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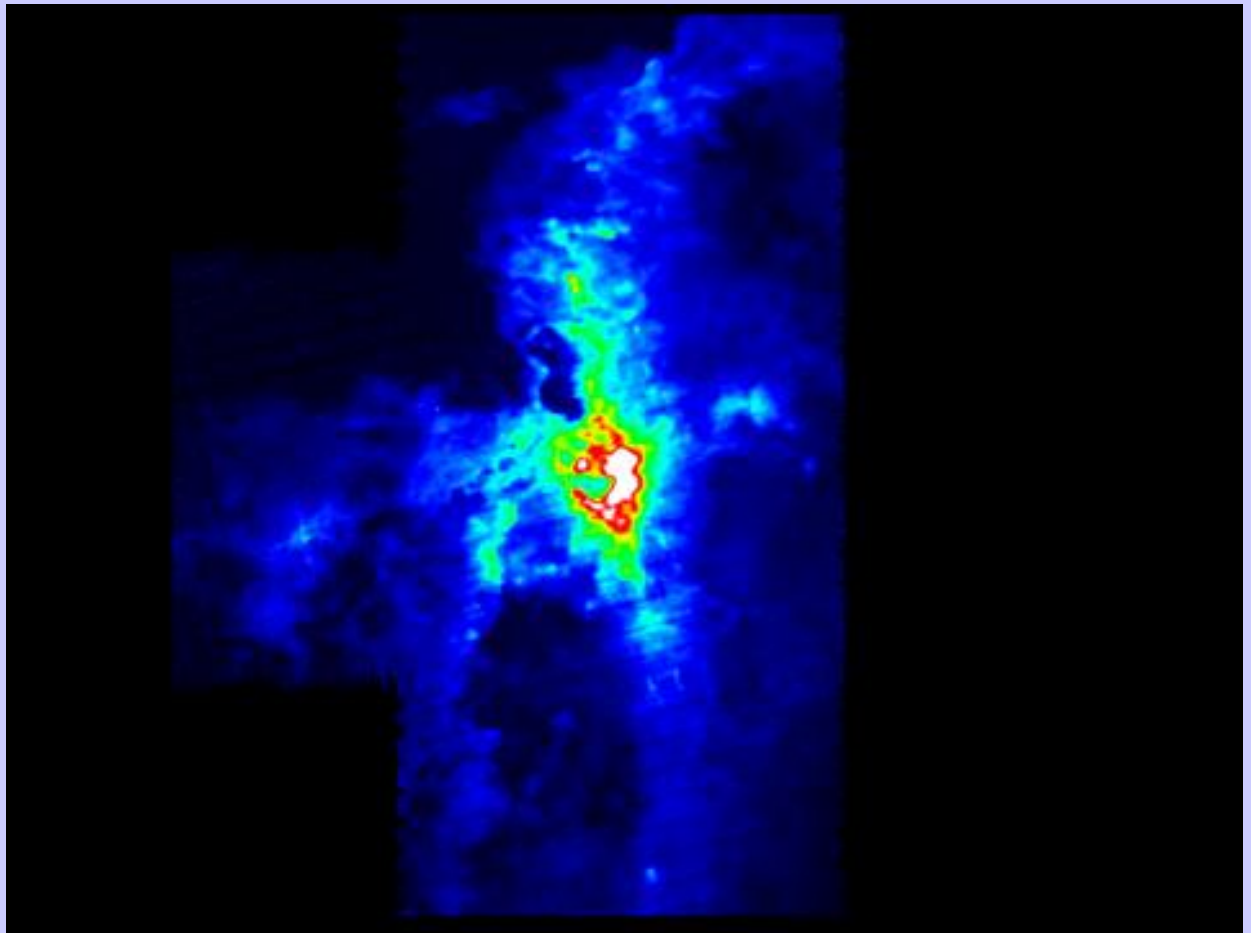
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E-Cass Soap Box

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Pluto not a planet - hmmm. I don't think we have heard the last of this. Apparently [Madonna](#) has launched a vigorous worldwide campaign to reinstate this icy chunk of real estate! Readers of E-Cass can rest assured that the entire editorial board of E-Cassiopeia is monitoring this closely. We will bring any fast breaking news on this as soon as it happens.

In the meantime enjoy a number of fine articles prepared by colleagues around the globe. This issue is full of good reading from Eric Steinbring's fascinating account of site testing in the high arctic to Gary Davis' JCMT -The Next Generation (could make a catchy name for a television series) and lots more. So, enjoy and a special thanks to all of the contributors who got so many great articles to me - on time!

Brian Martin (brian.martin@kingsu.ca)

From the President

From Autumn to a new Spring. A few autumn colours recently appearing are a reminder that my plan of wearing sandals and shorts until November might need some reconsideration. Dare I suggest that continuous planning seems to be here to stay? At least this seems to be the requirement for our discipline. No sooner has the ink dried on the Mid-Term Review (MTR) than we are presented with new opportunities. Perhaps it is a natural cycle. If the Long Range Plan (LRP) bore the promise of spring and began the summer growth, and the MTR presages some bountiful harvest, what follows next? Would it be too complacent to assume that “whether or not it is clear to you, no doubt the universe is unfolding as it should”? Probably, but staying on the cautious-optimism side of “Now is the winter of our discontent” might “keep peace in your soul.” And we are being ‘fast-forwarded’ to make preparations for a new spring. Yes, perhaps it is a natural cycle. It certainly seems to be catching on everywhere -- there is a new *Fours Seasons* Centre in Toronto and they have a catchy feature called the *Ring Cycle*. Maybe we’re riding a wave...

The Long and Short of It. How long is the “Long” in the LRP? Empirically, it seems about a decade. So maybe the next version “LRP2” for the second decade of this millennium could be dubbed the “Decadal Visionary Plan 2” (taking the high road, “DVP” already being sunk in concrete). Work on the DVP2 needs to begin now; think of this as the shoulder season. Das Dongold.

Plan to be in Space (or at least at the CSA). The CASCA Board is keen that the Canadian Space Astronomy Workshop (CSAW – www.space.gc.ca/CSAW), to be held at CSA headquarters in St. Hubert on 23-24 November, be well attended. The CSAW, aptly subtitled “Creating Ideas for the Next Decade,” is being organized by the CSA in close collaboration with CASCA’s out-of-this-world committee, the JCSA. The context includes the happy situation that many major projects from this decade are well in hand, even though the launches of Herschel/Planck (2008) and JWST (2012) might seem far away. Looking at the almanac, there is nothing planned beyond this horizon. Although we are only about at mid decade, space astronomy can have particularly long lead times, and so it is appropriate to plant the seeds now. CSAW is therefore a top planning priority for CASCA, a “town hall” meeting that one might later reflect has kicked off the DVP2. Create some new ideas. Be optimistic. The Board members will be certainly be there at the CSAW and we urge as many of you as possible to be there too. Especially the young ones who will reap the harvest of this investment.

Feature Articles

[La réserve de ciel étoilé du mont Mégantic prend forme !](#) par Yvan Dutil et Chloé Legris

[Astronomical Site Testing in the Canadian High Arctic](#) by Eric Steinbring, Ray Carlberg, Jonathan Klein, Dell Bayne and Bruce Cole

La réserve de ciel étoilé du mont Mégantic prend forme !

Yvan Dutil, Ph.D. , IAU commission 50
Chloé Legris, ing., ASTROLAB du Mont-Mégantic

Au cours des derniers mois, des progrès notables ont été faits vers l'établissement d'une réserve de ciel étoilé autour du mont Mégantic. D'abord

s, les municipalités des MRC du Granit et du Haut Saint-François ont adopté une réglementation visant à contrôler l'éclairage à proximité de l'observatoire. Le type et l'intensité des systèmes d'éclairage sont contrôlés afin de minimiser la pollution lumineuse. De plus, un couvre-feu a été établi afin d'assurer l'extinction de tout dispositif d'éclairage, dont les enseignes, dès 22h ou hors des heures d'affaires ou d'opération, pour ne préserver que l'éclairage sécuritaire des rues, des aires piétonnes publiques, des entrées de bâtiment et des aires d'entreposage.

Cependant, la réglementation n'est pas rétroactive, hormis pour le volet concernant l'extinction des dispositifs d'éclairage, et tout équipement installé avant l'adoption de la réglementation bénéficie d'un droit acquis. C'est pourquoi un programme de remplacement de tous les dispositifs d'éclairage des secteurs agricole, commercial, industriel, résidentiel et municipal des 16 municipalités environnant le mont Mégantic (à l'intérieur d'un rayon de 25 km de l'observatoire

) a été mis en place. -Différents organismes contribueront au financement de ce projet de plus d'un million de dollars (le parc national du Mont-Mégantic, l'Observatoire du Mont-Mégantic, les universités de Laval, Montréal et de McGill, la Conférence Régionale des Élus de l'Estrie, Hydro-Québec, et l'Office de l'efficacité énergétique du Canada) afin de réduire la pollution lumineuse d'au moins 25% et de réaliser près de 1,25 GWh/an en économie d'énergie.

En parallèle, plusieurs petits projets amélioreront la qualité des systèmes d'éclairage dans une région plus étendue. Ainsi, Hydro-Sherbrooke et l'Université de Sherbrooke remplaceront leurs luminaires non conformes et trop puissants. De même, le ministère des Transports du Québec va remplacer ses lampadaires situés dans un rayon de 25 km de l'observatoire et travaille sur un projet de démonstrateur d'éclairage adaptatif à l'entrée de la ville de Lac Mégantic.

Ce projet est aussi unique en ce qu'il sera très bien documenté tant en terme des actions prises que de leur impact sur le ciel. En effet, l'équipe de Martin Aubé du Collège de Sherbrooke est chargée d'obtenir des spectres du ciel de l'observatoire pendant le projet. Cette équipe a déjà fait un travail similaire pour des observatoires aux États-Unis. Déjà, ces mesures ont permis de montrer que le niveau de pollution lumineuse au zénith est déjà

comparable à Kitt Peak. Les mesures mises en place devraient donc en faire un des sites les plus noirs dans l'est de l'Amérique du Nord.

Mont Mégantic dark sky preserve takes shape!

Through the last few months, significant progresses have been made for the establishment of a dark sky preserve around the Mont Mégantic. First, towns of MRC du Granit and du Haut-Saint-François have adopted a bylaw to control lighting near the observatory. Type and intensity of any lighting system are controlled to minimise the light pollution. In addition, a curfew has been established in order to extinguish any lighting system, including sign, from 22h or outside the business or operating hours, to keep only the safety light of street, pedestrian public area, building entrance and storage zone.

However, this bylaw is not retroactive, except for the curfew, all lighting systems installed before the adoption of the bylaw benefit for a grand-father clause. This is why a program of replacement of all lighting systems of agricultural, commercial, industrial, residential and municipal sector of the 16 towns surrounding the Mont Mégantic (within a radius of 25 km of the observatory) has been put in place. Various organisations will contribute the financing of this project of more than one million of dollars (Mont Mégantic National Park, Mont Mégantic Observatory, universities Laval, Montréal and McGill, Conférence Régionale des Élus de l'Estrie, Hydro-Québec and the Canadian Office of Energy Efficiency) to reduce the light pollution by at least 25% and produce near 1,25 GWh/yr of energy saving.

In parallel, many small projects will improve the quality of lighting system with a larger region. For example, Hydro-Sherbrooke and the Université de Sherbrooke will replace their lamps inadequate and too powerful. In a similar way, the Quebec's Transportation Department will replace its streetlights within a radius of 25 km of the observatory and work on a demonstration project of adaptive lighting at the entrance of the city of Lac Mégantic.

This project is also unique, since it will be very well documented both in terms of actions taken and their impact on the sky. Indeed, the team of Martin Aubé of Collège de Sherbrooke is in charge of taking sky's spectra from the observatory through the project. This team has already done a similar work for some observatories in United States. Already, these measurements have demonstrated that the light pollution level at zenith can be compared to Kitt Peak. The actions put in place should therefore make it one of the darkest site in the east of the North America.

Astronomical Site Testing in the Canadian High Arctic

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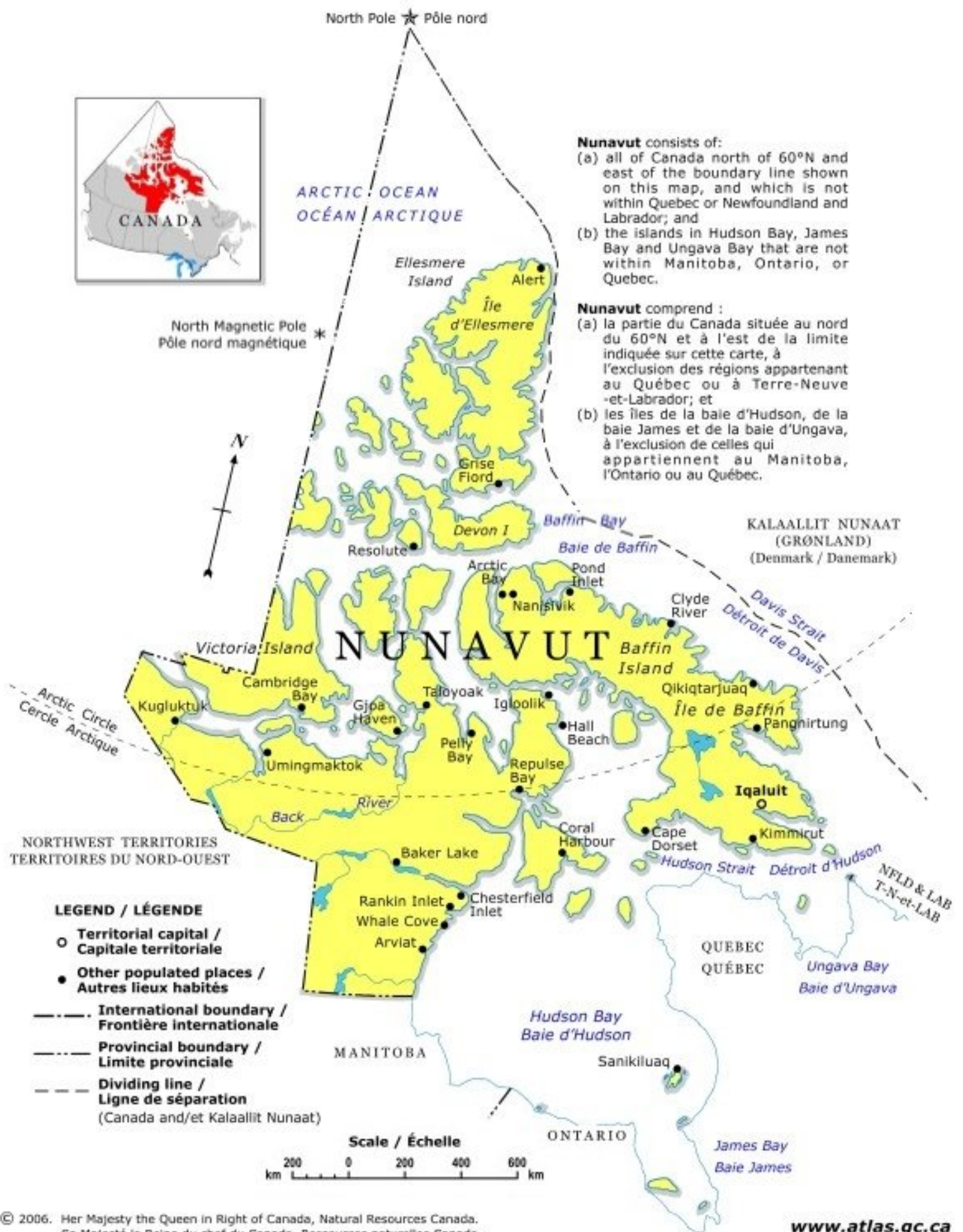
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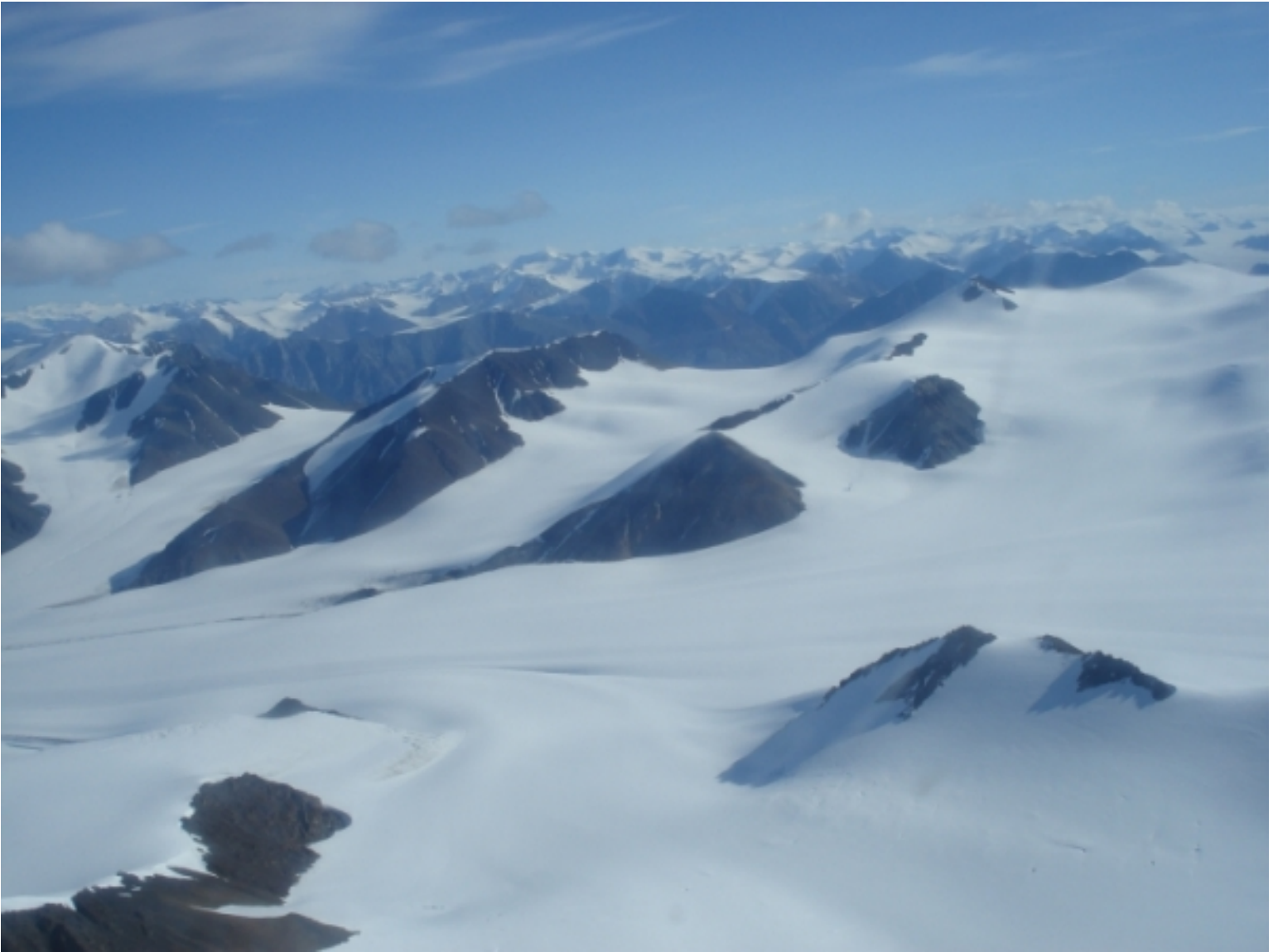
Winter in the Canadian High Arctic is long, dark, and extremely cold. At the northern tip of Nunavut, in the remote military outpost of Alert, the sun sets for the last time in October and does not rise again until late February [1]. During this time the temperature is typically -35 C, but it can drop to -50 C. And moreso than almost any other place on the planet, it is dry. The total annual precipitation is only 15 cm [2]. These are harsh conditions for people, but beneficial ones for infrared astronomy, provided one can find a high vantage point with clear skies. Conditions would be ideal if that location also provided good seeing. The idea that the Canadian Arctic may possess such a spot was discussed previously in *Cassiopeia* [3]. Here we report the first work on the ground in the North. We have scouted four candidate sites by helicopter and begun testing on two. All are on mountains between 1400 m and 1900 m high at the northern edge of Ellesmere Island. This is roughly level in latitude with Alert, only 740 km from the North Pole.



Map of Nunavut. (*Place cursor over image to overplot a relief map. Java must be enabled.*) Two mountains are being tested on the northern end of Ellesmere Island. The highest peak in Nunavut is Barbeau, at 2616 m. It is also on Ellesmere, but far inland, within Quttinirpaaq National Park.

The Antarctic has already attracted the focus of considerable site-testing resources, for largely the same reasons drawing us to the Arctic. One location receiving particular attention is Dome C, on a 3200-m-high glacial plateau roughly 1400 km from the South Pole. The skies at Dome C are remarkably clear [4]. But the seeing is poor by modern observatory standards. A median value of 1.8 ± 0.8 arcsec was obtained in winter with a Differential Image Motion Monitor (DIMM) on top of an 8.5 m tower [5]. Earlier excitement surrounding a mean value of 0.27 arcsec was based on a combination of Multi-Aperature Scintillation Sensor (MASS) and Sound Detection and Ranging (SODAR) measurements which are insensitive to the lowest 30 m of the atmosphere [6]. It is now known that the plateau is blanketed by a thick, strongly turbulent boundary layer. Balloon measurements show that 87% of turbulence occurs within 36 m of the ice surface [5]. Even so, this could conceivably be overcome by placing a telescope on a tall pier or mound.

Northern Ellesmere has a significant advantage over the Antarctic ice plateau in this regard. *There are mountains.* Although none reach 3200 m, some top 1900 m, and many are over 1400 m. These could provide a firm foundation on which to perch a telescope. No large telescope has ever been built on top of ice.



The northern end of Ellesmere Island in Nunavut. Mountains are flanked by glaciers which flow down to the Arctic Ocean.

The scale height of the atmospheric pressure profile decreases toward the poles, which makes these mountains effectively higher than if they were at a lower latitude. They should also benefit from exceptionally smooth airflow. Winds are predominantly from the west, travelling over hundreds of kilometres of uninterrupted ice. And unlike Hawaii or other mid-latitude sites, the upper atmosphere is untroubled by the jet stream. Given these unique conditions it is difficult to predict what seeing can be expected. It may be comparable to Dome C when that location's thick boundary layer is excluded. If the ground-layer contribution is more typical of the best mid-latitude sites (for example, as estimated via the empirical model of Racine [7]) the seeing could still be as good as 0.5 arcsec - the best in the world. Skies should also be clear. Analysis of satellite images of this region by Liviu Ivanescu predicts that several peaks should have clear skies 70% of the time or more in winter [8], as good as Hawaii or northern Chile.

Can a telescope be placed on any of these mountains? Last year, one of RC's summer students, Mubdi Rahman, found from topographic maps that most but not all of these peaks are permanently covered in snow. Further study of satellite images this year by JK revealed that some of these mountains possess rocky outcrops or ledges of sufficient size to allow construction of an observatory. >From these we

selected four candidate mountains on northern Ellesmere for study: two on the coast, and two higher peaks further inland. All four were visited this summer, and two of these received an autonomous site-testing station.

The station camera (far right) and communications equipment. The silver control box in the centre has a router with two spare channels for future instruments. The cable at left plugs into a standard meteorological station used by Environment Canada.



The station has a digital camera housed in a heated enclosure. This offers a wide viewing angle, sufficient to see both local ground conditions and a large patch of sky. An automatic iris, exposure meter, and infrared cut filter will respond to darkening light conditions in order to measure night-time cloud cover. Basic meteorological measurements - windspeed and direction, temperature, pressure, and humidity - are taken with a standard Environment Canada instrument suite. And there is room for more instrumentation to be added later.

The data are all stored on a flash drive, via a Linux-based PC board. These are off-the-shelf components, and integration was in collaboration with a commercial surveillance firm in Vancouver. We have tried to learn from the failed early Antarctic efforts, and so everything is solid state - no fans or disk drives. Everything is rated to -40 C. We assume that at least once the station will freeze down to this or colder, and must come back up on its own. Limited communication with the outside world is possible through a satellite transceiver, but the only available network is Iridium, which has too low bandwidth to get all of the data out this way. We must return to retrieve the full dataset.

The station framework is a 2-m-tall aluminum tripod. Solar panels are of no use during the Arctic winter, so the station is topped by a rotary wind turbine. It charges a bank of batteries in the same warm enclosure housing the electronics. Because our mountain sites are only accessible by helicopter, the station is light, under 100 kg, and very compact. The tower disassembles and is small enough to fit within the passenger compartment of a Bell Ranger 206L - a medium-sized machine. For big loads, of say 2000 kg or more,

something in the heavy-lift category would be required, such as a twin-rotor Chinook.

Logistical support for this project was provided by Natural Resources Canada through the Polar Continental Shelf Project (PCSP) which operates out of a base in Resolute Bay. Their offer of support came in March of this year, just three months before we would need to be in the field. This required quick development of the stations. In fact, the first test of the complete stations did not take place until the field party (ES, DB, and JK) converged in Resolute on 13 July. We test assembled the stations near the airstrip, just outside the PCSP hangar. It is from here that PCSP oversees aircraft logistics for dozens of scientific research groups all over the Arctic.





Undergraduate summer student Jonathan Klein poses in front of the two stations just after the completion of testing in Resolute. The first images sent home by the two cameras are inset. Note the bush planes and helicopter in the background.

Throughout the summer all manner of researchers pass through the PCSP base on their way to and from the field: climatologists, paleontologists, paleomagnetists, ichthyologists, and others whose specializations are even harder to spell. Many astronomers would find the Resolute base familiar. It is similar to the Hale Pohaku facility which supports the Mauna Kea Observatory. Except in Resolute, evening conversations in the mess hall are more likely to stray into the sexual lives of arctic fish. And perhaps more disturbing, the sun never sets.



Inside the Twin Otter on the way to camp. Dell Bayne looks out over our equipment, including two drums of jet fuel for the helicopter.

The PCSP base is roughly 700 km south of our candidate sites, far too distant to reach with a loaded helicopter. So instead we flew in the field party, gear, food, and fuel on the "Workhorse of the North" - a deHavilland Twin

Otter bushplane. This involved a somewhat uncomfortable 4 hour flight in cramped conditions, but the landing on the gravel bank near where we would later establish camp was surprisingly smooth, even with a full 1000 kg load.

Our camp was a clump of bright yellow dome tents, a cookstove, and a portable outhouse. Very luxurious. We also had a radio for checking in with Resolute twice a day, and a shotgun in case a polar bear strayed into camp. Local hunters suggested we were too far north to expect any bears to visit, but even so it is best to be prepared. The radio is key. If a camp misses two radio calls in a row, the base facility will send a plane to look for them. It was also our means of communicating with the other camps, and knowing when

the helicopter would arrive. We anxiously awaited the helicopter, which rendezvoused with us on 18 July. This marked the beginning of the field work.

The first task was to establish which of the candidate peaks offered a safe landing site for the helicopter. By its nature, such a spot would probably also be sufficient for setting up a station. It must not be covered by thick snow or ice, and have enough bare rock to provide a suitable footing for the tripod. On the first morning, two of us (ES and JK) flew over all four candidate peaks and quickly confirmed that none had such conditions at their true summits. Nor did the two higher peaks possess good spots lower down their flanks. But the two coastal mountains have ridges that run down to the sea, forming headlands at either edge of a large ice-locked bay. We selected high rocky outcrops at the leading edge of each of these, one at 1100 m elevation (designated Site 11A) and another at 800 m (Site 12A). These sites are within view of each other across the bay.

The helicopter flies across the bay. ([Click on the image for a video clip. This is a 4 Mb MPEG file.](#))



Both sites are large flat areas strewn with boulders - perfect for piling on the feet of the stations. They are also perfect for building inukshuks, the waymarkers of the North. And in a way, these seemed conspicuously absent. We did not really expect to find any, and a condition of our permit to test here required that we would not disturb any, if we did. Even so, both locations seem to demand one, as these headlands naturally point out towards the North Pole.



Station 2 up and running. On the right is Eric Steinbring, putting the final touches on this new "inukshuk."

Joined by our weather station expert (DB), the full field party then shuttled to the two selected sites and set up the stations



over the next day. Both were up and running by noon on 19 July, just a day after the helicopter arrived. Working to such a tight schedule was worth the extra effort, because using the helicopter is expensive, charged per hour, and subject to a minimum fee of

\$6000 per day. It may come as a surprise to some how well established logistics are in the far North. Weather may delay flights in and out of either the Resolute base or the field location by a day or so. Fog is a particular problem in the glacial fiords, and delayed flying into our camp by one day, for example. However, two of our party suffered worse delays at the hands of southern carriers in their attempts to return home to Saskatoon and Toronto.

Camera 2 2006-07-19 11:07:03



The view from Site 12A captured with the station camera. The field of view includes one leg of the tower. The base of the satellite antenna is also visible in the upper centre of the image. We do not expect any icing of the station due to the low humidity, but this needs to be shown.

Now we wait. The robotic stations will take data throughout the winter without any intervention from us. We know that a computer glitch has cut off data transmission up to the satellite, but this will not affect the datataking. Next summer we plan to return and retrieve the data as well as fix the modems. We will also prepare for new instrumentation, especially a means of measuring the seeing. But the first winter's data should already be sufficient to show if the satellite analysis of cloud cover is correct and skies are clear.

Camera 1 2006-07-18 14:06:21



The view from Site 11A. This bay remains locked in ice year round. The North Pole is off to the left in this picture, across 740 km of ice.

What science can be done if it turns out that conditions are as good as we expect? The unique location - just 7 degrees from the pole - is ideal for circumpolar objects. The winter sky should be very dark - perhaps as much as 100 times darker in the near infrared than typical mid-latitude sites [4] - and dry, which suggests a whole new window might open up for near-infrared and submillimetre science. If true, the exoplanet and observational cosmology communities would be very interested, as this window would be open 24 hours a day for months on end, perfect for long-term monitoring of short-period and transitory events.

Just what sort of telescope this demands is yet to be determined, but anything of 0.5 m size and up could be quite interesting. A dark sky can make a small telescope very efficient; even moreso if the seeing is particularly good. And the first two sites we have selected are suitable for supporting much larger instruments. A design will develop as the data come in, which should allow plenty of time to consult with local communities. We recognize that this would not only be a new Canadian observatory, it would be

Nunavut's first. We welcome all Canadian astronomers to join in our project as we start looking toward this.

Acknowledgements

Many individuals have helped the project get this far. We gratefully acknowledge the support of Greg Fahlman as well as guidance from Paul Hickson, Chris Pritchett, Howard Yee, Rene Racine, Tony Travouillon, and Brian Leckie. We thank Liviu Ivanescu and Mubdi Rahman for their photographic analyses. We appreciate the helpfulness of John Tarduno with the University of Rochester paleomagnetism group, whose sharing of aircraft time kept our research costs down. ES is indebted to the HIA purchasing department, whose quick action rescued some of our equipment from customs purgatory only just in time to make it to Resolute. This research was supported by funds from the Natural Sciences and Engineering Research Council, the National Research Council, and Environment Canada. Support from the Polar Continental Shelf Project is through Natural Resources Canada, and we particularly thank their staff, without whose arctic expertise this work would not have been possible.

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News

[*An Alma Update*](#) by Chris Wilson

[*Events at NRC's HIA \(2004 July - Sept.\) / Du neuf à l'IHA du CNRC \(Juillet - Septembre 2006\)*](#)
by Jacques P. Vallée

[*JCMT: The Next Generation*](#) by Gary Davis

ALMA Update

1 Recent news

1.1 Construction Progress

The President of the NINS (National Institute for Natural Sciences, Japan) signed the ALMA agreement on July 4, 2006 and the agreement was signed shortly afterwards by ESO and NSF. We can now formally welcome our East Asian colleagues to the ALMA project. To remind my readers, this agreement will add the Atacama Compact Array (12 x 7m dishes), four 12m antennas to be used for total power (single dish) observations, and two additional receiver bands (Band 4 at 2 mm and band 8 at 0.6 mm) to the "baseline" ALMA project.

ESO has signed the contract for the construction of the Operations Support Facility (OSF). The first ALMA antenna pad was completed on June 29 at the Vertex Site Erection Facility (SEF), which is located at the 2900 m site of the OSF. Construction of the underground utilities to the Vertex, Melco and Alcatel SEF is under way and expected to finish on August 9. Fabrication of SEF building is nearing completion and planned to be shipped to Chile in August. Factory acceptance tests for the Vertex production antenna azimuth and elevation bearings have been successfully completed. The first delivered Band 7 (0.85 mm) cartridge from IRAM was tested at the North American Front End Integration Center, with Provisional Acceptance on-Site (PAS) completed.



Figure 1: Steel is being cut for the Vertex antenna. The plan is to erect the antenna first in Texas in October and then at the OSF in early 2007. This picture from August 23 shows the base of the yoke.

A major revision of the ALMA Operations Plan is underway which will incorporate the Japanese contribution of hardware and operations funds and will include a revised budget. A major task for the North American community is securing the money for ALMA operations, which will ramp up over the next few years in preparation for Early Science observations in 2010. NRAO is working to a deadline this fall to submit a proposal for ALMA Operations funding to the NSF.

The ALMA project is looking to fill key positions as the project ramps up towards assembly, integration, verification, and commissioning. Interviews have been conducted towards hiring a head of science operations and a new search is underway to hire an ALMA Project scientist. Anyone interested in this position can find the job ad on the NRAO or ESO web pages and Jim Hesser would be happy to talk to anyone who is thinking about applying for this position.

Finally, the ALMA Science team is working to update the ALMA Design Reference Science Plan (DRSP) to include new projects, especially projects that will use the two new receiver bands being contributed by Japan and projects that need to use the Atacama Compact Array.

Information on the DRSP is available at

<http://www.strw.leidenuniv.nl/~alma/drsp.shtml>

Anyone interested in participating in the update of the DRSP can contact Chris Wilson or James di Francesco (HIA) for more information.

1.2 ALMA Science Meetings

ALMA was well represented at the recent IAU meeting in Prague. In addition to a special session on ALMA, Jean Turner gave a standing-room only talk on ALMA at the session on "Astronomical Facilities of the Next Decade".

The second world-wide meeting on "Science with the Atacama Large Millimeter Array" will be held in Madrid, Spain, on 13-16 November 2006. Registration for this meeting is now closed with approximately 40 people on a waiting list. The conference will cover a wide range of topics, which will include the main scientific drivers of ALMA: the formation and evolution of galaxies, the physics and chemistry of the interstellar medium, and the processes of star and planet formation. The web page for the conference, including the preliminary scientific program and registration information, is available at

<http://www.oan.es/alma2006/>

NRAO is planning a science workshop on "Transformational Science with ALMA: Through Disks to Stars and Planets" to be held in Charlottesville, Virginia June 22-24, 2007. This workshop will likely be limited to about 60 people so I encourage anyone who is interested to watch for the web page to appear and to register early.

2 ALMA Science Advisory Committee

The ASAC will be meeting September 16-17, 2006 in Florence, Italy. The ASAC has three charges for the meeting: to review the revised Commissioning and Science Verification Plan for ALMA; to review the revised Calibration Plan for ALMA; and to review the existing work on developing complete descriptions of the ALMA observing modes (e.g. software, hardware etc.) and make recommendations as to their relative priority. We will also be discussing progress in the development of the scientific software and the structure of the ALMA TAC. I will report on the results of these discussions in my next newsletter.

3 ALMA Developments in Canada

3.1 Canadian ALMA Science Steering Committee

The Canadian ALMA Science Steering Committee (CASSC) met Sept 10-11, 2006 at the Herzberg Institute of Astrophysics in Victoria. The primary focus of the meeting was to discuss the charges given to the ASAC for their September 2006 meeting and to consider how to position Canada to participate to maximum advantage in ALMA Operations. We also discussed outreach to the Canadian astronomy community and heard short reports on the Band 3 development effort and the software effort, including the ALMA archive.

Since the report from the meeting is not yet available, I want to highlight just one critical issue. ALMA work in Canada continues to need the second infusion of funds that was foreseen in the original Long Range Plan (LRP) and has been requested as part of the LRP mid-term review. We are in our final year of the money that was allocated five years ago and new money is absolutely required if we are to continue and complete our construction commitments to ALMA, including the very visible and high priority Band 3 receiver work.

I will give a more complete summary of the report from the CASSC in my next newsletter.

3.2 Band 3 Receiver Development

The Band 3 Receiver Development Team has been extremely busy over the last months. Important documents, including the Statement of Work, acceptance procedures, and specifications, have been either completed or are now awaiting final signatures. These items are of critical importance and they determine the rigorous specifications that the Band 3 receivers must attain. Additionally, automation of the mixer test sets is now complete, which allows noise measurement tests to be completed in two and a half days with little operator supervision.

A number of milestones are on the horizon for the Band 3 team as well. The preliminary in-house acceptance of the first cartridge, necessary before the receiver can be shipped, is to take place in late September, with delivery of the first cartridge to NRAO soon after. The second cartridge is slated for delivery in early November. The very important critical design review of the Band 3 receiver is planned for January of next year.

These highlights and many more details were presented to the Canadian ALMA Science Steering Committee at the September face-to-face meeting. The Committee was extremely impressed by both the quality of the Band 3 Receiver and the management of the project.

For more information on the ALMA Band 3 Receiver Project contact Keith Yeung (Project Manager, keith.yeung@nrc-cnrc.gc.ca), Stephane Claude (Project Engineer, stephane.claude@nrc-cnrc.gc.ca), or Doug Johnstone (Project Scientist, doug.johnstone@nrc-cnrc.gc.ca).

3.3 Software

Software work for the ALMA Offline system and the ALMA Common Software system is continuing in Calgary and at DRAO. Raymond Rusk has completed porting of the images and

coordsys tools from the old AIPS++ framework to the new CASA framework and the tools are ready for thorough testing. In the new framework, these tools are coded in C++ but accessible from Python. Previously they were coded in a mixture of Glish and C++ and accessed using Glish scripts. The next step with respect to these two tools is converting the image test scripts from Glish to Python which will allow for much more extensive testing.

Raymond also reports that the measures component implementation is complete and has been tested against examples from the AIPS++ User Reference Manual. The Python and Glish output are in good agreement. He now needs to update the documentation for the measures, images, and coordsys tools so that examples in the documents show Python rather than Glish.

In an attempt to meet tight deadlines, porting of the quanta tool that is used to manipulate units and quantities was re-assigned from a developer in Socorro to Raymond. Raymond has also been given the high-priority task of porting Juan Pardo's recently updated atmospheric modeling code to CASA; this code is used in the ALMA Telescope Calibration package.

Shannon Jaeger, who has replaced Gary Li at the University of Calgary, has been working on bug fixes and enhancements to the msplot component. Msplot is a key tool used for plotting, displaying, listing, and editing CASA MeasurementSets. Shannon has also done some work on porting the functionals tool to CASA.

In August, Shannon and Raymond attended the millimeter observing techniques workshop in Victoria where they had the opportunity to meet many potential ALMA users. In mid-October, Shannon and Raymond will be traveling to Tucson to attend ADASS 2006 and to Socorro to spend some time working face-to-face with the off-line development team at NRAO.

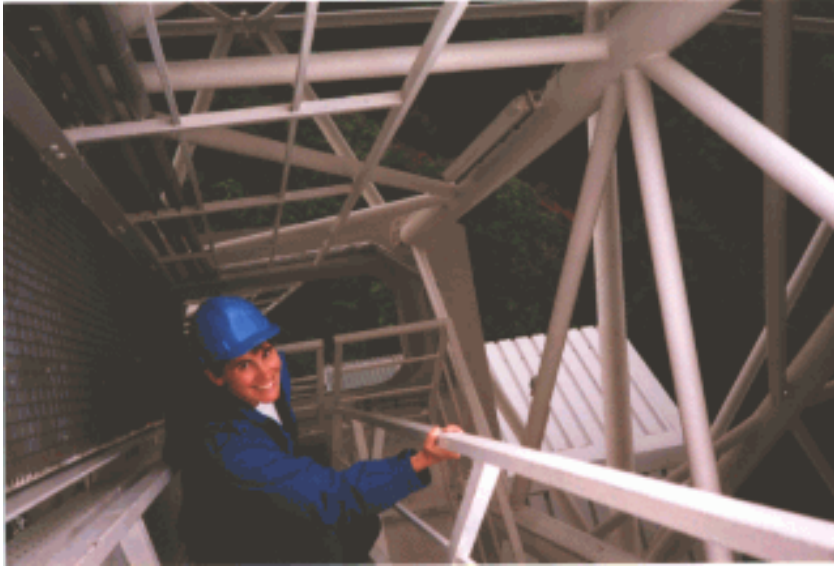
The process of replacing David Fugate, our former ACS worker at the University of Calgary, has moved to the stage that short-listed candidates are being interviewed. It is hoped that this position will be filled soon. Lewis Knee is heading the selection committee. Raymond Rusk, Gianluca Chiozzi, and Heiko Sommer are the other panel members.

The CADC has recently hired a new operations manager, freeing Norm Hill from his acting operations manager duties. This will allow him to begin work in late September on the requirements gathering phase of the design and implementation of the Request Handler component of the Archive system. He is currently attending the US-VO Summer School in Aspen, in part to develop an understanding of Virtual Observatory data access protocols and how they will influence the design of the Request Handler. Norm has been attending the weekly ALMA Archive team teleconferences.

Chris Wilson is working on planning for the fourth ALMA Pipeline User Test which will begin later this fall. James di Francesco from HIA will be one of the testers. This test will be the first one to involve flagging, calibration, and imaging of the scientific target in addition to the calibrators.

Aknowledgments

Thanks to Séverin Gaudet, Doug Johnstone, and Raymond Rusk for contributions to this article.



**Chris Wilson -
Canadian ALMA
Project Scientist**

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File translated from T_E X by [L^AT_EX](#), version 3.40.

On 18 Sep 2006, 22:54.

Milestones at NRC's [HIA](#) (2006 Summer)

edited by:

[Dr. Jacques P. Vallée](#)

Late June, HIA Victoria started its share of the workload for the [Gemini Planetary Imager](#) [GPI]. Led by our HIA co-PI **Jean-Pierre Véran** and Project Manager **Les Saddlemyer**, HIA will be providing the overall structure, interfaces with Gemini, integrated Adaptive Optics bench, top level software, and motion control software. Currently close to 14 HIA people are directly involved.

From 14-17 August, 50 students, postdocs and faculty attended in Victoria the HIA-hosted Summer school on Submillimetre Observing Techniques, led by **Brenda Matthews** and organized by the Millimeter Astronomy Group. Attendees enjoyed open personal interactions with the speakers.

In September, **Ken Tapping** of HIA DRAO in Penticton attended the final meeting marking the end of the Task Group 1-9 of the International Telecommunications Union. This task group did a series of compatibility studies between various new radio services and radio astronomy.

The URSI [Union Radio Science Internationale] CNC [Canadian National Committee] Commission J [Radio Astronomy] Chair, **Andrew Gray** at HIA DRAO in Penticton, has written a report on [Canadian radio astronomy](#). The CNC, which met in April in Victoria, received the [6th] version of the URSI White Paper on the future [Solar Power Satellites](#) and potential effects on all of astronomy. Comments are welcomed.

In July, **Tyler Foster** joined Brandon U in Manitoba after a 2-year Research Associate term with HIA DRAO in Penticton, where he collaborated on the Canadian Galactic Plane Survey [CGPS] and developed new HI models, among other interests.

Du neuf à l'[IHA](#) du CNRC - été 2006

édité par:

Fin juin, on a débuté des travaux à l'IHA de Victoria sur le projet [Imageur planétaire pour Gemini](#) [GPI]. Dirigé par notre co-CP **Jean-Pierre Véran** et Agent de projet **Les Saddlemyer**, l'IHA développera les aspects suivants: infrastructure, interfaces avec Gemini, banc intégré d'optique adaptative, logiciel de haut niveau, et logiciel de contrôle de mouvement. Présentement environ 14 personnes de l'IHA sont impliquées.

Du 14 au 17 août, 50 étudiants, postdocs, et staff ont suivi à Victoria l'Ecole d'été en Techniques d'observations sous-millimétrique, sous la direction de **Brenda Matthews** et appuyée par le Groupe d'astronomie sous-millimétrique. Tous ont aimé les interactions ouvertes et personnelles avec les conférenciers.

Ken Tapping de l'IHA OFRA de Penticton s'est rendu à la dernière rencontre marquant la fin du Groupe de Travail 1-9 de l'Union Internationale des Télécommunications. Ce groupe a fait une série d'études de compatibilité entre divers nouveaux services radio et la radioastronomie.

Le président de la Commission J [radioastronomie] du CNC [Comité National Canadien] de l'URSI [Union Radio Science Internationale], **Andrew Gray** de l'OFRA de l'IHA à Penticton, a écrit son rapport sur [Canadian radio astronomy](#). Le CNC, qui s'est réuni à Victoria en avril, a reçu la plus récente (6e) version du document URSI White Paper on [Solar Power Satellites](#) et ses effets potentiels sur toute l'astronomie. Vos commentaires sont bienvenus.

En juillet, **Tyler Foster** s'est joint à l'U. Brandon au Manitoba après un terme de 2 ans comme Chercheur Associé à l'IHA OFRA de Penticton, où il a collaboré au Relevé Canadien du Plan Galactique [CGPS] et a développé de nouveaux modèles en HI, entre autres.

Rob Reid joined NRAO Charlottesville to work on ALMA, after a 3-year NSERC Visiting Fellow term with HIA DRAO in Penticton, where he collaborated on CGPS polarization data, among other interests.

Mid-August, about a dozen HIA staff travelled to Prague for the triennial IAU General Assembly, to participate in various workshops and learn something new to bring back.

This summer, HIA has offered some positions of 6 months to a year to study at HIA under an agreement with the National Science Council of Taiwan's student exchange program in astronomy, involving **Chin-Wei Chen, Pin Cheng Huang & Yi-Jhen Chen**, and an eminent researcher exchange visit involving Dr. **Wing Huen Ip**.

In July, **Bonnie Bullock** became the new Head of CISTI/HIA Information Centre [librarian] in Victoria. She moved here from CISTI in Ottawa.

After 5 years at HIA in Victoria as a Technical Officer, **Danielle Frenette** moved in July to PEI University to train as a teacher. While at HIA, she oversaw data management & reduction within CADC, publishing papers on galaxies with John Hutchings and ALTAIR with HIA staff.

Early August, **Chris Willott** ended his highly productive Plaskett Fellowship term in Victoria, working on quasars & galaxy clusters; he has now moved to the University of Ottawa.

On 5 September, **John Ouellette** became Operations manager for the CADC, coming from the American Museum of Natural History in New York. He has published on stars and globular clusters, among other things.

Mid-September, **Marla Geha** starts as a Plaskett Fellow in Victoria, coming from Carnegie Observatories where she held a Hubble Fellowship. Among her many areas of expertise, one can find dE galaxies and the Magellanic Clouds.

Rob Reid s'est joint à NRAO Charlottesville pour travailler sur ALMA, après un terme de 3 ans comme Visiteur Boursier CRSNG à l'IHA OFRA de Penticton, où il a collaboré sur les données polarimétriques du CGPS, entre autres.

Mi-août, une douzaine de personnes de l'IHA sont allés pour l'assemblée générale de l'UAI à Prague, pour participer aux ateliers et revenir avec des nouvelles.

Cet été, l'IHA a offert des positions de 6 mois à un an pour étudier ici grâce à une entente avec le Conseil Scientifique National de Taiwan. **Chin-Wei Chen, Pin Cheng Huang & Yi-Jhen Chen** font parti du programme d'échange d'étudiants en astronomie. Dr. **Wing Huen Ip** est sur le programme de visite et d'échange de chercheur éminent.

En juillet, **Bonnie Bullock** est devenue le Chef du Centre d'information de CISTI/IHA [libraire] à Victoria. Elle nous arrive de CISTI à Ottawa.

Après 5 ans à l'IHA de Victoria comme Agent Technique, **Danielle Frenette** est partie à l'université de l'IPE pour devenir un professeur. A l'IHA, elle s'est occupée du management et de la réduction de données au CCDA, et a publié des articles sur des galaxies avec John Hutchings et sur ALTAIR avec des membres du personnel.

Début août, **Chris Willott** a terminé son terme de Boursier Plaskett à Victoria, un travail extrêmement productif sur les quasars et les amas de galaxies; il est maintenant parti pour un poste à l'University of Ottawa.

Le 5 septembre, **John Ouellette** devint Gestionnaire des opérations pour le CCDA, nous arrivant de l'American Museum of Natural History de New York. Il a déjà publié, entre autres, sur les étoiles et les amas globulaires.

Marla Geha débute mi-septembre comme Boursière Plaskett, et nous arrive de Carnegie Observatories où elle était Boursière Hubble. Parmi ses nombreuses zones de recherche, on peut trouver les galaxies naines elliptiques et les Nuages de Magellan.

JCMT: The Next Generation

Gary Davis, Director JCMT

Welcome to the first of what I intend to be a regular contribution to Cassiopeia. The James Clerk Maxwell Telescope is the world's premier submillimetre observatory. It is one of three telescopes on Mauna Kea in which Canada has a share, and the only one with a Canadian as Director. In this article I will present an update on the instrumentation programme and the prospects for the future of the facility.

After several years of stable operation during which the SCUBA instrument set the worldwide standard for submillimetre astronomy, the observatory is currently in the midst of an aggressive programme of development in which the entire instrument suite is being replaced: the DAS by ACSIS, our new multi-channel correlator; RxB by HARP, a 16-pixel heterodyne array for the 345-GHz band; and SCUBA by SCUBA-2, the next-generation continuum camera currently under development. In addition, we are developing an interferometry mode for sub-arcsecond astronomy in collaboration with the SMA and the CSO. This instrumentation programme is an essential component of our strategy for maintaining the facility at the forefront of submillimetre astronomy.

Heterodyne Instrumentation

Our new suite of heterodyne instruments consists of four components:

- ACSIS, a hybrid correlator built around 32 down-converters and samplers (Figure 1). It was developed and built by DRAO in collaboration with the JAC and the UK ATC, and was delivered to the JCMT in December 2004.
- A new Observatory Control System (OCS), which has been in development at the JAC (in collaboration with the UK ATC) for the past few years. The OCS replaces virtually all of the software which controls the observatory and its instruments.
- HARP, a 4x4-pixel heterodyne receiver array covering the 325---375 GHz window (Figure 2). HARP was developed and built by MRAO in Cambridge in collaboration with HIA and the UK ATC, with SIS devices supplied by Delft University, and was delivered to the JCMT in November 2005.
- ROVER, a polarimeter developed at the UK ATC.



Figure 1: ACSIS, in position on the carousel floor of the JCMT.

This suite of instruments is currently being commissioned and I anticipate releasing it to the community, with the exception of ROVER, for semester 07A. ROVER will follow in due course. During the first phase of commissioning in February 2006, HARP/ACIS obtained the map around the Orion nebula in Figure 3 in under two hours; with the previous instruments it would have taken nearly two months of continuous observing with the JCMT to map this area of sky.



Figure 2: HARP on the right Nasmyth platform of the JCMT.

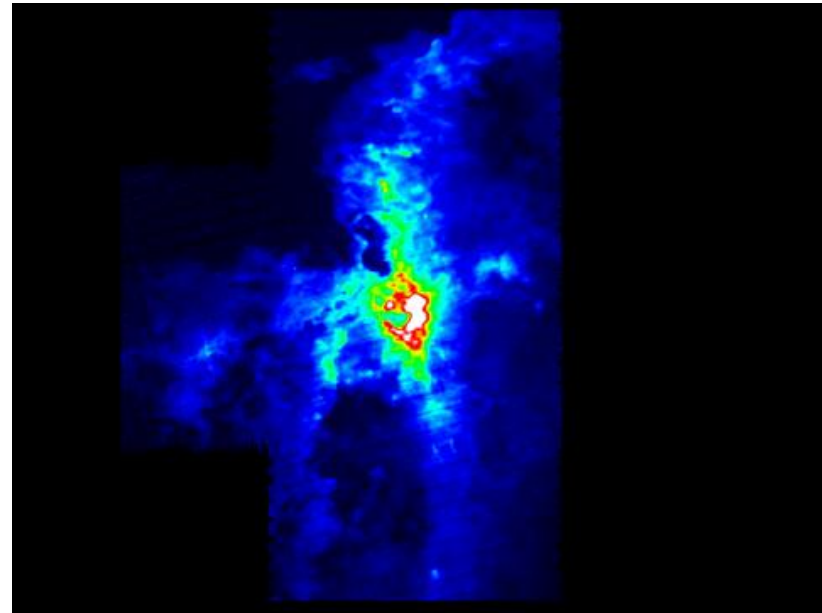


Figure 3: Image in Orion obtained with HARP/ACIS during commissioning.

So, what of our current heterodyne instruments?

- ACSIS replaces the DAS, which was retired in February after 14 years of excellent service to the JCMT community.
- RxA, which operates in the 230-GHz band, will be retained on the telescope at least until HARP/ACIS and SCUBA-2 are fully commissioned and delivering science. Its future will then be re-examined.

- RxB, which operates in the 345-GHz band, will be replaced by HARP. It is currently in use but will be retired before the end of 2006.
- RxW is being modified: the C-band capability is being replaced by a B-band channel, with two mixers from the HARP programme being provided by MRAO; and the D-band mixers are being replaced with new mixers of the ALMA design, provided by SRON. The modified RxW will therefore be a powerful instrument, providing enhanced sensitivity in two polarisations at both bands. The rationale for this modification was to provide a dual-polarisation capability at B-band for compatibility with the eSMA. The modifications are proceeding on schedule and I expect RxW to be installed in the receiver cabin this autumn.

Continuum Instrumentation

SCUBA-2 is the next-generation continuum camera for the JCMT. It is designed to capitalise on the enormous success of SCUBA by providing a wide-field continuum mapping capability of unprecedented scope. This improvement will be achieved through three technical innovations: better per-pixel sensitivity, a much larger field of view, and novel scanning and sampling modes. These factors combine to enable SCUBA-2 to map large areas of the sky up to 1000 times faster than was possible with SCUBA, opening up the prospect of large-scale submillimetre surveys for the first time. The instrument development is led by the UK ATC in Edinburgh in collaboration with the University of Cardiff and a consortium of Canadian universities. The detector technology is being developed at the National Institute of Standards and Technology in Boulder, while the silicon micro-machining is performed by the Scottish Microelectronics Centre at the University of Edinburgh, supported by commercial vendors.

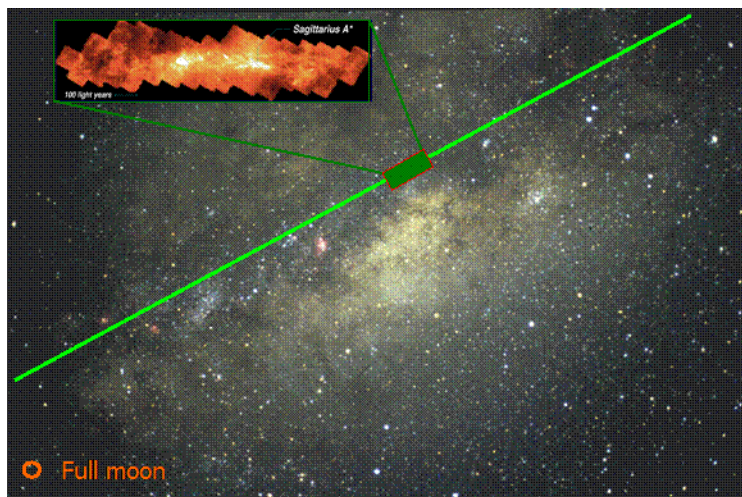


Figure 4: SCUBA 850 μ m image of the Galactic centre (inset).



Figure 5: Bryce Burger, Mark Halpern and Mandana Amiri (all UBC) with the prototype SCUBA-2 multi-channel electronics.

As one example of the revolutionary capabilities of this instrument, the inset of Figure 4 shows the largest single map ever taken using SCUBA; it required 120 hours of excellent weather. SCUBA-2, however, will be able to map the entire area shown in the figure to the same depth in just a couple of hours. SCUBA-2 will thus initiate a new paradigm in submillimetre astronomy, in which we move from the study of individual objects to the study of statistically-significant samples.

Canada has a prominent role in this highly-innovative project. Supported by an award from the CFI (PI: Mike Fich), three components of the project are being undertaken in Canadian universities:

- MUX screening: University of Waterloo (Jan Kycia)
- Multichannel electronics: University of British Columbia (Mark Halpern; Figure 5)
- Data reduction pipeline: University of British Columbia (Douglas Scott)

In addition, and supported from the same award, Canada will be supplying two ancillary common-user instruments for use in conjunction with SCUBA-2:

- a polarimeter, POL-2: Université de Montréal (Pierre Bastien)
- a Fourier transform spectrometer, FTS-2: University of Lethbridge (David Naylor)

SCUBA-2 is currently scheduled for delivery to the JCMT in the spring of 2007, and early science operations will commence in semester 07B. Commissioning of FTS-2 and POL-2 will follow some time thereafter.

SCUBA-2 will be by far the largest instrument ever installed at the JCMT, and accommodating it on the telescope as a facility instrument represents a massive engineering challenge. The JCMT was therefore closed for a period of six months, from mid-February to mid-August, in order to carry out this construction work (Figure 6). The engineering staff worked long hours under difficult conditions to bring this project to a successful conclusion. As I write this article, JCMT science staff are working hard to re-commission the observatory for common-user observing.

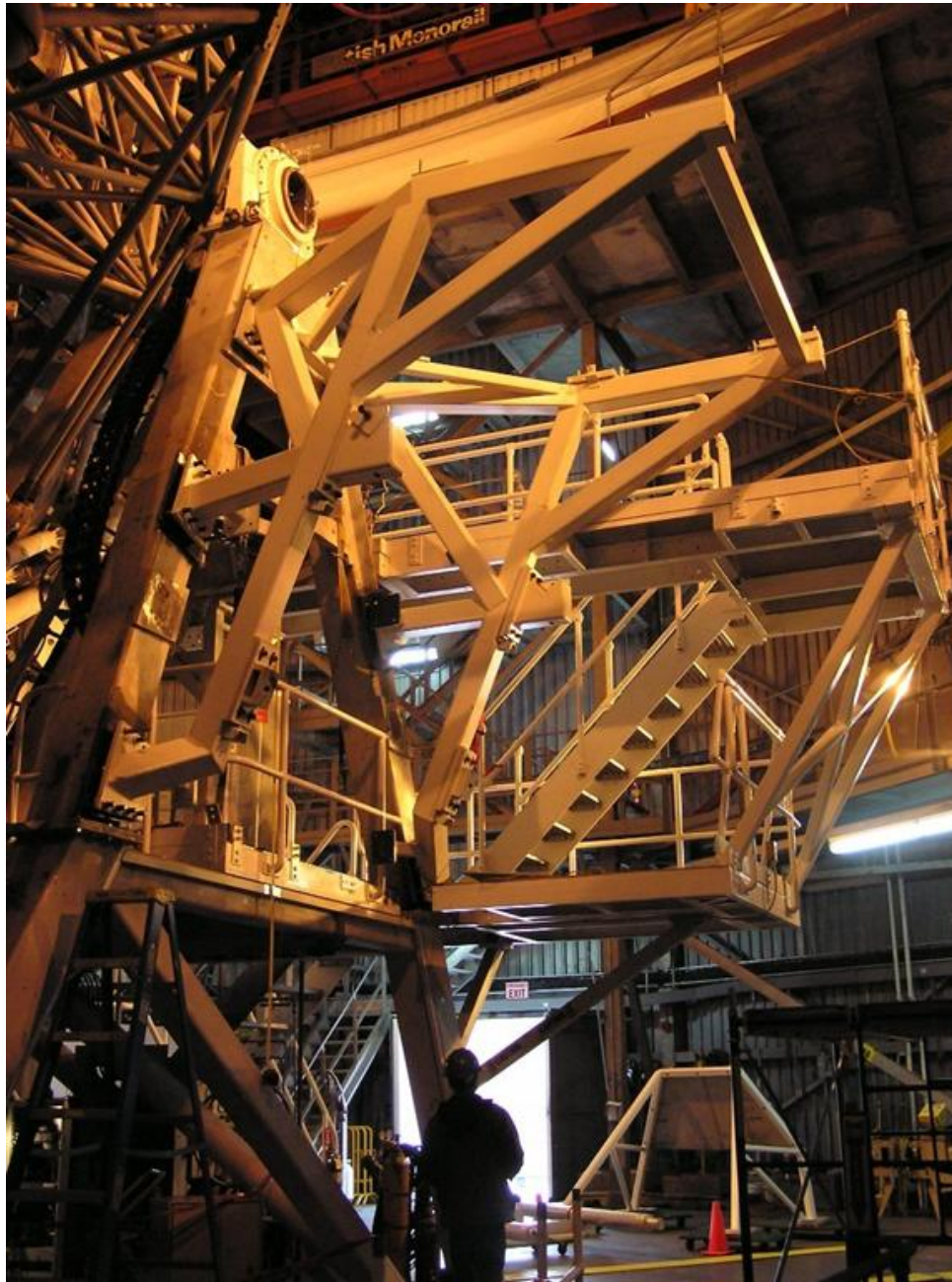


Figure 6: SCUBA-2 mounting frame secured on the JCMT, in the location formerly occupied by SCUBA.

Legacy Survey Programme

In recognition of the potential of HARP/ACSIS and SCUBA-2 for large area mapping, the JCMT Board approved in July 2005 an ambitious set of legacy surveys for the JCMT. The survey programme was allocated 55% of UK/Ca/NL time over four semesters, which in average conditions would correspond to 265 nights. The Board also approved a further 307 nights, in principle, over the years 2009–12; this latter approval is conditional on continuation of the JCMT beyond 2009 (about which more below) and is subject to renewed competition. The seven survey projects are as follows:

- *Spectral line survey*: a project to use HARP to study the molecular inventory and the physical structure of a sample of objects spanning different evolutionary stages and different physical environments in molecular clouds and to probe their evolution during the star formation process.
- *Local galaxy survey*: a project to use SCUBA-2 and HARP to study the ISM and its interplay with star formation in a sample of 331 nearby galaxies.
- *Debris disk survey*: a project to use SCUBA-2 to conduct the first unbiased survey of debris disks around 500 nearby main-sequence stars, providing robust statistics on the incidence of such disks.
- *Gould's belt survey*: a comprehensive project to map most of the star-forming regions within 0.5 kpc using SCUBA-2, to obtain HARP maps of the brightest sources in three isotopomers of CO, and to produce the first statistically-significant set of submillimetre polarisation maps using POL-2.
- *SCUBA-2 All-Sky Survey (SASSy)*: a project to map the entire sky visible from the JCMT (18,000 square degrees) using SCUBA-2 in band-4 weather, providing a comprehensive dataset of value for both cosmology and galactic studies.
- *Cosmology survey*: a project to build on the success of the SCUBA surveys (e.g., SHADES) by mapping 70 square degrees at 850 μ m and 2 square degrees at 450 μ m.
- *Galactic Plane survey*: a project to address key questions in massive star formation by mapping two-thirds of the Galactic Plane in the submillimetre continuum and in ^{13}CO , using HARP and SCUBA-2.

These seven projects are led by coordinators, in many cases one from each of the three JCMT partner countries. Canadian coordinators are James Di Francesco, Mark Halpern, Doug Johnstone, Brenda Matthews, Rene Plume, Douglas Scott and Christine Wilson.

4. Submillimetre Interferometry: The eSMA Project

The eSMA is a collaboration between the JCMT, the SMA and the CSO to combine the three observatories into a single interferometric array with roughly twice the collecting area of, plus more and longer baselines than, the SMA acting alone. The eSMA will operate part-time and in the 345-GHz window, taking full advantage of Mauna Kea's excellent observing conditions and prolonged periods of superb weather at that frequency. With spatial resolutions of $\sim 0.15''$, this will bring a subarcsecond capability to the JCMT for the first time and well in advance of ALMA.

Although the project has been in the works for several years, commissioning began in earnest in 2005 and first fringes between the SMA and JCMT were obtained at 267 GHz in July, followed by first spectra in September. The commissioning will be resumed this autumn, following the hiatus forced by the JCMT closure. The agreement between the three observatories calls for a Pilot Programme at 345 GHz, consisting of 42 nights spread over 12 months, to fully characterise the system. The Pilot Programme will commence in 2007 and Canadians will have access to this time through a conventional proposal process.

5. The Future of the JCMT

The future of the JCMT is extremely promising. The new instrument suite described above will open up new observational paradigms in submillimetre astronomy; SCUBA-2, in particular, will have no competition for the foreseeable future, and I expect it to revolutionise the field just as its predecessor SCUBA did.

The tripartite agreement between the three agencies which fund the JCMT is currently set to expire in May 2009. In preparation for this deadline, the JCMT underwent a comprehensive strategic review in 2005, chaired by Martin Harwit (Cornell). The review was extremely successful: the panel praised the JCMT's historical record of scientific productivity and its ambitious plans for the future. The panel's report is available from the JCMT website.

Given the strong endorsement of the JCMT by the Harwit panel and the large investments which have been made in the new instrumentation suite, the case for continuation of observatory operations beyond 2009 is extremely compelling. As a consequence, all three agencies have indicated their wish to continue funding the JCMT until at least 2012, and are seeking the required funds from their governments. A final decision is anticipated by the end of 2006.

Reports

[Canadian TAG for James Clerk Maxwell Telescope - Summary for Semester 2006b /GAT](#)
[Canadien du Telescope James Clerk Maxwell - Sommaire du semestre 2006b](#) by Henry
Matthews

Canadian TAG for James Clerk Maxwell Telescope - Summary for Semester 2006b	GAT Canadien du Telescope James Clerk Maxwell - Sommaire du semestre 2006b
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Submission and refereeing

Proposals requesting telescope time were uploaded to the NorthStar web site at <http://proposal.astron.nl> which was being used for the first time as the common web submission system for the JCMT. Proposals retrieved by the Canadian Time Allocation Group [CTAG] were each sent to two external referees. As usual, there was a high percentage (76 %) of responses from referees (only 1 reminder was issued).

Soumission et arbitrage

Les demandes de temps sont envoyées au site web de NorthStar <http://proposal.astron.nl> qui est devenu le site commun de soumission de demandes pour le TJCM. Les demandes récupérées par le Groupe d'Allocation de Temps Canadien (GATC) pour le Télescope James Clerk Maxwell (TJCM) furent envoyées chacune à deux arbitres externes et, comme d'habitude, environ 76 % des arbitres ont répondu (1 rappel seulement).

Statistics & oversubscription

In semester 2006B continuing integration of the new correlator system (ACSIS) and the 345-GHz heterodyne array receiver (HARP), and preparation for the installation of the new continuum array receiver (SCUBA2) will substantially overlap the start of the semester. Integration of associated new software will also continue in parallel with observing throughout the semester, substantially limiting the time available for astronomical programs.

The total amount of Canadian time requested (24h for CANSERV and 824h for 19 new proposals), greatly exceeded the 162h available, resulting in a Canadian oversubscription of **5.24**, demonstrating a continuing strong interest by the radio astronomy community.

If we remove the time for CANSERV and focus only on the 19 new proposals, the time requested (824h) cannot be fitted in the remaining time (138h), giving an oversubscription of **5.97** !

Statistiques & sursouscription

Au semestre 2006, l'insertion du nouveau corrélateur (ACSIS) et du récepteur à réseau de 345-GHz (HARP), et les préparatifs pour le récepteur continuum (SCUBA2) viendront retarder le début du semestre. L'insertion des logiciels d'appoint sera faite en parallèle avec les observations durant le semestre, réduisant de beaucoup le temps pour les programmes en astronomie.

Le temps canadien total demandé (24h pour CANSERV et 824h pour 19 nouvelles demandes), surpasse les 162h disponibles, donnant un taux de sursouscription de **5.24**, ce qui démontre un grand intérêt constant par la communauté radioastronomique.

Après avoir enlevé le temps pour CANSERV, et si on regarde uniquement les 19 nouvelles demandes, alors le temps demandé (824h) ne peut pas entrer dans le temps restant (138h), donnant une sursouscription de **5.97** !

CTAG meeting

Réunion du GATC

The voting members of CTAG are:

Les membres votants du GATC sont:

Beaulieu, Sylvie (Univ. Laval, Ste Foy)
Matthews, Henry (NRC HIA, Penticton), Chair/Président
Fiege, Jason (Univ. Manitoba, Winnipeg),
Houde, Martin (Univ. Waterloo)
Redman, Russell (NRC HIA, Victoria)

The NRC CTAG is ably assisted by **Jacques Vallée** for the technical secretarial duties, computer processing, communication linkage, interfaces with HIA and NorthStar, and the corporate memory.

Le GATC du CNRC reçoit l'aide compétente de **Jacques Vallée** pour le secrétariat technique, l'analyse computationnelle, les liaisons de communication, interfaces avec IHA et NorthStar, et la mémoire corporative.

On this occasion, the CTAG met in Victoria (NRC HIA) on 2006 June 16 to discuss proposals to use the JCMT. Taking into account comments from referees, technical assessors, and the CTAG's own assessments, the proposals were ranked in order of merit and a provisional time allocation was made.

Le GATC s'est réuni à Victoria (IHA du CNRC) le 16 juin 2006 pour évaluer les demandes de temps canadiennes. Le GATC a ordonné les demandes de temps selon le mérite scientifique, tenant compte des commentaires des arbitres, des évaluateurs techniques, et de l'évaluation du GATC, et une distribution provisoire du temps a été faite.

CTAG Notes

1. CTAG reiterated that CANSERV is limited to 'urgent' proposals. The maximum time per proposal is 4h, and the 'urgency' aspect must be well justified.

2. CTAG notes that the CANSERV allotment is less this semester, owing to the late semester starting date and the high fraction of continuing work anticipated to integrate the new systems and software at the telescope.

International TAC

ITAC members met by teleconference on July 5. The ITAC includes the Chairs of the Canadian, UK, and the Netherlands TAG's. It oversees the division of time between the partners and also assesses all "purely international proposals".

Allocations for successful proposals will be posted on the [JCMT Web pages in Hawaii](#). In all cases, further information is sent to the PI's in the form of feedback from the CTAG.

Points d'intérêt du GATC

1. Le GATC réaffirme que CANSERV est restreint aux demandes 'urgentes'. Le temps maximum d'une demande est de 4h, et l'urgence doit être expliquée.

2. Le GATC note le temps restreint de CANSERV pour ce semestre, dû au début tardif de ce semestre et à la grande fraction de temps requise pour insérer les nouveaux systèmes et logiciels au télescope.

CAT International

Les membres du CATI se sont rejoins via télécon le 5 juillet. Le CIAT est composé des présidents des TAGs du Canada, du RU, et des Pays-Bas. De plus, le CIAT divise le temps entre les partenaires et évalue les demandes 100% internationales.

On pourra voir sur la [toile du TJCM à Hawaii](#) la liste des demandes de temps fructueuses. Des informations plus détaillées sont envoyées par le GATC aux chercheurs principaux.

Dr. Henry Matthews

Chair, Canadian Time Allocation
Group (CTAG) for JCMT

Dr. Matthews is at NRC HIA, where
his research concentrates on the
physics of the ISM.

henry.matthews@nrc-cnrc.gc.ca



Dr. Henry Matthews

Président, Groupe d'Allocation de
Temps Canadien (GATC) pour le
TJCM

Dr. Matthews est à l'IHA du CNRC,
Ses recherches portent sur la
physique du milieu interstellaire.

henry.matthews@nrc-cnrc.gc.ca

Briefly Noted

[International Year of Astronomy 2009 \(IYA2009\)](#)

[Submission Deadlines Extended / Report de la date limite pour la présentation des idées et des résumés](#)

[Astro Ski 2007](#)

[Submillimetre Astronomy Comes to Victoria!](#)

International Year of Astronomy 2009 (IYA2009)

The IAU initiated a process to have 2009 declared the International Year of Astronomy at its General Assembly in Sydney Australia in 2003. A proposal was made by the Italian Government to UNESCO, the UN organization regarding Educational, Scientific, and Cultural matters. This proposal was accepted during the 33rd session (2005) of the UNESCO General Conference, and a recommendation was made to the United Nations General Assembly to approve this declaration. There are now intense efforts underway to have the United Nations approve this declaration. Only the UN can officially approve *International Year of* designations.

Meanwhile, the IAU has decided to forge ahead assuming that the UN will approve the declaration either this year or next. The IAU Executive Committee has formed an IYA2009 Working Group chaired by incoming IAU President Catherine Cesarsky. At the moment the only other members of the IYA2009 WG are Lars Lindberg Christensen (Denmark), Dennis Crabtree (Canada) and Ian Robson (UK) but the membership will be expanded to approximately 15 members very shortly.

The IAU will play a leading role as a catalyst and coordinator for IYA2009. While the majority of the events will be organized at the local and national level, the IAU will take the lead on a small number of international or global events. For example, we expect there will be an opening event in January 2009, possibly at UNESCO headquarters in Paris , a closing event in Italy and at least one special event during the General Assembly in Rio de Janeiro in August 2009.

In Canada , CASCA formed the International Year of Astronomy Canada Committee (IYACC) to lead Canadian efforts in celebrating astronomy during 2009. IYACC has reached out to the amateur community and the IYACC Steering Committee consists of the following:

- Dennis Crabtree (NRC-HIA)
- Jayanne English (U. of Mantoba/Chair of CASCA EPO Committee)
- Jim Hesser (NRC-HIA/Past President of CASCA)
- Peter Jedicke (Fanshawe College/Past President of the RASC)
- Rémi Lacasse (President of the FAAQ)
- John Percy (U. of Toronto)
- Scott Young (Manitoba Museum/President of the RASC)
- Andy Woodsworth (NRC retired - ex-Director General)

IYACC has a draft mission statement:

The "IYA2009 Canada Committee" (IYACC), a partnership of organizations in Canada involved in communicating astronomy as a science and hobby with the public and students, organizes and coordinates Canadian endeavors to celebrate the International Year of Astronomy in 2009

(IYA2009) by

- defining, developing, coordinating and/or managing national programs
- providing a bilingual website that serves as the central resource for Canadian IYA2009 activities and as a clearinghouse of local and regional IYA2009 activities to encourage, inspire and support broader participation at the local level
- raising funds for the definition, development and management of national programs and activities for IYA2009
- promoting IYA2009 through our website, the media and our member organizations

The Steering Committee is working very well together and we've had two telecons (July 31 and Sept 5) plus numerous e-mail exchanges. IYACC has established a TWiki for the group to work collaboratively. We've made contact with CSA, Canadian Association of Science Centres, and other groups (and individuals such as Bob McDonald) that promote science. In addition we've contacted Cheryl Bartlett at Cape Breton University . Cheryl has a CRC in “integrative science”, which merges western scientific knowledge with traditional knowledge of Canadian aboriginals. Cheryl is very keen to get involved with the IYA activities and offered to help lead the aboriginal segment of it.

We've registered (and CASCA has paid for) the domain astronomy2009.ca which will be the Canadian IYA2009 bilingual website.

A couple of long lead time projects that we are pursuing include special issue stamps and a commemorative coin.

Besides the steering group IYACC will have three working groups: Programs, Resources, Media Relations. We will attempt to appoint two (one from Quebec) honorary co-chairs to help raise the visibility of our efforts.

Dennis Crabtree for IYACC

Submission Deadlines Extended / Report de la date limite pour la présentation des idées et des résumés

 Agence spatiale
canadienne Canadian Space
Agency



**Atelier canadien sur
l'astronomie spatiale (CSAW)**

**Des idées innovatrices
pour la prochaine décennie**

23 et 24 novembre 2006

Centre spatial John H. Chapman
Longueuil, Québec

Nous encourageons les universitaires,
les représentants des secteurs privé et public et
d'autres groupes intéressés à participer à cet atelier.
Aide financière possible pour les étudiants.

Consultez le site Web pour obtenir des détails
concernant la présentation des résumés.

www.espace.gc.ca/csaw-fr

Credit : Photo Hubble/NASA de C.R. O'Dell (Rice University)

**Canadian Space
Astronomy Workshop (CSAW)**

**Creating Ideas
for the Next Decade**

November 23 – 24, 2006

John H. Chapman Space Centre
Longueuil, Québec

Participation from academia,
industry, government and other interested
groups is encouraged. Some financial assistance
is available to students.

Please see the website for details
on submitting abstracts.

www.space.gc.ca/CSAW

Credit NASA/Hubble Photo by C.R. O'Dell (Rice University)



Canadian Space Astronomy Workshop (CSAW)

November 23 and 24, 2006

Canadian Space Agency, Longueuil, Quebec

Atelier canadien sur l'astronomie spatiale (CSAW)

Les 23 et 24 novembre 2006

Agence spatiale canadienne, Longueuil (Québec)

The Call for Ideas deadline has been extended to October 1, 2006.

The Call for Ideas is an opportunity to ensure that your ideas for future Canadian space astronomy concepts and instruments are considered during the workshop discussions.

The Poster Presentations Abstract submission deadline has been extended to October 1, 2006.

Posters presentations give participants the opportunity to present their current research results, and may also provide background information for an idea being submitted.

La date limite pour la présentation des idées a été reportée au 1^{er} octobre 2006.

Cet appel d'idées constitue une occasion de vous assurer que vos idées visant des concepts et des instruments canadiens futurs d'astronomie spatiale seront prises en compte lors des discussions au cours de l'atelier.

La date limite pour la présentation des résumés d'affiches a été reportée au 1^{er} octobre 2006.

Les affiches donnent aux participants la possibilité de présenter les résultats des recherches qu'ils mènent actuellement et aussi de fournir des renseignements de

Register On-line today! Visit our website at www.space.gc.ca/CSAW, where up-to-date information about submitting ideas and abstracts, student assistance, travel and accommodation, on-line registration and more can be found. There are no fees to register; however, pre-registration is mandatory for planning and security purposes.

We look forward to welcoming you to the Canadian Space Agency on November 23 and 24 for this exciting workshop, where participants will work together on ideas for future Space Astronomy missions for the benefit of Canadians and the Canadian astronomical community.

Should you have questions regarding CSAW, please write to us at csaw@space.gc.ca.

base concernant une idée qu'ils ont soumise.

Inscrivez-vous en ligne dès aujourd'hui!

Consultez notre site Web à l'adresse www.espace.gc.ca/csaw-fr, où vous pourrez trouver des renseignements à jour concernant la présentation des idées et des résumés, l'aide aux étudiants, les déplacements et l'hébergement, l'inscription en ligne et autres. Il n'y a aucun frais d'inscription, mais il est toutefois nécessaire de s'inscrire d'avance à des fins de planification et de sécurité.

Nous espérons vous accueillir à l'Agence spatiale canadienne les 23 et 24 novembre pour cet atelier passionnant, où les participants travailleront de concert sur des idées concernant de futures missions spatiales d'astronomie qui profiteront aux Canadiens et à la communauté canadienne d'astronomie.

Si vous avez des questions concernant le CSAW, veuillez nous écrire à csaw@espace.gc.ca

Astro Ski 2007

Over the past five years the CFHTLS and TMT groups have sponsored three meetings at the Mt Washington resort on Vancouver Island. The meetings are a chance to have informal interaction between astronomers, PDFs, graduate students and senior undergrads about science in progress and plans for new projects. The informal context has been useful in giving a chance for clear and forceful airing of a wide range of viewpoints.

Various people have expressed the strong view that there should be at least one more astro-ski meeting. Issues/science include:

- CFHTLS wrap-up observations and science in progress
- WIRCam efforts
- Should there be a second round of Megaprime surveys?
- Douglas Scott and others on SCUBA2, etc
- We could have some initial discussion of TMT Time Allocation policies.
For instance, it would probably be desirable to have some way of having TMT support JWST and ALMA applications.
- Another very important meeting is the CSA sponsored Montreal meeting in late November. It could be timely to have some followup.

We are looking at the fairly common Reading week Feb19-23. We have a tentative booking at Mt Washington on Vancouver Island--it is about the only place we can really afford and is available. All the big name resorts cost about twice as much and are already booked up.

Our approach to these meetings is that we provide:

- Organization of block bookings which leads to costs of about \$100/night single and 3 bedroom condos for about \$200/night (a sensational deal). We also get a very good group rate on lift tickets.
- 3 meals, 2 coffee breaks per day

Individuals are responsible for their own travel and room bookings.

Please indicate interest through pre-registering or sending email to carlberg@astro.utoronto.ca, Pre-register at:

<http://legacy.astro.utoronto.ca/Meetings/registration.php?id=5>

Submillimetre Astronomy Comes to Victoria!

Brenda Matthews (on behalf of the LOC)

In mid-August, a summer school was held in Victoria, BC to educate astronomers from across the EM spectrum about the techniques of observing at submillimetre and millimetre wavelengths. The school also highlighted forthcoming facilities such as the upgraded James Clerk Maxwell Telescope, the Herschel Space Observatory, the Atacama Large Millimeter Array, Expanded Very Large Array and the Extended Submillimeter Array. The school was organized by the Herzberg Institute of Astrophysics in Victoria and co-sponsored by the National Reserach Council and the Canadian Space Agency.

The workshop intention was to bring together and help build the future foundations of the community in Canada in order that they are ready to do science with these new facilities in a very competitive international context. The workshop was a significant step in that direction as the high level of open personal interactions between the students and speakers indicated (one comment heard was that it was sometimes difficult to tell who were the students and who the instructors were). Feedback from participants and speakers alike indicate that the summer school was a great success. In spite of the attractions of Victoria in August, the meeting room was packed to capacity for every session over the four days.

In all, 51 participants took part in the meeting. The majority were graduate students, but many undergraduates, postdocs and even some faculty were present. Most of the 18 speakers stayed for the duration of the meeting. Although the meeting was targeted toward Canadian astronomers and the facilities to which we have access, there was a significant international presence, including seven registrants from the US and two from Europe. The enthusiasm of the speakers and participants alike made for an enjoyable and educational school. The effectiveness of the talks was increased by the high level of preparation put forth by our speakers, who coordinated with each other to ensure that material was not omitted or excessively repeated.

Special recognition goes to Sean Dougherty of DRAO who not only opened the meeting with an excellent lecture on the Basics of Radio Astronomy, but also contributed the final facility talk four days later on the EVLA Project. The LOC extends our thanks to all the speakers for contributing their time to make the summer school such a success. Several students expressed the desire to see another such school held in the period just before ALMA becomes operational in 2009.

The final talks, supplemental material and the group photo are linked off the meeting website at <http://www.hia-ihp.nrc-cnrc.gc.ca/astroschool> (follow the link to "NEW - Documents").

In The Classroom

[Astronomy Education at the 2006 General Assembly of the IAU](#) *by John Percy*

[Learning the Lexicon](#) by Heather R. (Scott) Theijsmeijer

[Astronomy Programs for all Ages](#) by: Michel Labrecque

Astronomy Education at the 2006 General Assembly of the IAU

There is a public misconception that the 2006 General Assembly (GA) of the IAU did nothing other than to demote Pluto. In fact, there were a dozen or more parallel strands. By going to most of the education sessions, I missed most of the sessions on my research interests. And there was always the temptation to go off and explore Prague, which is one of the most interesting cities in the world -- even when inundated with tourists, and with a McDonald's on every corner. In our weekend free time, there was a session and city walk on mathematics, physics, and astronomy in Prague, with everything from Tycho's grave to Einstein's favourite cafe.

There were two special sessions on education and development. One was a two day session on Innovations in Teaching and Learning astronomy; there is a summary available at: <http://astro.cas.cz/nuncius/supplement10.html#ros>

The proceedings are being edited by Jay Pasachoff (US) and Rosa Maria Ros (Spain) and published by Cambridge University Press.

There was also a two day session on Astronomy for Developing Countries; it is described in the ninth issue of the daily newspaper of the IAU GA at: http://astro.cas.cz/nuncius/nsiii_09.pdf

This will give you a sense of the excellent internal press coverage that we had at the GA. It certainly helped us to keep up with the sessions that we missed.

In addition, there were some important sessions on Communicating Astronomy, and on plans for International Year of Astronomy 2009 (the 400th anniversary of the development of the astronomical telescope). But I hope that Dennis Crabtree (NRC-HIA) will report on those, since he is a leader in both efforts. And you can follow the website: <http://www.communicatingastronomy.org>

One of the forty commissions (interest groups) of the IAU is Commission 46: Education and Development. Its meetings included a half-day session, organized by George Greenstein (US) and Bruce Partridge (US) on the training of astronomers. Several speakers pointed out that the majority of astronomy graduates, at both the undergraduate and graduate level, do not end up in careers in astronomy. This is partly because of the limited number of astronomy positions, and partly because well-trained astronomers have the generic skills to succeed in a wide variety of careers.

One feature of this IAU GA was special events for "young astronomers", which included graduate students and PhDs. The IAU is keen to serve young astronomers, as well as more

established ones. There was a very successful lunch at which over 200 young astronomers met with experienced astronomers (such as me) to address concerns which were important to them. Notes were kept, and I look forward to seeing them on the IAU website.

There was also a "consulting service" at which young astronomers could meet one-on-one with experienced astronomers to get advice on professional and career issues.

At the business meeting of Commission 46, Magda Stavinschi (Romania) was elected President, and Rosa Ros (Spain) was elected Vice-President. We thank Jay Pasachoff (US) and Barrie Jones (UK) for filling these two positions, so effectively, in the 2003-2006 triennium. For more information about Commission 46, see our website at: <http://physics.open.ac.uk/IAU46/>

Canada's representative on IAU Commission 46 is Jayanne English, University of Manitoba, and Chair of the CASCA Education and Outreach Committee. She replaces me in this position.

John Percy (University of Toronto, jpercy@utm.utoronto.ca)

Learning the Lexicon

Heather R. (Scott) Theijsmeijer

The key to learning any new language – French, English, Russian, or even (rather, especially!) mathematics – is to start with a good vocabulary base. Sentences, idioms, contexts all come later. The same can be said for the sciences. Without a strong base of the meanings of the words used in Astronomy, a student has little hope of successfully completing a course, let alone even understanding the daily lessons. Students learn an average of over 2000 words every year in various subject areas – is it any wonder they confuse some of the vocabulary presented to them?

Teaching not only scientific knowledge, but also scientific literacy will help ensure that students get the most out of your courses. Scientific literacy can be split into three areas of assessment: reading, writing, and communicating orally. Depending on the course, you may only be able to realistically address one of these consistently, but every chance your students get to improve their literacy skills will help them in the end. Improving literacy can be done in many ways, some of which I am sure you already use in class, perhaps without realizing: oral presentations, textbook readings, using journal articles.

Reading is very much a thinking process. In a world where short attention spans seem to be becoming the norm, many students need all the help they can get when it comes to succeeding. With a little extra attention paid to the literacy aspect of your teaching, students may find learning a little easier, and the harder concepts a little more attainable. Below is a listing of strategies that can be used in your courses to help students improve their scientific literacy. As usual, I have tried to include items that will give you the most “bang for your buck” – hopefully little work that will result in larger payoffs of the part of the students.

- **Have a list of “new” or challenging words** that the students will find in the text, when distributing a new article, reading passage or starting a new chapter in the textbook. This allows the students to be aware of these new words (and aware of the fact that they need to know them) before they even begin. It also provides a list to study from later on in the course, and expands the student’s vocabulary.
- **Provide a variety of informational texts.** Always reading from the textbook will acclimatize the student to information presented in only one way. Newspaper articles, website articles, journal articles, or even a summary of a topic written by a second source provide more depth, and further contextual understanding. Something that a student didn’t quite pick up on in the textbook may become quite obvious when reading about it in the news. This also allows the student to see who uses the information presented in class.
- **Use different types of texts.** There are *informational* texts (articles, textbook

passages), which make up the majority of students' reading, but don't forget *graphical* texts. These include graphs, schematic diagrams and flow charts, which, depending on the content, could make up a large part of what the students read in your course. Since they also use the terms found in informational texts, it is good to provide students with examples of both to reinforce terminology. Though it might not apply for advanced levels, "following instructions" is also an example of scientific literacy, one which many of the younger students still need to improve!

- **Choose a good textbook.** A well-designed textbook uses both informational texts and graphical texts to organize the main ideas of a course. Textbooks that offer consistency in the layout allow students to spend more time concentrated on the reading itself, rather than trying to work their way through the book. This is especially effective for younger (Astronomy 100) students.
- **Help the students visualize what they are reading.** Particularly in the sciences, being able to picture what you are reading will help the understanding of spatial relationships and create cross-curricular connections. Similarly, being able to talk through something that was just read reinforces the material and often allows the student to approach the topic from a different perspective. You can help students visualize by asking them to think through a process aloud, or discuss a particular passage of text.
- **Have the students make notes on their readings.** Notes can help students monitor their understanding and organize the information they have just learned. Have students summarize their reading (either orally to a small group of fellow students, or on paper), or provide them with tips for making notes, such as using point form/shorthand/symbols, using headings and putting the concepts in their own words.

Astronomy Programs for all Ages: Alive and Kicking at the Canada Science and Technology Museum

Michel Labrecque, Education Officer, CSTM

The public astronomy programming at the Canada Science and Technology Museum in Ottawa has its roots in the opening of the Dominion Observatory in 1905 and a key element in its efforts to make the 15 inch refractor accessible to the citizens of Ottawa including politicians. That year also marked the early days of the Ottawa Centre of the Royal Astronomical Society of Canada (RASC) and its long links to the Observatory and, in recent years, to the Museum and its' Helen Sawyer Hogg Observatory.

Complementing professional research conducted at the Dominion, the 15 inch refracting telescope also provided a public education function. Saturday evening stargazing in the countryside observatory was reserved for the public. When founded, the observatory was on the outskirts of Ottawa. Throughout

the years and two world wars, tens of thousands of visitors trekked to the observatory and enjoyed the wonders of the night sky through this prized instrument. As a 13 year old looking through the telescope for the first time, Rob Dick (now teaching astronomy at Carleton University), commented, "Where else could you look through such a large professional telescope and see the planets so clearly! -- the answer of course, nowhere but the Dominion Observatory".

Technological improvements came in leaps and bounds, and soon,



Canadian professional astronomers had access to larger telescopes. When the Federal Government transferred all astronomy activities to the National Research Council of Canada in 1970, public education became the only function of the Dominion Observatory. Under the stewardship of the late Mary Grey, Curator of Physical Sciences, the National Museum of Science and Technology acquired the Warner and Swasey instrument and assumed the support of public programming at the Dominion until the instrument

was moved to the Museum in 1974.

Astronomy programming in Ottawa has never been more active with clubs operating at the high school level and groups operating in the region. The Ottawa Centre of the RASC continues with monthly meetings at the Museum and supports our major public events like Astronomy Day while the Ottawa Valley Astronomy and Observers Group conducts regular observing sessions in the region.

A group of young students eager to peer through the 15" refractor.

The Museum has offered on-site astronomy programs to all ages and in both French and English for over 30 years. The programs include daytime sessions for school classes, summer day camps and, of course, evening observing sessions. Over the years, many young eyes have

marvelled at the night sky through the 15" and other smaller instruments and youngsters continue to gaze at the stars - some have subsequently even pursued careers in astronomy. We regularly host the families of politicians and the diplomatic core as participants in these programs thereby contributing to one of the objectives of the *Long Range Plan* for Canadian astronomy.

The type and range of programs has increased and the number of participants has steadily increased -- today schools visit the Helen Sawyer Hogg Observatory, families take part in the Family Astronomy and Space Workshops (a series of hands-on programs which features telescope observing and a new take-home project each month), and guest speakers frequently drop by for evening lectures. Most recently the director of the Canada-France-Hawaii Telescope offered a great presentation on that facility and this Fall we will feature "The Future of Spaceflight: Why is the Adventure Crucial to Canada?" (November 25). Highlights from our *Discover the Universe* programs include "The Moon: Our Closest Neighbour" (September 29), "Ancient Sky Watchers: Egyptians" (October 20), "The Right Telescope for the Budding Astronomer" (November 17). Astronomy courses are also popular including "Backyard Astronomy - Level I" and "Photographing the Night Sky with Your Digital Camera". Families can take part in "Beginner's Guide to Astronomy" - a three week mini course. For those who just want to look through a very cool telescope, we bring "Stargazing" - a free scheduled program offered weather permitting.

The Canada Science and Technology Museum continues the long tradition of public astronomy programs as one of our core efforts to improve scientific literacy. The conservation work completed on the 15 inch telescope -- a working artefact and part of our technological heritage, the inauguration of the first Museum programs in January 1975, the dedication of the Helen Sawyer Hogg Observatory in 1989 guarantee continued interest and growth in astronomy today. There are very few institutions with the level of commitment to public education in astronomy in Canada. With the assistance of the RASC, Ottawa Centre we consider our astronomy programs to be one of the Museum's core contributions and one of the activities that differentiates us from the other national museums. When we move into new facilities in a few years, our astronomy programs will continue to be the focus of our scientific education mandate. Clear skies!