Stargazey Pie!
A slice of Highlands astronomical life!
Tues 7th April 2015

# HAS Meeting Notices April 2015

**Current News and Dates for your Diary**

- **Solar Saturdays** will be starting soon - these take place at the Observatory at Culloden Moor (park at the far back left of the NTS Battlefield car park, there is a grassy path to your left which leads to the Observatory). Please check the website (www.spacegazer.com) before setting off to find out what time (and whether) the session is running. We have two special telescopes for looking at the sun. Children welcome.

- **The next meeting is on Tuesday 5 May 2015** - Arthur Milnes (HAS Chairman) will present two short lectures from the acclaimed programme, "A visual Guide to the Universe", by David D Meyer, Professor of Physics and Astronomy, Dearborn Observatory and the Smithsonian Institution: "Probing the universe from space", and "The magnetic beauty of the active sun."

- **Events:**
  - 9th May 2015, 12 noon to 4pm - Inverness Science Festival Family day at the Inverness Aquadome, Bught Road, Inverness. HAS is planning to have a table – more details nearer the time.
  - 3rd – 9th September 2015 – the renowned Orkney Science Festival will be taking place. There is much to see and hear on astronomy subjects this year, but also music, arts, food and drink, and Orkney history. If you have not been before, and you can make it, then attendance is certainly recommended.

- **Suggestion Box** – at reception. Don't forget to let us know if you have any ideas you would like the committee to look at – this is your Society, please help the committee to provide what you are looking for. Or of course speak to a committee member.

- **Aurorae and Telephone alerts** – should you see an aurora, noctilucent clouds, or anything else of astronomical interest, please alert Paul (01667 456789) or Pauline (07751 112 586). It is never too late at night to let us know. PLEASE NOTE, the wording of the telephone alert is a little strange. If you receive a telephone call with a disembodied voice beginning, "This call will not cost you anything..." - please don't hang up, it is your aurora alert! Alerts can also be sent by text to your mobile – if you would prefer this option please check with Ronnie that we have you signed up for this.

- **Subscriptions** – these are now due. It was agreed at the AGM not to raise fees. Forms are available at the front desk during tea break next month or please get in touch with Ronnie our Treasurer.

**Main Event (the AGM)**

The minutes from the AGM of 2014 were approved with no matters arising.

Arthur, our Chairman, thanked everyone for coming and doing their bit for the Society. He said our membership is over 100 and many are returning members so we must be doing something right. He thanked the Committee with the amount of work that is put in to keeping the Society running as well as the Observatory team lead by Gerry Gaitens, our Observatory Manager and he hoped everyone would visit the observatory. He also thanked Marian for all her hard work keeping us afloat with tea and coffee, Pauline (me) for talking to schols and youth groups as well as Youngstars. He thanked Christine for manning the desk and Pat Williams, who although is in Edinburgh, still contributes to the Courier and keeps us up to date with space news. He also mentioned that there are many other members who help behind the scenes and are invaluable in keeping the Society going.

Ronnie our Treasurer gave his report which is detailed in the Trustees' annual report and which you will have received either by e-mail or through the post. Briefly, the good news is that the subscripions are not being raised and we are looking at other ways of paying them which might be a little easier. Ronnie pointed out that because we don't pay rates for the observatory, we are in effect saving £854! All in all we have a healthy bank balance which is kept topped up by the monthly raffle.

The Treasurers report and budget was approved with no dissenters.

The only Office Bearer up for re-election was Arthur as Chairman. He has served four years already but the Constitution says he may stay on if so elected. Arthur was elected unopposed.

The AGM was closed at 20:10.

**Main Event (the nicer bit)**

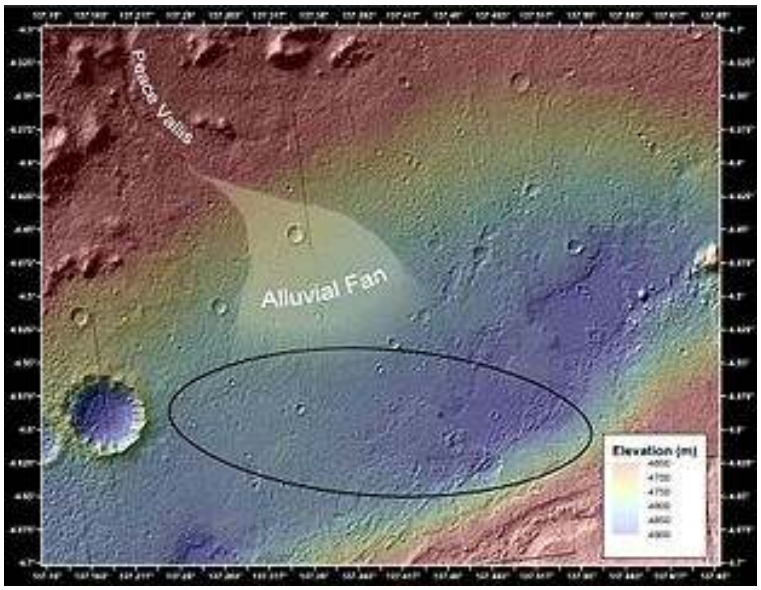
We were delighted to welcome John Bridges (who was made a professor last month) as our speaker after the AGM. Professor Bridges began his distinguished career as a space scientist with a PhD from the Open University (1992). After several years as a Planetary Science Researcher in mineralogy at the Natural Science Museum, he went to the UCLA in California and NASA Johnson Space Centre in Houston as a researcher in Lunar and martian science. He has since worked at the Open University as a research scientist and joined the University of Leicester in 2007 where he is now part of the Space Research Centre. At the Centre, they use a range of techniques to study early solar system processes related to the origin of asteroids and comets, and what they might tell us about the evolution of Mars. He currently works with the Mars Science Laboratory (Curiosity Rover) as a ChemCam team member.

Professor Bridges began his presentation with a video about the entry and landing of Curiosity, known as the "Seven Minutes of Terror" because it was a completely new way of reaching the surface involving a great number of processes that had to occur before landing took place. The radio transmission from Mars to Earth took seven minutes so scientists had to wait for seven minutes before they knew whether or not Curiosity had landed safely. See video here: http://www.jpl.nasa.gov/video/details.php?id=1090

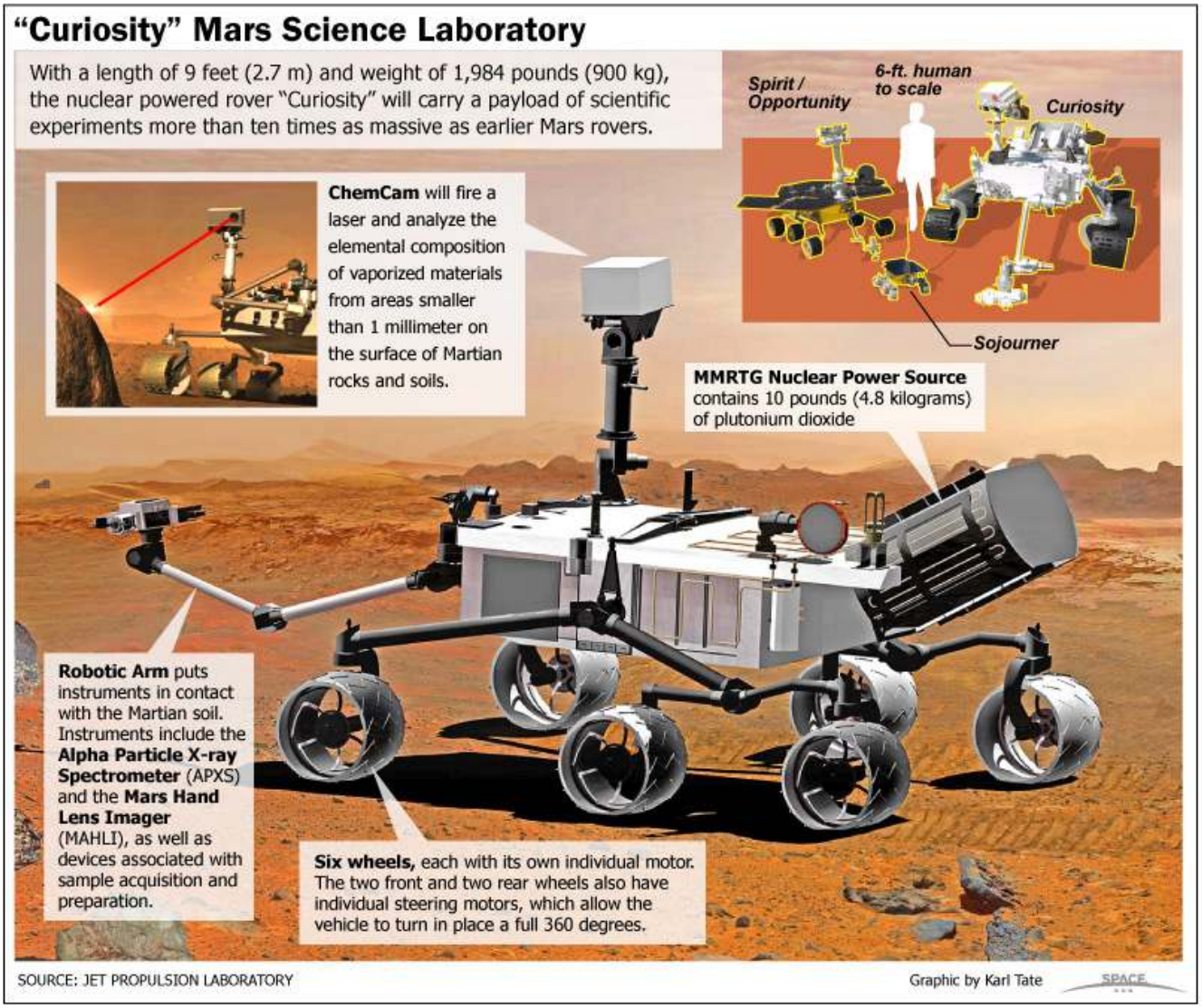
This was the most ambitious planetary mission ever achieved and faced massive challenges as it required a fully equipped laboratory that could receive samples from different places on the martian surface. It cost one and a half billion dollars and of course ties up many of the best scientific minds but, as Darwin said about his voyage on the Beagle, there would be benefits from his findings although he didn't yet know what they would be and this will be the same with the Curiosity mission.

Why was Curiosity needed? Our views and understanding of Mars have changed as the imagery has improved and it's the tantalising evidence of water that has drawn scientists to the red planet. Over the years the idea of the possibility of life on Mars has gone from optimistic (from the early days when changes seen were thought to be vegetation) to pessimistic (when Mariner 4 sent back the first disappointing images showing a dry place covered in craters) to optimistic again with recent images showing more definite support for water on the surface. The differences in images between 1964 (Mariner 4) to the most recent images received today are immense.

In 2000, Mars Global Surveyor found layers in Candor Chasma in Vallis Marineris but it was not sure whether they were sedimentary or volcanic although one scientist, called Malin, was sure they were sedimentary and he was proved right.




The landing site for Curiosity was chosen because of the detail in the images from the HIRISE camera on Mars Reconnaissance Orbiter, which showed what appeared to be an alluvial fan – a feature of watery environments – within Gale Crater. There appears to be a mountain in the centre that looks layered and clay seems to be present in one of the layers – again suggesting water as clay can only form in the presence of water. *See left.*



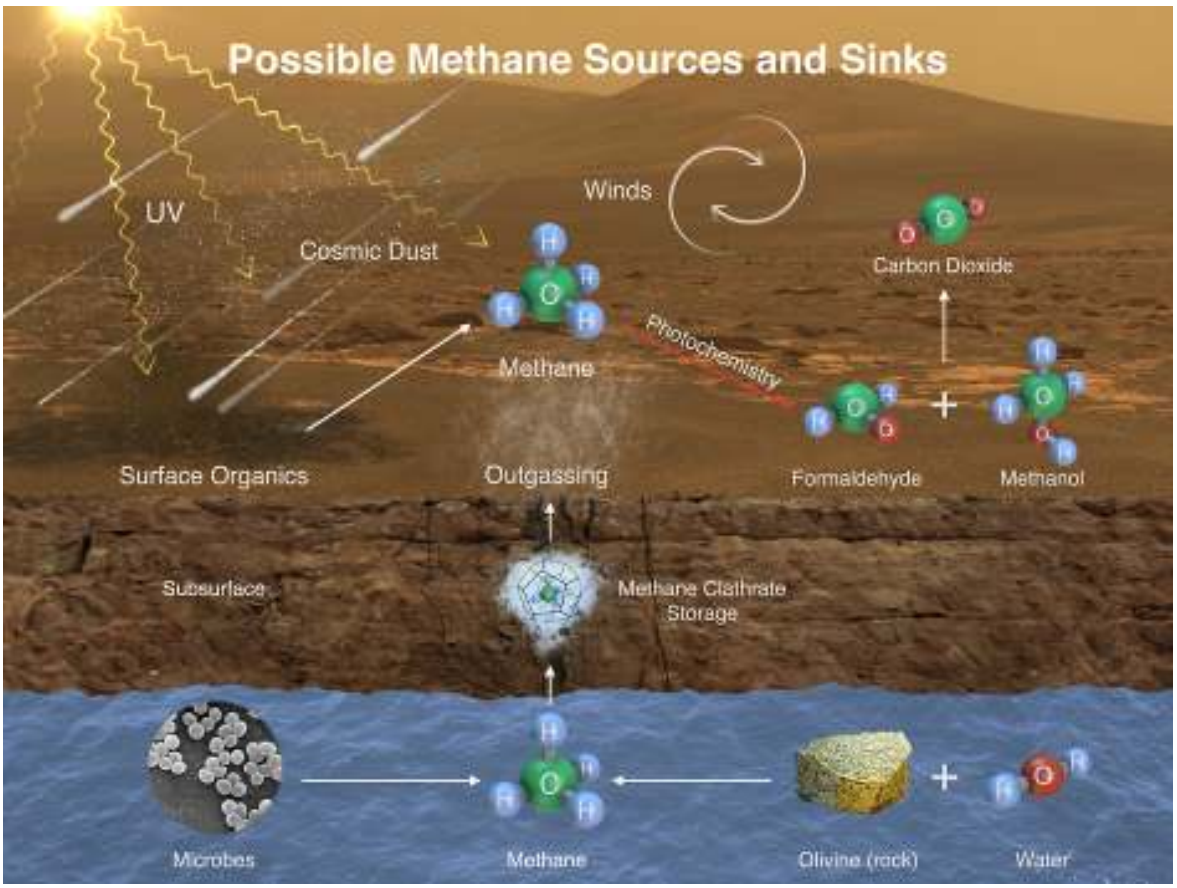

Curiosity is the latest design of rovers for Mars and much larger (size of an SUV) than previous rovers. The robotic arm looks clumsy but is actually very precise. A long time was spent testing that Curiosity would work on martian terrain; it has wheels 65cm wide to cope with the rocks it needs to drive over.

After landing, it began taking images of itself to check there was no damage and that everything was working. Scientists were put onto a Mars day (about 24 ½ hours long) for the first 90 sols (martian day). They would start the day with a download link from Odyssey and Mars Reconnaissance Orbiter then make a plan for what they wanted the rover to do that day.


The landing had exposed bedrock and Curiosity could drive right up to the scour mark and take a close look. It found rounded pebbles, the size of which suggested this was an ancient riverbed, and confirmed when comparing the conglomerate rock found here with known samples on Earth. The stone ringed is large and round and was probably carried in water for a long distance before it became cemented into this rock. *See left*

There is also a radiation detector which measures high energy radiation and scientists have concluded that the levels are just manageable for a crewed mission to Mars at some point in the future where the crew would receive a dose of 1 sievert which is considered to be a lifetime dose.

A mass spectrometer measures the composition of the atmosphere. Where Mars used to be warm and wet it is now cold and dry and suggests most of the atmosphere has been lost.

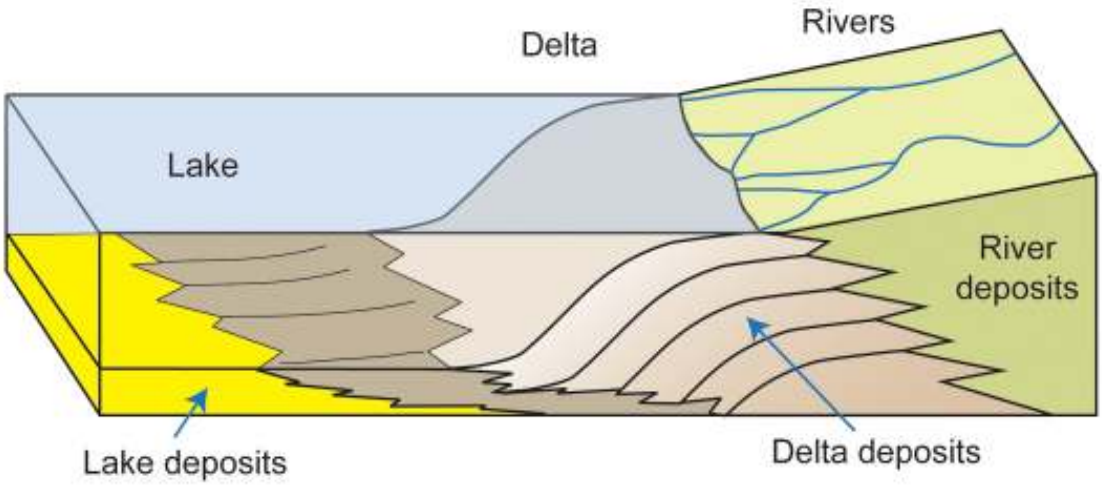



Another interesting feature of the atmosphere is methane, which has been detected occasionally. Curiosity's initial readings did not find any and then more recently a spike of methane was detected suggesting something is releasing methane from the surface.

Now that Mars has been studied for some time, it has been found to be a lot more complex than originally thought. Sand dunes tend to be dark in colour because they are from volcanic rock, the rock itself appears to be basalt from the partial melting of the mantle. Layers can be seen in the distance on Mount Sharp and evidence has been found for water being present in the past. *Artist's depiction of water in this area, see right.*

Just recently in the Pahrump hills at the bottom of Mt Sharp, Curiosity has found veins and spherules deposited by water in buried sediment with cross bedding and clay rich deposits. *See left.*

http://astronomynow.com/2015/04/02/curiosity-rover-eyes-prominent-mineral-veins-on-mars/




It is now thought that the sedimentary layers slope towards Mt Sharp and the whole area may have looked something like the above.

Curiosity has also identified organics from drilling into a rock and although don't show proof of life the reduced organic molecules could be used as building blocks for life. The area that Curiosity is investigating appears to have been habitable for life with water in the form of a lake that was probably drinkable.

"A fundamental question for this mission is whether Mars could have supported a habitable environment," stated Michael Meyer, lead scientist for NASA's Mars Exploration Program. "From what we know now, the answer is yes."

Thank you Proffessor Bridges for telling us all about Curiosity and the exciting findings from this mission so far.

Next month we are into the lighter evenings and hopefully some sunshine during the day to allow views with the hydrogen alpha filter on the Lunt telescope. We will look forward to Arthur's interesting videos as well as the always welcome tea and biscuits.

Pauline Macrae