

Stargazey Pie!

A slice of Highlands astronomical life!

Tues 4th Oct 2011

INTRODUCTION

The October meeting started off with the machines taking over the world. Or at least, the machines fighting any attempt the humans made to actually use them. Finally though, humanity prevailed and the machines were replaced with ones that would comply, and so we were promised that Dr Lyndsay Fletcher's talk would be able to go ahead! Just as well, as there were rather a lot of us who'd turned up to hear her speak. With the rebellion quashed (or at least postponed) the meeting started, with Arthur "John Connor" Milnes back in control...

- **Committee Vacancy.** Because of other commitments (is Rhona really being committed?) Rhona is standing down both as Vice-Chairwoman and from the Committee. We hope to see her back on the Committee 'ere long. She will stay on as Deputy Observatory Manager. Thank you for all you have done for HAS Rhona. This of course leaves a vacancy. Please approach any committee member if you would like to be considered as a Committee Member.
- **Tea Rota – Help Needed!** The Committee would like to thank Marian Porteous for organising the teas and coffees so efficiently. She has been helped up to now by Lynda MacKay and Irene Goodwin. Sadly, after this evening, Lynda and Irene are no longer able to assist. On your behalf the Committee would like to thank them for their part in making our meetings so satisfying. Marian is asking for a few people to assist on a rota basis. She has made out a list which will be at the front desk and then on the tea-bar at the break.

- **2011-12 Programme Update with Dates For Your Diary.**

Special Event – Caroline Smith, Curator of the Natural History Museum, London will give a talk to HAS about meteorites. This is scheduled for Thursday 17th November. Further details will be available at the monthly HAS Meeting in November and will be on the website, in the notices and in November's Stargazey Pie.

Saturday 3rd December - HAS Christmas Dinner. Pat Escott would welcome suggestions for a suitable venue; ideally in the centre of Inverness in case of snow and with HAS having sole occupancy. We anticipate around 40 members and partners attending.

Saturday 21st January from 10:00 to 16:00 - Outreach Day at the Eastgate Centre, Inverness with viewing at the observatory from 20:00 to 23:00. The BBC is hosting another Stargazing Live Day so details may change.

Volunteers will be needed for most of these events. Please contact Pat Escott if you can help.

- **Can You Help?** To date we have had no volunteers.
Break-out Groups - Help is required to organise these. Gordon McKenna takes on this role, but, as he is away on business some of the time, he is asking for a member to assist him. Volunteers contact Gordon.

Technology Team - Smithton-Culloden Free Church has state of the art technology. HAS therefore requires a state of the art volunteer with some experience in this field to join the Technology Team. Please contact Paul Jenkins.

James Webb Telescope - <http://goo.gl/mvaOO> Please consider this petition re probable cancellation.

- **Membership.** We currently have 89 members. We have come close to, but never reached, 100. Could this be the year we make our century? If we don't ... well, it doesn't really matter, after all it's about quality not quantity!
- **Observing Sessions - JSL Observatory.**

Date	For Whom	Time	Supervisor
Fri. 21 st Oct.	public and members	20:00 – 23:00	Pauline
Sat. 22 nd Oct.	members and guests only	20:00 – 23:00	Paul J
Fri. 28 th Oct.	public and members	20:00 – 23:00	Paul J
Sat. 29 th Oct.	members and guests only	20:00 – 23:00	Pat W

Please check www.spacegazer.com before setting out.

If a Saturday session is cancelled the supervisor will try to put on an extra session. Members are needed to train as supervisors and as assistants, especially for the Friday public evenings. Please contact Gerry or Rhona. Steve Cullen has volunteered to train as a supervisor. Welcome to the team Steve.

- **September Meeting & Stargazey Pie.** 55 people attended the September Meeting. The raffle raised £42 and the *Pie* was subsequently sent to all members who were unable to attend the meeting.
- **Radio Gaga.** Your computer is bored. It wants to take over the world. It has spare computing power nearly all the time that could be used to do something cool. So why not let it? By connecting 100s and 1000s of computers together through the Internet, it's possible to simulate a single machine capable of doing some pretty amazing stuff. That's what theSkyNet is all about - using your spare computing power to process radio astronomy data.

TheSkyNet is a community computing project dedicated to radio astronomy. Radio astronomers use radio telescopes (of course) to observe the Universe at radio wavelengths (still with me?). All day, every day, signals from distant galaxies, stars and other cosmic bits and pieces arrive at the Earth in the form of radio waves. Once detected by a radio telescope the signal is processed by computers and used by scientists to support a theory or inspire a new one. Or even disprove them.

Please join the project at www.theskynet.org and join the Scottish Highlanders alliance to hopefully win telescope time.

By joining an alliance you have your own points and the alliance gets points as well. Lynn Robinson, a former HAS Observatory Manager, started the Scottish Highlanders the day the project started so could be in for founder status as well.

Any connection between this "SkyNet" and the SkyNet in the Terminator movies is, as far as I know, completely coincidental. We hope.

Shooting Stars: Other Important Club News!

Arthur Milnes took the floor to start the meeting, and began by paying our respects to the wonderful ladies who have provided us all with tea and biscuits recently. Sadly though, all good things come to an end, and we are now seeking volunteers to take over the roles (no, not rolls, just biscuits) from Marian, Lynda and Irene. It will be organised on a rota basis, as mentioned in the notices above.

Similarly, unless volunteers can be found to help with the organising of the breakout groups, we will all be forced to watch DVDs at every meeting. Suitable subjects are many and varied, from practical demonstrations of equipment, to techniques, to software applications, to imaging processes – there really is no limit. Gordon McKenna is unable to do this all by himself so some help in organising these little side-events would be greatly appreciated. The breakouts are very much valued by all the members of the Society.

While Arthur retired to the sidelines, his place was taken by Paul “T-1000” Jenkins, who delivered the monthly Observatory report. It’s all good news really, as we now have an Internet connection to the Observing Station, and the Society has invested in a new 80mm f5 refractor all of its own. This will replace the one that Gerry had loaned to the club for use as the video camera’s visual conduit to the night sky. It will be mounted atop the LX200R (why does everyone forget that “R” – it’s very important) and will serve us well. With this equipment in place and being used more effectively all the time, it makes it a lot easier for the dream of “observing the cold outside from the warm inside” to become a reality. It’s cheating really, but it will be with us soon. Just like the future.

Recent observation made at the observatory include a stunning wealth of solar detail on the very last Solar Saturday of the season. Talk about going out with a bang! We were lucky enough to observe very bright active regions in h-alpha wavelength, which only the previous day had emitted large solar flares, and were still exceedingly fearsome looking! Night observations have also been made of the two recent supernovae in the galaxies M101 and M51, with the M101 one being observed at the observatory and independently by members.

Paul also apologised on behalf of the machines that held up the start of the meeting, thereby proving beyond any doubt his complicity in the technological sabotage. Still, despite the fact that we may well soon all become the slaves of the Earth’s machine overlords, the short-term future for the club looks rather good. Well-organised observing sessions are looming for this coming season, with a reliable and well-behaving 14” ‘scope, and even the possibility of the old 12” HASDobs Dobsonian telescope being put into use on a regular basis – after a little wash and freshen up. The Dobs performs really well and is of course completely immune to mechanical failures and EMPs.

Hope you get up to Culloden one night soon and make use of our excellent equipment. If you’d like to volunteer to become a session host or assistant, please contact Gerry, Paul, Rhona or one of the other committee members.

The Main Event: ‘Solar Flares and Space Weather’

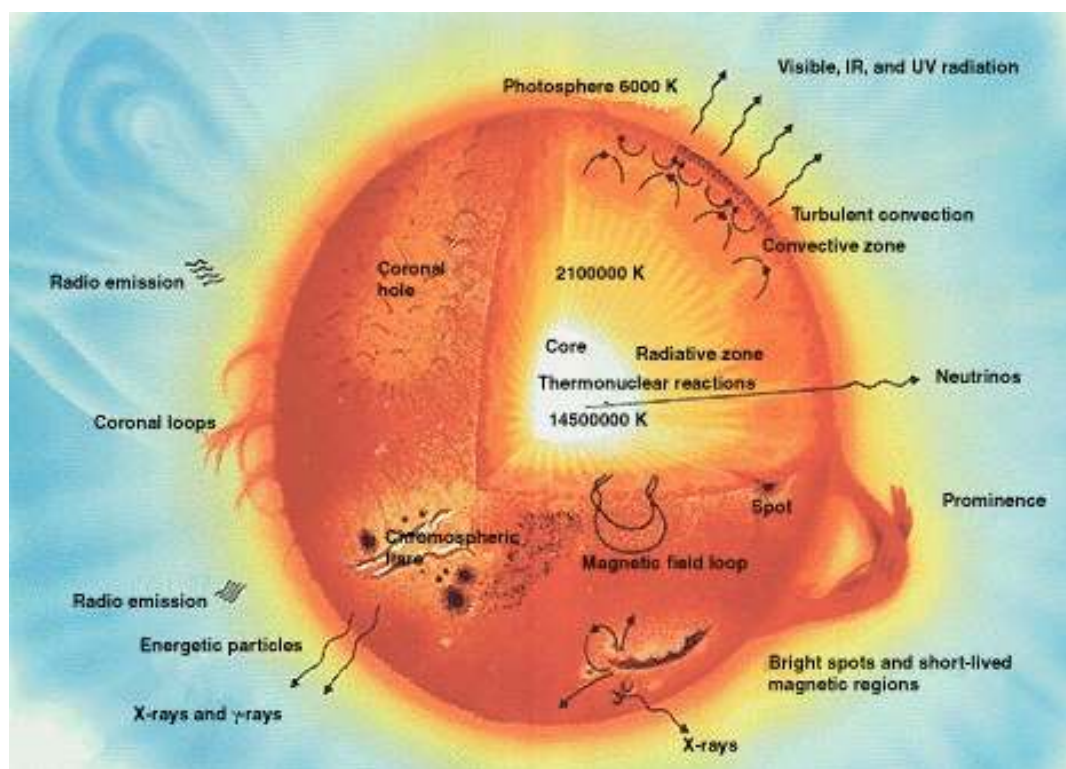
Lyndsay Fletcher obtained her PhD in solar physics at the University of Glasgow. Following several years working in the Netherlands (at the University of Utrecht and the European Space Agency) and in California (Lockheed Martin Solar and Astrophysics Lab) she returned to Glasgow to

a Lectureship in 2000, and has been a Reader in Solar Physics since 2006. Her research interests are in solar flares and associated problems of solar magnetism and she is the Royal Astronomical Society's 2011 'Harold Jeffreys' Lecturer.

Lyndsay last spoke to us in October 2004 (complete with long hair and ponytail) on the latest advances with RHESSI. This month's talk took us back to the basics of solar flares and how space weather is related to solar activity, and also touched upon how it affects us on Earth.

Surprisingly, Lyndsay started the talk off with a very old-fashioned picture of Victorian telegraph operators in the 1850s. It became obvious that phenomena such as electric shocks being transmitted through the telegraph equipment were related to solar activity in the form of Sunspots. They also occurred at times of very intense auroral activity – another give-away sign of the Sun's influence, which we are now aware of.

So what is it that's actually coming from the Sun to produce these phenomena? Lyndsay explained how the energy is released from the Sun, starting with the nuclear reactions that take place right at the core and then following the long slow journey of the energetic particles (or photons) through the various layers of the Sun. This journey can take between 10,000 and 170,000 years! The photons have to pass through the Radiative Zone then cross the tachocline, before passing through the Convective Zone to the "surface" of the Sun.



When we look at the Sun through a specially filtered telescope in "white light", we can see Sunspots and granulation. Granulation is the dotted appearance, like orange-peel that covers the disc. Each little pimple is the top of a granule, or convection cell. Think of it as a pan of boiling porridge. The hot material comes to the surface, bursts through, and then cools again before sinking back down into the mixture. As the particles come to the top of the Sun's convective zone and out onto what we might call the surface (the photosphere), they release their energy in a number of wavelengths, but mostly heat and light.

The Sunspots we see are areas that are cooler than the surrounding material, and so appear darker. They are caused by intense magnetic field activity on the Sun and tend to be found in

pairs with a loop of magnetic field between them. The Sun's magnetic field is very complicated, because the different parts of the Sun rotate at different speeds. This results in the magnetic field lines getting "wound up" into each other, causing a huge build up of potential energy. Because this interferes with convection, the areas around the bases of the magnetic field loops do not transport as much energy to the photosphere, and so the areas appear dark. In fact, Sunspots are still very hot indeed at 4500k or so, but because the surrounding photosphere is around 6000k the contrast effect makes them appear obvious to us.

Eventually the magnetic field becomes so wound up that it snaps, releasing huge amounts of energetic material into the chromosphere and corona. This may result in solar flares – huge outpourings of material into the space around the Sun. If the energy released is sufficiently potent, it can be blasted off at escape velocity, and break free of the Sun's enormous gravity – known as a coronal mass ejection. The material then travels out into the much thinner regions of the Sun's atmosphere – which includes the environs around the Earth!

If this energetic outpouring should reach the Earth, it would destroy us all if it were not for the natural shield that Earth has. Yes, the Earth's magnetic field is here to channel away the deadly charged particles that come to visit us from the Sun. As a final barrier, we also have the Earth's atmosphere, which acts as an invaluable filter against such harmful radiation as UV, some IR, X-Rays etc that the Sun shoots our way every single day. The magnetosphere that protects Earth is the subject of a talk all by itself, but basically it is an extension of the Earth's magnetic field. Sometimes, however, the Sun's ejections do seep through into the Earth's atmosphere. This can result in huge electrical disturbances. For example, the shorting out of power transformers in Quebec in 1989 – and referring back to the start of Lyndsay's talk, the electrical disturbances in the telegraph equipment that shocked those poor ladies back in the 1850's.

These days there are more than telegraphs to worry about. Think instead of communication satellites, orbiting telescopes and space probes, missions to the Moon and other planets and the International Space Station to name but a few. Power cuts are bad enough, but when entire provinces can be rendered powerless, or astronauts lives put at risk, by a single coronal mass ejection hitting our portion of space, it is something very important to consider – and avoid if possible.

The latest generations of orbiting probes are monitoring the Sun (RHESSI, The Solar Dynamics Observatory, the Solar and Heliospheric Observatory and many others) to determine when these ejections are likely to take place. This is spaceweather. Their observations are taken very seriously by industry and the Space Agencies, as damage to a mobile telephone network satellite or Television satellite can mean huge losses for the company and great inconvenience for the subscriber. The space agencies are always concerned about anything that might harm their equipment or personnel in orbit around the Earth or en route through the solar system.

Observing the Sun in all its different guises is more important to us now than ever before, as we have reached out and stepped beyond the atmosphere, making the space around the Earth our laboratory and business park. The coming years and the developments in future solar observing missions are going to be very interesting. I only hope that when there is some big news to impart to us, that we can welcome Dr Fletcher back to HAS to tell us all about it!

Highland Skies – October

The last few weeks have been very exciting. We have had a comet to observe that a) is relatively easy to find, and b) actually looks like a comet should when it is found. Comet C/2009 P1 Garradd has been resplendent in low to medium power telescopic magnifications, shining at magnitude 8-ish and has been steadily making progress through the Summer Triangle area. There is a definite tail in telescopic views now, but it is a subtle one and will require some small effort to see.

Unfortunately Comet Garradd will certainly not be the grandstanding event that Comet Hale-Bopp was in 1997 – but we can still keep on hoping for another such comet in the months and/or years to come.

How does a pair of Supernovae sound to you? Well there are indeed two recent supernovae to observe, both in relatively easy to locate galaxies in the constellations of Ursa Major and Canes Venatici. SN2011fe in M101 (near the handle of the Plough in Ursa Major) is the easiest to see visually, although M101 itself is actually quite a subtle and sometimes hard to detect galaxy. Once you are centered on the correct area, the supernova itself is the brightest star in the environs of the galaxy, and sits third along in a string of four stars. It shines at around magnitude 10 at the moment, though of course it will fade over the weeks to come.

A nearby second supernova is in the galaxy M51 was spotted in June by French astronomers. It is in the galaxy M51 in Canes Venatici and is the more difficult star to spot, shining at magnitude 13 or so. This makes it detectable in larger aperture telescopes only – visually at least. Photographically even a small refractor will show it, as digital imaging is a very effective and efficient way of revealing objects that are traditionally too “dim” to be seen at the same aperture visually.

This was revealed to me most emphatically on a recent night when I shared a “supernova hunting session” with Maarten and Simon at Simon’s superbly dark site on the Black Isle. Maarten was using his new imaging set-up, which comprises a Mintron astronomical digital video camera and a short tube 6” Newtonian. I was using a 6-inch f8 achromatic refractor. Both ‘scopes are considered quite reasonable for “seeing” deep sky objects, but the comparison on the night in question between digital and eyeball observing left me in no doubt that the video set-up shows a lot more detail and goes a lot deeper. It was also able to cut through the severe moonglow and haze more effectively to show the very dim supernova star in M51. Through my visual set-up I could not even make out either of the galaxies!

Thankfully, on a later night of good seeing, my refractor did indeed return to the fray and reveal everything I wanted to see of those objects. However, the point is that the digital video image is a very effective tool for displaying difficult and detailed objects to either large audiences or neophyte observers. This has also recently been proven at our Solar Saturday events at the JSL Observatory, with live webcam images being shown on large screens proving most popular for first-time (and experienced) solar observers.

Why am I saying all this? To show that variety is the spice of life. It is very easy to pigeonhole oneself as a certain type of astronomer or observer and thus close off many other aspects of the hobby through a kind of self-imposed exclusion. The night with Maarten’s video set-up opened my eyes (literally) to the potential and the enjoyment of such a system, and regardless of the poor performance of my visual ‘scope on that particular night, it did NOT suddenly tarnish my traditional visual observations as lacking. Rather, as I said recently, it merely shows them as being “different” and even complementary.

So, rather than suggesting you seek out new observing targets this month, I am instead suggesting that you try to look at them in a different way. Consider attending one of the observing nights at the observatory and see for yourselves the different ways we have at our disposal to observe the wealth of celestial targets in the October skies. Good hunting!

Antony McEwan

Next Time... The next meeting will be on Tuesday 1st November, and will feature a talk by Pauline Macrae entitled "*Galaxies: Active and Starburst*". The Youngstars session will run from 19:00 – 19:30 and the main meeting will start at 19:30. Please be in attendance for 19:15 if possible.

As well as that there will be the usual tea-break, chatter, biscuits, latest developments in club activities, observatory report, technological troubles and maybe even a breakout or two. The dark season will be well upon us by then so hopefully we'll get a night or two to go and observe at the observatory, or independently. There's plenty to see up there, when the clouds part.

Until then, Clear Skies!

Antony McEwan