Aurora
The Royal Astronomical Society of Canada - Windsor Centre
Volume 28, Number 1
September 2002

Hallam Observatory Update by Randy Groundwater

About 50 members, guests and friends gathered at the Ainslee farm for a very special Windsor Centre annual picnic last June 15th, to enjoy food, company, and of course see our new building, many for the first time. Before dinner was served, I had the honour of presiding over a brief dedication ceremony.

You may recall that earlier this year, a request was made to the membership for a name for the observatory. Out of many and varied responses that were submitted during the first part of this year concerning a name for the facility, the one finally chosen was a submission from Robert Hastings-Trew, a member of our centre for many years.

Rob's suggestion of "Hallam Observatory", with an accompanying logo, was made out of regard for one of the Windsor Centre's most pivotal members of days gone by, Mr. Cyril Hallam. His widow, Dorothy Hallam, was also on hand for a ribbon cutting ceremony that officially opened the facility to all in attendance, and gave a marvelous impromptu speech about her late husband that everyone in attendance will remember for a long, long time.

Threatening clouds with distant thunder, lightning, as well as a beautiful rainbow provided a dramatic backdrop to the evening, and although the weather didn't allow our traditional observing session this year, everyone went home well fed and satisfied!

R.A.S.C. Windsor Centre Council Meeting - November 1979 at Cyril Hallam's House.

Pictured from l-r back row, Jim Meredith, Dave Hamilton, Lorison Durocher and R. Mayville. Front row, Danny Bawtenheimer, Cyril Hallam and Randy Groundwater

Mr. Cyril Hallam (1906 - 1988)

Mr. Cyril Hallam, whose name is now remembered through our observatory in Comber, was born in Cannington, Ontario, on November 15, 1906. He was a long-time educator, teaching high school for many years at Paterson Collegiate in Windsor.

The early 1940's was a busy time for Cyril. He married his wife, Dorothy, in Toronto on June 30, 1942. After coming to Windsor, Cyril would share his keen interest in astronomy with young people when he would set up the old 4" brass refractor (the one we now refer to as the "Paterson Refractor") on the school lawn, and show the moon, planets and stars to them.

In 1943. Cyril was instrumental in the founding of the Astronomy Study Club of Windsor, which subsequently eventually became the R.A.S.C. Windsor Centre two years later, in 1945.

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In This Issue

Calendar of Events

Our next meeting…

Tuesday, September 17, 2002
8:00 p.m.
at
St. Stephen's Church
Howard Road, 1.4 kms. south of
Hwy # 3

Main Speaker…

To Be Announced

Topic...

“To Be Announced”

Activities...

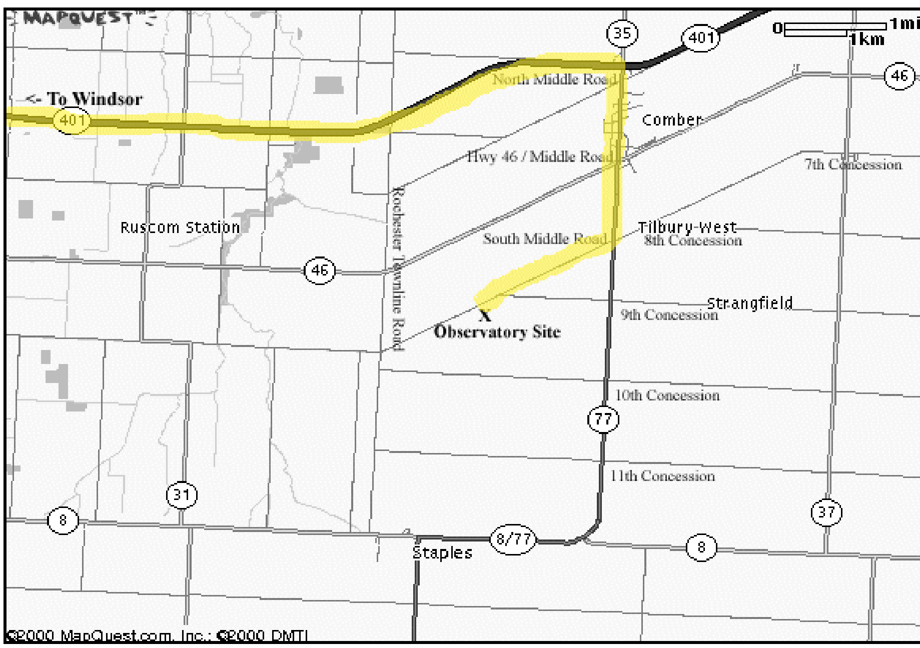
Astrofest: Will be held September 12 - 15 at Camp Shaw-Waw-Nas-See near Kankakee, Illinois.

Autumnal Equinox: Fall officially begins on September 23 at 12:55 a.m. E.D.T.

Council Meeting: Tuesday October 8th at Susan Sawyer-Beaulieu’s house. The meeting will begin at 7:30 p.m. sharp.

Jupiter’s Moons: On October 17th Jupiter's Moon Europa will partially occult Io from 5:38 - 5:42 a.m. EDT

Orionid Meteor Shower: Look for the Orionids to peak in the predawn hours of October 21st. The full Moon interferes with these fast meteors this year so begin your watch earlier in the month.



Hallam Observatory Site

At left is a map showing the Comber area and it includes the major highways (401, 77, 8 and 46) that are in the area of the observatory. I "highlighted" the most direct route from Windsor on this map which is to take 401 East to Highway 77 South to South Middle Road. While on South Middle Road you will cross some railroad tracks (they just removed the tracks) and just after the barely discernable point where Concession 9 joins it you will find the observatory site on the South side of the road. If you hit the Rochester Townline Road (i.e. you come to a stop sign and have to turn left or right) you have gone too far. On most clear nights someone is usually out there observing but if it happens to be a clear, moonless, weekend night you should have many observing buddies.

Submissions

Aurora is published monthly except for August. The September, November, January, March, May and July issues are full newsletters (usually 6 pages) with a number of member submitted articles. The October, December, February, April and June issues are short flyers (2 pages) with one short article. Submitted articles can be of any length from a paragraph to multiple pages. I can scan pictures and/or diagrams (both prints and film) to support your article and the originals will be returned to you.

Submission deadline is the 1st of the month. I will accept Emails at the address below, floppy disks, or written submissions.

Editor: Steve Mastellotto Email: mmastellotto@cogeco.ca

Membership

The Windsor Centre of The Royal Astronomical Society of Canada meets on the 3rd Tuesday of every month (except July and August) at St. Stephan’s church. In addition to regular meetings the centre hosts a number of observing nights, a picnic and a December social. Members receive a copy of the Observer’s Handbook, the RASC Journal, a subscription to SkyNews magazine and access to the Centre’s library and telescopes.

Annual Membership Fees are Regular - $44.00, Youth - $27.50 and Life - $880.00.

Contact Frank Shepley at (519) 839-5934 or visit our website at: www.mnsi.net/~rasc for more information.

Summer Observing Reports

Pluto From The Hallam Observatory - Dave Panton

They say there is no substitute for aperture. Pluto is a very dim and distant little planet visible in an 8 inch telescope only under absolutely ideal conditions. My many searches for the last planet in my Celestron 8 inch Nexstar "Goto" telescope came very close but I could never claim to having seen anything where Pluto was located. Views of star patterns in the area matched detailed maps perfectly down to about magnitude 13. At only 13.8 in faint reflected Sun light it was my personal challenge object.

Help was clearly needed. A big telescope might do the job. Randy Groundwater happened to have his home built 18 inch F/4.4 Dobsonian set up Saturday night July 6th 2002. The sky in Windsor was superb but at the Hallam it was initially very hazy. Slowly it become more transparent. Situated near the lower corner of Ophiuchus Pluto would be highest near midnight. Given the initial poor conditions I did not set up my own telescope.

Before leaving home I had used "Starry Night Pro" to produce two sets of three July 6th finder charts. One set mirrored for my telescope, the other set in normal images on the chance someone with a big Newtonian telescope might be on site. All showed Pluto, each in more detail. The last chart showed exactly where Pluto would be in a 36 minute wide field printed about 5 inches in diameter. The dimmest stars shown were magnitude 16.

About midnight I asked Randy if he would be interested in having a go at finding Pluto. After checking my charts he willingly agreed and the hunt was on. Randy and Mike Ethier worked together observing and carefully cross checking the charts. The star patterns matched step by step as they star hopped into the deeps, finally identifying the closest and dimmest star patterns near Pluto.

Changing lenses to a 12.5 mm orthoscopic at 160X produced the best image. The planet's position still did not look quite right. Suddenly I realized my charts were 24 hours old. It was past midnight and now July 7th. We quickly made the small position adjustment from a map of Pluto's path I had printed a few days prior. Now we had a match!

Randy confirmed it could be none other than Pluto. It's position, magnitude and appearance compared to background stars were our evidence. The sight was shared by Robin Smallwood, Steve Mastellotto, Peter Bondy and Al Des Rosiers.

An initially poor night turned out very well. It was "Pluto Night" at the Hallam Observatory.

Notes From The Summer Logbook - by Randy Groundwater

Well, Summer will soon draw to a close, the kids are back in school, and hopefully everyone got a chance for some rest and relaxation at least for a few days over the past several weeks. Perhaps this included getting in a little bit of sky watching at some point or another. On this latter topic, I had a couple of memorable moments over the summer that I thought might interest other observers in our midst.

Seeing Double

During the deepening twilight of Wednesday, July 24th, I had the 18" Newtonian out in my backyard, ready for a night's tour. I'd just finishing good collimation of the optics, and noticed the air appeared particularly steady. This was nicely evidenced from 1st magnitude Antares, in Scorpius, appearing with hardly the slightest flicker in it's reddish glow as it straddled the meridian, low in the south.

Antares is a double star, and recalling many times in the past my attempts to obtain a clear view of this red giant's delicate little companion, I swung the 'scope once more in its direction, inserted a 10mm Clave plossl eyepiece (200x), and focused. At about three seconds of arc separation, one would think that even the smallest telescope should reveal the companion. But at magnitude 6.5, and so low to the horizon, it is usually hopelessly buried in the flaming light of its overpoweringly bright parent. But the air was indeed remarkably steady on this night, which made all the difference. The light of brilliant Antares behaved beautifully in the steady evening air, allowing a superb view of the little, greyish-green companion. I was awestruck! Never have I had such a superb view of this rather difficult double. Leading the primary as it tracked across the field of view, I was able to hold dark sky between the two quite steadily. This one observation had made my night, even before it had barely begun.

Hallam Observatory Skies

I've had the chance to enjoy a few weekend nights at Hallam Observatory in Comber, over the summer. One Saturday evening in particular was memorable, when a few of us at the suggestion of Dave Panton, tracked down distant Pluto, presently against the stars of southern Ophiuchus, with the 18". Dave gives a good account of this accomplishment in a separate article in this issue. What I will say here is that the skies at our observatory are indeed excellent. On this and other nights, I have marveled that the summer Milky Way arching overhead late at night can still be found to be this good in Essex County, so relatively close to Windsor. The grounds surrounding Hallam Observatory are an observer's delight. If you haven't had the chance to get out there yet, you owe it to yourself, soon. What better time, than a cool, crisp early autumn evening???

Up On The Bruce

I once again had the luck of clear weather on a recent trek to a secluded little spot called Hope Bay, on the Georgian Bay side of the Bruce Peninsula. My wife Anita has a sister and brother-in-law with a cottage in this idyllic spot, which we like to visit for a short while each summer. When it's clear there, the skies are to die for. And so it was during the predawn hours of August 18 and 19, when the waxing gibbous moon had finally set, that I was able to sit back with binoculars in hand on a wooden deck that seemed to float above the trees along a ravine, and lose myself in the dense star-fields of those magnificent skies. Cygnus was still upright in the northwest, while the stars of winter were making their grand entrance in the east and south. Under these black skies, there was almost no loss of brightness in the starry scene near the horizon - it was as dramatic as the view overhead! I was unable to take the 18" on this outing, but even so I didn't miss it too much. To sit back and take in such a presence of nature all around you, under such a magnificent universe of stars wheeling above, was experience enough for this go-round!

The summer of 2002 will soon be gone, but I hope that some of your astronomical experiences will be as memorable as some of those I've fondly recalled in these few lines.

The Sun, Inside and Out by Bert Huneault

When I saw the accompanying cutaway view of the Sun on a NASA website I saved it, as I thought the diagram would make a handy reference for an article on various solar features.

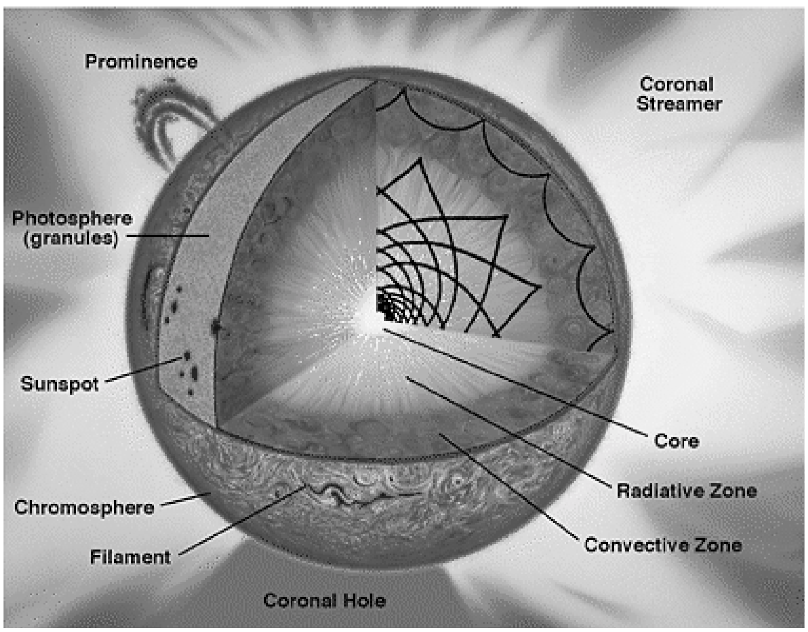
The Sun is a giant ball of gas (mostly hydrogen and helium), some 1,392,000 kilometres in equatorial diameter. To find out a little more about this star of ours, let's dig deep down into its interior and then gradually work our way out through its various layers or zones.

Core

The source of the Sun's energy is the thermonuclear reactions occurring in its *core*. There, at temperatures of about 15 million degrees Kelvin, the nuclei of hydrogen atoms are fused and become helium atom nuclei.

Radiative Zone

The energy produced by fusion in the core works its way outward, first in the form of electromagnetic (EM) radiation (photons) in the *radiative zone*. Most of this initial EM radiation is at very short wavelengths, in the form of X-rays and gamma rays. Before this released energy reaches the Sun's surface, however, it is absorbed and reemitted by atoms a very great number of times. In the process, the high-energy photons get converted to lower-energy and longer-wavelength photons which constitute the radiation which eventually leaves the Sun, e.g. ultraviolet (UV), visible and infrared (IR) light.



It should be noted that radiative transfer is not an efficient means of energy transport because gases in the Sun's interior are very opaque. Thus, a photon doesn't go far before it is absorbed by an atom. The absorbed energy is reemitted, but in random directions, including back towards the core. As a result, the energy tends to zigzag around in a highly random manner within the radiative zone, and takes a long time -- several million years -- to work its way from the Sun's centre to its surface.

Convection Zone

On their way upwards, the photons heat the solar gas, resulting in *convection*. This type of energy transport is what causes bubbles to rise to the surface of a pot of boiling fudge; or bubbles of air heated by the Earth's surface to rise and form cumulus clouds as they cool and condense. In the Sun, convection currents carry heat outward quite efficiently.

Photosphere

Convection causes the solar gas to emerge in the form of granules (bubbles) which appear as bright spots surrounded by narrow darker regions on the visible surface. These convection cells (typically several hundred kilometres in diameter) are what give the surface a mottled appearance resembling rice grains when seen through a high-power telescope. Granulation is associated with large-scale fluid motions at and below the surface. Typical speeds in granular flows are of the order of a few kilometres per second.

The visible surface is actually a thin layer (about 100 km deep) of the Sun's atmosphere, and is called the *photosphere*. In other words, what we see when we look at the Sun is the photosphere. Not only visible light, but most solar energy, including UV and IR, escapes from the photosphere whose temperature is about 5,800 degrees K. Convection motions within the solar interior also generate magnetic fields which emerge at the changeable and chaotic surface as sunspots and prominences.

Sunspots

Sunspots are the most conspicuous of the photospheric features, and are occasionally large enough (several Earth diameters) to be visible to the naked eye. They are regions where the gases are up to 1,500 degrees K cooler than those of the surrounding photosphere, and thus appear darker in contrast. Individual sunspots have lifetimes ranging from a few hours to a few months. Sunspots often appear in groups of two or more; the largest groups can be quite complex and may contain over 100 individual spots. While they may move slowly on the surface of the Sun, their individual motions are quite slow compared with the solar rotation (about 28 days at mid-latitudes) which carries them across the disk of the Sun.

The number of sunspots visible, on average, varies over a period of about 11 years. During sunspot maxima, more than 100 spots can often be seen on the Sun at once; but during sunspot minima the Sun sometimes has no visible spots. The last solar maximum occurred about a year ago; this suggests that solar activity should now be in a declining phase. But this doesn't necessarily mean that our parent star is behaving itself these days. In fact, as I write this (late July) there have been an unusually high number of violent solar flares and very large sunspots in the past few weeks. Old Sol is currently peppered with sunspots, the largest of which stretches more than a dozen Earth diameters from end to end, and poses a threat for powerful flares. And yesterday (July 27) the sunspot number soared to 323, the highest value since March 28, 2001 when it reached 352, the largest number in the current solar cycle (cycle 23). So, as you can see, the Sun doesn't give up without a fight!

Incidentally, the official "*sunspot number*" is derived from a

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formula which includes the number of sunspot groups as well as the number of individual spots. As a rule of thumb, if you divide the official sunspot number by 15, you'll get the approximate number of individual sunspots visible on the solar disk when viewing the Sun by projecting its image on a white surface with a small telescope.

Sunspots are transient concentrated magnetic fields, ranging from a few hundred to a few thousand gauss (as great as the field of a good alnico magnet). In comparison, the Earth's magnetic field is quite weak, averaging about one half gauss at the surface. The intense magnetic field below a sunspot strangles the normal up-flow of energy from the hot solar interior. As a result a sunspot is cooler and therefore darker than its surroundings.

Chromosphere

The region of the Sun's atmosphere that lies immediately above the photosphere is the *chromosphere*. About 2,000 to 3,000 km thick, its temperature gradually increases from 4,500 K at the photosphere to tens of thousands of degrees K at its highest level. Chromospheric gases are transparent to most radiation; thus we can see through the layer down to the photosphere. This makes the chromosphere difficult to observe, except during a total solar eclipse when the photosphere is occulted by the Moon; or by using a coronagraph which produces an artificial eclipse of the disk of the photosphere. When viewed through a coronagraph, the chromosphere appears as a pink irregular fringe with streamers. By means of monochromatic filters, the chromosphere can also be photographed in the light of some of the strongest emission lines in the visible part of its spectrum, e.g.. the bright red line due to hydrogen (H-alpha line); these photographs are called "filtergrams".

Corona

The chromosphere merges into the outermost part of the Sun's atmosphere, i.e. the *corona*, which is the halo of white light seen around the Sun during total eclipses. The corona, which can be observed in the entire EM spectrum from X-rays through the visible to radio waves, extends millions of kilometres above the photosphere and gradually thins to a tenuous wind of magnetic fields, ions and electrons (*solar wind*) flowing outward through the entire solar system. Blown continuously by the Sun, the solar wind passes the Earth at an average speed of 400 km/s, with a density of a few protons per cubic centimetre; and can produce profound changes in the magnetic field of our planet. It eventually blends with the interstellar medium beyond the edge of the solar system.

The corona emits half as much light as the full moon. Under ordinary circumstances it is invisible due to the overpowering brightness of the photosphere. But, like the chromosphere, it can be photographed during total solar eclipses or by means of a coronagraph. The corona is usually not uniform in appearance, but generally features *streamers*, jets and other features which evolve in association with solar activity. X-ray images occasionally reveal *coronal holes*, i.e. extended regions of extremely low density which make parts of the corona seem to disappear. Seen as dark structures in X-ray images of the solar disk, coronal holes are frequently present at the poles; but they can extend as far as the equator and occupy a large portion of the solar surface, particularly during minima in solar activity.

Coronal mass ejections often occur during periods of high solar activity. These huge bubbles or tongues of magnetized gas with masses as large as a billion tonnes are thrown off for a few hours, fly away from the Sun at speeds of several million kilometres per hour, and buffet the Earth a day or so later in the form of *interplanetary shock waves* detected by dramatic increases in the speed of the solar wind.

The corona is very hot – millions of degrees – but its density is so low that the actual heat energy is very low. In that near vacuum, it would take a long time for the hot coronal gases to warm up a cup of coffee!

Among the most spectacular of coronal phenomena are the *prominences*, red flamelike protuberances of solar material held above the Sun's limb by magnetic fields Some prominences are quiescent and may last several months, while more active ones shoot upward in the form of arches, evolving in several tens of hours. The more violent ones erupt at speeds exceeding 1,000 km per second and have reached heights of over 1,000,000 kilometres above the photosphere. When seen silhouetted against the disk of the Sun, prominences appear as irregular dark *filaments* which generally follow the magnetic field lines on the disk's surface.

Flares

Occasionally, filtergrams reveal a sudden intense brightening of a small region of the chromosphere. These very bright spots, called *flares*, are typically several thousand km in diameter and usually reach maximum intensity in a few minutes; then fade out slowly. Major flares release an enormous amount of energy, particularly at UV, X-ray and gamma-ray wavelengths. In addition, they eject matter into the corona at speeds sometimes exceeding 1,000 km/s. After some 48 hours or so the ejected protons and electrons reach the Earth where they can generate geomagnetic storms, cause aurorae and disrupt shortwave radio communications. Flares are most frequent in the regions of complex sunspot groups with twisted magnetic fields.

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Through the years, Cyril served on the Council of the Centre in many capacities. He remained active in our midst well into the 1980's, when failing health forced him to give up the Treasurer's position he had held for many years.

Cyril passed away on March 5, 1988, at the age of 81.

Some of us in the Windsor Centre today are lucky enough to have known Cyril. What we may not know, however, that in addition to astronomy he was also a well known local historian who had a special love and knowledge of the history of the Old Walkerville area of Windsor.

Cyril was a scholar and a perfectionist; having a keen eye for every detail, he was nevertheless a patient and kindly man - a true gentleman of the "old school" who held fast to the kinds of values and principles that never go out of fashion from generation to generation. He loved the stars, he loved the R.A.S.C. Windsor Centre, and it is wonderful that his name and legacy will be remembered into the future through our new observatory.

More Summer News and Activities

Winery Summer Fundraiser Success

For a second year, in what appears to be developing into an annual event, an astronomy theme night was held as a special event at Pelee Island Winery, in Kingsville. This year's wine tasting and buffet was held on Saturday evening, August 10th, from 7:30p.m., with about 50 people in attendance. They came to learn a little about the stars, to see through telescopes that some members had brought along, and of course enjoy wine tasting as well as a light buffet. Thanks to all of you who showed up and participated! Although the sky was a bit hazy, the observing session held in the back field at the end of a "candlelight trail" was enjoyed by all. Tickets were $30.00 each, and we will realize somewhere between $12.00 and $15.00 per ticket sold. Proceeds will be used towards the annual operating costs for Hallam Observatory. *Photo (l-r): Michelle Mastellotto, Anita and Randy Groundwater, Karen and Pete Bondy. Photo by Tom Sobocan*

Dorothy Hallam is pictured here giving an impromptu speech at the dedication of the Windsor Centre Observatory named in honour of her late husband Cyril Hallam. The celebration took place on June 15th during our annual centre picnic. Rob Hastings-Trew not only named the observatory but also designed the logo.

Hallam Observatory Fees

Effective October 1, 2002 the Windsor Centre of the R.A.S.C. will begin to charge a user fee for the Hallam Observatory and access to the site. These fees will be used to partially offset the operating costs of the site and building.

We will have two levels of access with two different charges:

1. For access only privileges to the site a voluntary access fee of $10 per year is suggested. This level of access allows you to use the observatory site for you own observing and enjoyment of the night sky.
2. For access to the site, warm room and observatory the required key charge will be $40 per year. This level of access allows you full access to the site, observatory and warm building including the use of the telescopes that are kept onsite.

Windsor Centre Council

The annual picnic was well attended and was the first to take place at the Windsor Centre Observatory (Hallam Observatory) site in Comber. Picnicers enjoyed a great BBQ and a couple of short speeches.