole than a hawk, best at sensing only its immediate surroundings. It's the IBEX satellite that's the hawk, mapping the whole of space from its Earth orbit based on energetic neutral particles that stream in to it from outer space. IBEX data indicate that there exists in space a very narrow ENA ribbon two or three times the brightness of anything else that may help us diagnose the structure of the heliosphere.

"My research definitely depends on where Voyager is and measurements it's taking, if it did cross the heliopause, which the Voyager team released recently," said Zirnstein, whose advisor is Dr. Jacob Heerikhuisen, assistant professor of physics and assistant director of CSPAR.

"If it did," Zirnstein said, "then we did expect that the magnetic field would change direction, because according to our simulations, in order for us to simulate the IBEX ribbon, we have had to assume a quite specific direction and strength of the magnetic field."

"So that's one thing that we're actually going to try to figure out, why for some reason our ribbon simulation predicts a certain magnetic field direction. We expected the magnetic field would change in direction significantly, but all of the other measurements that Voyager made indicated that it did cross the heliopause, except the magnetic field didn't change very much," Zirnstein said. "Is it going to change later? But the fact that the density did change so dramatically, that definitely is an indication that it did cross the heliopause."

Zirnstein's work sheds a great deal of light on the IBEX measurements, said Dr. Zank. "Tying together the IBEX global view with the extremely microscopic view of Voyager is very important. What is the magnetic field doing? Why did it not change direction, as we expected? Eric has the most sophisticated model to address energetic neutral atoms and the ability to use them to probe the physics of the very local interstellar medium and its magnetic field."

Both scientists are keen for Voyager 2 to perhaps shed more light on the magnetic field conundrum when it arrives at the heliopause. Unlike Voyager 1, its plasma measurement instrument is still working.

Geezer Craft

Truthfully, by now the Voyager 1 spacecraft should be just another burnt out retiree, it's primary work done as of Nov. 20, 1980, floating away out in space somewhere.

But Voyager refuses to go quietly into that dark night. With most of its sensors still working, it utilizes computer power that's dwarfed by today's smartphones to send sometimes surprising data packets back to Earth -- first recording them on its ancient 8-track digital tape machines before assembling them and blasting them out at a staggering 23 watts for a trip that NASA says now begins in interstellar space.

Thing is, almost nobody on Earth is learning from the old codger, launched Sept. 5, 1977, during the "Saturday Night Fever" disco dancing era primarily to study the planets. For example, NASA's Dr. Fayock says funding is drying up for his Voyager work, and he is holding on to the hope that an upcoming UAH graduate student may see value in continuing it. Yet news from the geezer satellite keeps intriguing scientists. NASA expects it to send data through at least 2020, and its ability to power itself could last until 2025.

Taking a momentary break during a hectic day, CSPAR Director Dr. Zank indulges a visitor to his office by setting aside mounds of calculation-laden journal proofs he's reading and speaking about the impact of Voyager 1's amazing journey.

He paints a picture of a spacecraft constructed entirely of materials made by the sun, even put together by people made of stuff made by the sun. It's a package totally of solar origin that scientists with a great degree of certainty say has shed itself of its creator and now exists in a place where almost nothing around it is of solar creation or influence.

As the first human-made craft to achieve such a feat, it's an emissary that travels with its Golden Record -- literally a gold phonograph record containing a wide assortment of information about Earth and including a stylus and cartridge to play it -- in an area where there's almost nothing that can harm it.

"So when the sun burns out a few billion years from now and Earth ceases to exist and humans are extinct, this craft could still be out there in orbit," Dr. Zank said, "where it will exist for billions more years."

He thinks it's important we learn from it as long as we can.

Courtesy: Science Daily

ALMA observatory opens window to universe's darkest secrets

The Atacama Large Millimeter/submillimeter Array (ALMA) in the Chilean Andes allows astronomers to peer into some of the darkest and furthest parts of the universe, unveiling some of its previously hidden secrets.

Read more at: <http://phys.org/news/2013-09-alma-observatory-window-universe-darkest.html#jCp>

ALMA produces high-quality [interferometer](#) images at wavelengths in the range between [infrared light](#) and [radio waves](#). The [observatory](#), a partnership of European, North American, and East Asian countries, was officially inaugurated in March 2013.

The EU project ALMA ENHANCEMENT ('Enhancement of ALMA early science') was part of Europe's contribution to the observatory. The project, coordinated by the European Southern Observatory, built the hardware and software components that produce [high fidelity](#) images and high resolution measurements of [water vapour spectral lines](#).

Water is an important constituent of star forming regions and comets, so measuring the best and most complete data set of their spectral lines is crucial to discovering more about the universe's origins.

Gie Han Tan, ALMA's system engineer and European front end project manager at the European Southern Observatory, says ALMA's construction, which started in 2003, was quite a feat and marked a milestone in international scientific cooperation.

"In about 10 years, the largest and most advanced millimetre and sub-millimetre radio observatory has been built from scratch in the remote Atacama desert in Chile," he says.

ALMA ENHANCEMENT played its part by contributing to some of the observatory's early scientific work, which began in 2011, and giving Europe's astronomers access to state-of-the-art instrumentation.

"Under ALMA, European industry and research organisations have developed advanced technology such as receivers and antennas that could have potential spin-off for other, commercial, applications," adds Tan. The project has also injected hundreds of millions of euros into the European construction industry.

Now, the ALMA observatory is producing a steady stream of scientifically significant results. These include giving scientists the best view yet of an embryonic monster star in the process of formation, and pinpointing the location of more than 100 of the most fertile star-forming galaxies in the universe.

Another breakthrough was the detection of sugar molecules in the gas surrounding a young star, revealing that these building blocks of life



could be incorporated into any planets forming around the star.

In July, the radio telescope gave astronomers the best view of how vigorous star formation can blast gas out of a galaxy and starve future generations of stars of the fuel they need to grow.

These findings and many others that continue to emerge - could help scientists and citizens - in many ways.

"ALMA develops society and furthers education by contributing to basic science such as in the areas of physics and chemistry," says Tan.

With the inauguration this year, ALMA is officially open to the global astronomical community, which will benefit from its unique capabilities for at least 30 years. The world can expect even more exciting and unprecedented discoveries about our universe.

Explore further: [World's largest space observatory opens in Chile \(Update\)](#)

More information: www.almaobservatory.org/

Read more at: <http://phys.org/news/2013-09-alma-observatory-window-universe-darkest.html#jCp>

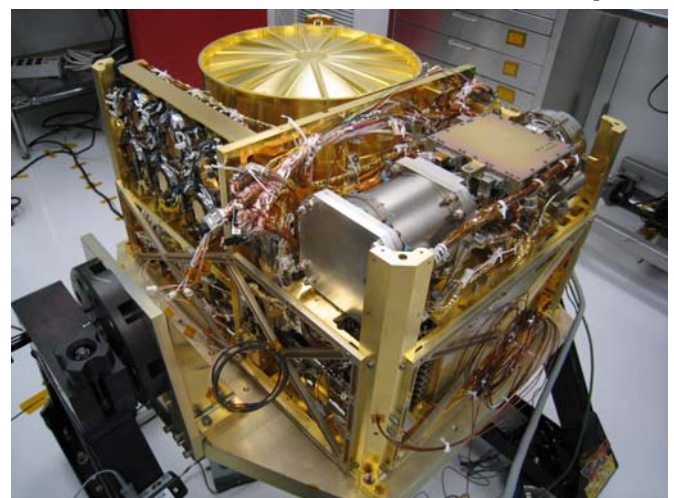
Courtesy: phys.org

Curiosity's SAM Instrument Finds Water and More in Surface Sample

The first scoop of soil analyzed by the analytical suite in the belly of NASA's Curiosity rover reveals that fine materials on the surface of the planet contain several percent water by weight. The results were published today in Science as one article in a five-paper special section on the Curiosity mission.

"One of the most exciting results from this very first solid sample ingested by Curiosity is the high percentage of water in the soil," said Laurie Leshin, lead author of one paper and dean of the School Science at Rensselaer Polytechnic Institute. "About 2 percent of the soil on the surface of Mars is made up of water, which is a great resource, and interesting scientifically." The sample also released significant carbon dioxide, oxygen and sulfur compounds when heated.

Curiosity landed in Gale Crater on the surface of Mars on Aug. 6, 2012, charged with answering the question: "Could Mars have once harbored life?" To do that, Curiosity is the first rover on Mars to carry equipment for gathering and processing samples of rock and soil. One of those instruments was employed in the current research: the Sample Analysis at Mars (SAM) instrument suite, which includes a gas chromatograph, a mass spectrometer and a tunable laser spectrometer. These



*The Sample Analysis at Mars instrument suite, prior to its installation on the Curiosity rover.
Image Credit: NASA Goddard*

tools enable SAM to identify a wide range of chemical compounds and determine the ratios of different isotopes of key elements.

"This work not only demonstrates that SAM is working beautifully on Mars, but also shows how SAM fits into Curiosity's powerful and comprehensive suite of scientific instruments," said Paul Mahaffy, principal investigator for SAM at NASA's Goddard Space Flight Center in Greenbelt, Md. "By combining analyses of water and other volatiles from SAM with mineralogical, chemical and geological data from Curiosity's other instruments, we have the most comprehensive information ever obtained on Martian surface fines. These data greatly advance our understanding surface processes and the action of water on Mars."

Thirty-four researchers, all members of the Mars Science Laboratory Science Team, contributed to the paper.

In this study, scientists used the rover's scoop to collect dust, dirt and finely grained soil from a sandy patch known as Rocknest. Researchers fed portions of the fifth scoop into SAM. Inside SAM, the "fines"—the dust, dirt and fine soil—were heated to 1,535 degrees F (835 C).

Baking the sample also revealed a compound containing chlorine and oxygen, likely chlorate or perchlorate, previously found near the north pole on Mars. Finding such compounds at Curiosity's equatorial site suggests they could be distributed more globally. The analysis also suggests the presence of carbonate materials, which form in the presence of water.

In addition to determining the amount of the major gases released, SAM also analyzed ratios of isotopes of hydrogen and carbon in the released water and carbon dioxide. Isotopes are variants of the same chemical element with different numbers of neutrons, and therefore different atomic weights. SAM found that the ratio of some isotopes in the soil is similar to the ratio found in atmospheric samples analyzed earlier, indicating that the surface soil has interacted heavily with the atmosphere.

"The isotopic ratios, including hydrogen-to-deuterium ratios and carbon isotopes, tend to support the idea that as the dust is moving around the planet, it's reacting with some of the gases from the atmosphere," Leshin said.

SAM can also search for trace levels of organic compounds. Although several simple organic compounds were detected in the experiments at Rocknest, they aren't clearly Martian in origin. Instead, it is likely that they formed during the high-temperature experiments, when the heat decomposed perchlorates in the Rocknest samples, releasing oxygen and chlorine that then reacted with terrestrial organics already present in the SAM instrument.

A related paper, published in the *Journal of Geophysical Research-Planets*, details the findings of perchlorates and other chlorine-bearing compounds in the Rocknest sample. This paper is led by Daniel Glavin, a Mars Science Laboratory Science Team member at Goddard.

Glavin notes that SAM has the ability to perform another kind of experiment to address the question of whether organic molecules are present in the Martian samples. The SAM suite includes nine fluid-filled cups which hold chemicals that can react with organic molecules if present in the soil samples. "Because these reactions occur at low temperatures, the presence of perchlorates will not inhibit the detection of Martian organic compounds," said Glavin.

The combined results shed light on the composition of the planet's surface, while offering direction for future research.

"Mars has kind of a global layer, a layer of surface soil that has been mixed and distributed by frequent dust storms. So a



The Sample Analysis at Mars instrument suite found water in the dust, dirt and fine soil from the Rocknest site on Mars. (This file photo shows trenches Curiosity dug in October 2012.)
Image Credit: NASA/JPL-Caltech/MSSS

scoop of this stuff is basically a microscopic Mars rock collection," said Leshin. "If you mix many grains of it together, you probably have an accurate picture of typical Martian crust. By learning about it in any one place you're learning about the entire planet."



Mosaic image of Curiosity.
Image Credit: NASA/JPL-Caltech/Malin Space Science Systems

Courtesy: NASA