Anglo-Australian Observatory

Annual Report

of the Anglo-Australian Telescope Board

1 July 2003 to 30 June 2004

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COVER: Filtered images of the Anglo-Australian Telescope inside the dome beside a section of the Hydra cluster of galaxies, observed on the AAT with the Infra Red Imager Spectrograph (IRIS). Photos Courtesy David Malin and Chris McCowage

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The Honourable Dr Brendan Nelson, MP,
Minister for Education, Science and Training
Government of the Commonwealth of Australia

The Right Honourable Patricia Hewitt, MP,
Secretary of State for Trade and Industry,
Government of the United Kingdom of Great Britain
and Northern Ireland

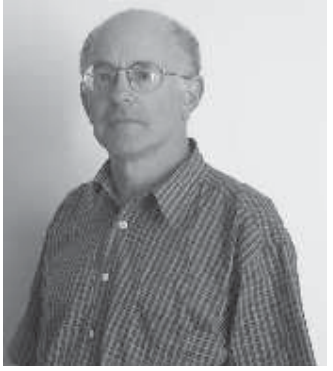
In accordance with Article 8 of the Agreement between the Australian Government and the Government of the United Kingdom to provide for the establishment and operation of an optical telescope at Siding Spring Mountain in the state of New South Wales, I present herewith a report by the Anglo-Australian Telescope Board for the year from 1 July 2003 to 30 June 2004. The report summarises the operations of the Board for the period under review and includes financial statements and statements of estimated expenditure in accordance with the provisions of the Agreement.

R D Ekers
Chair
Anglo-Australian Telescope Board

Anglo-Australian Telescope Board
30 June 2004

Appointed by the Australian Government

Chair
Prof. R D Ekers ARC Federation Fellow



Prof. K C Freeman Research School of Astronomy and Astrophysics, Australian National University

Prof. L Cram Deputy Vice-Chancellor (Research) Australian National University

Appointed by the UK Government

Deputy Chair
Prof. M Birkinshaw William P Coldrick Professor of Cosmology & Astrophysics, University of Bristol

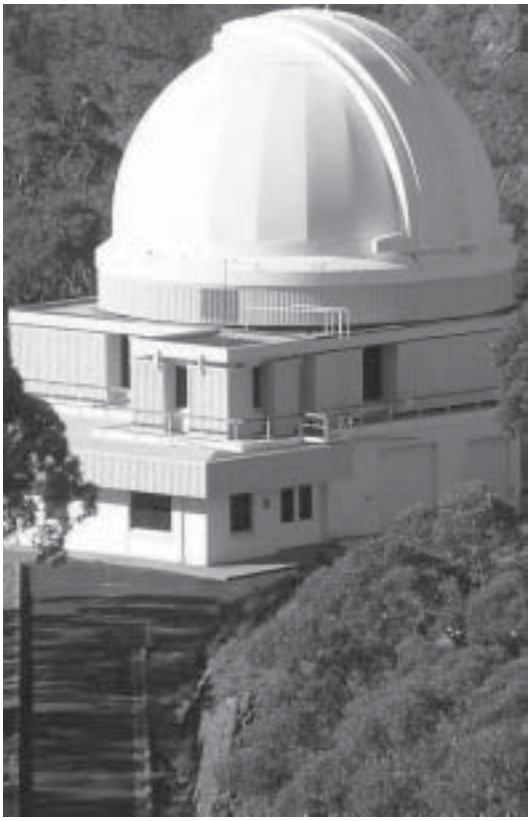
Mr. G Brooks Head of Astronomy Division, Particle Physics and Astronomy Research Council

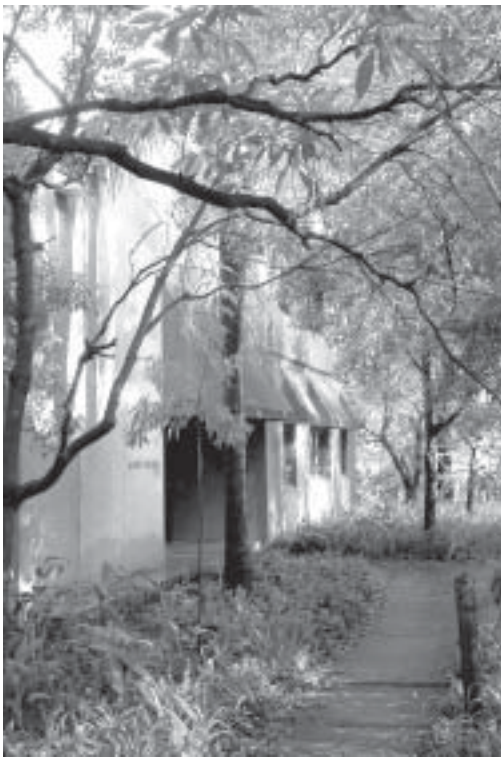
Dr. P Roche Department of Astrophysics, Oxford University

Anglo-Australian Observatory

Above: Dr Matthew Colless Director of the AAO with the Anglo-Australian Telescope in the background

Below: The UK Schmidt Telescope at Siding Spring Mountain





Above: AAO laboratory building, Epping

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1 About the Anglo-Australian Observatory

Statement of purpose

The Anglo-Australian Observatory provides world-class optical and infrared observing facilities for British and Australian astronomers to ensure the best possible science. It also takes a leading role in the formulation of long-term plans and strategies for astronomy in both countries and, through its research and development of new instrumentation, contributes to the advance of astronomy internationally.

History and governing legislation

The Anglo-Australian Telescope Board is an independent, bi-national authority funded equally by the Governments of Australia and the United Kingdom. The Board operates under the *Anglo-Australian Telescope Agreement* which came into operation in February 1971 for an initial period of 25 years. If either Government wishes to withdraw from the Agreement after this period, it must give five years' notice. So far, neither party has done so, and both have indicated their support for the AATB until at least 2010.

The Board's facilities consist of the 3.9-metre Anglo-Australian Telescope (AAT) and the 1.2-metre UK Schmidt Telescope (UKST) on Siding Spring Mountain, outside Coonabarabran, NSW, and a laboratory in the Sydney suburb of Epping. Collectively, these form the Anglo-Australian Observatory (AAO).

Above: Rob Patterson (AAO) scaling the telescope dome during the repair of the shutter mechanism. Photo courtesy Kristin Fiegert

Ministers responsible

The Minister responsible for the AAT Board in the United Kingdom is The Right Hon. Patricia Hewitt, MP, as Secretary of State for Trade and Industry. The Minister responsible in Australia is The Hon. Dr Brendan Nelson MP, Minister for Education, Science and Training.

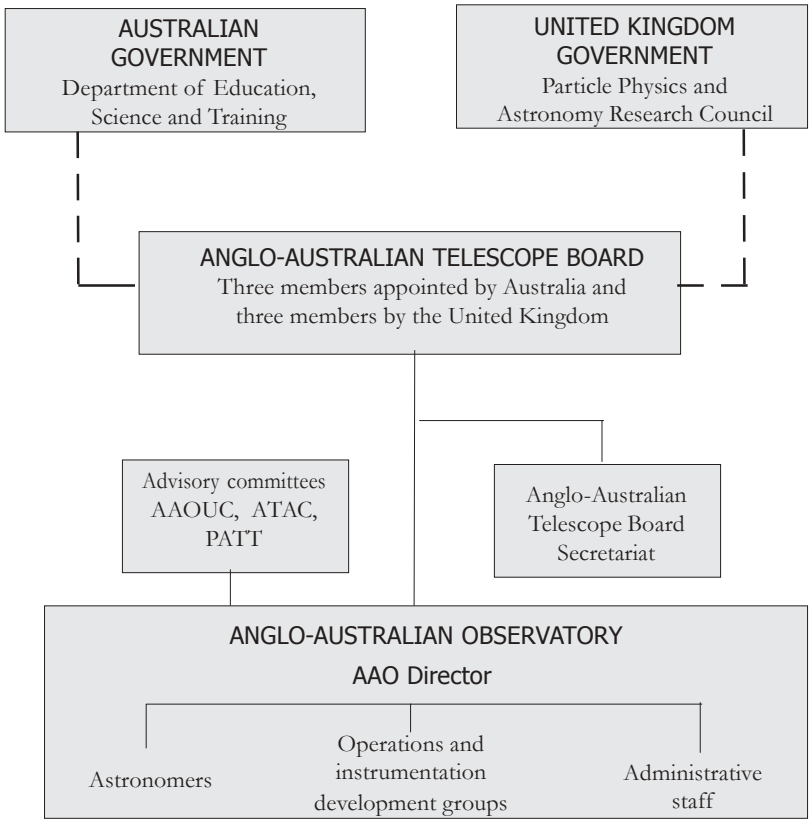
Designated agencies

Pursuant to Article 1 (2) of the Anglo-Australian Telescope Agreement, each Government acts through an agency designated for the purpose. These Designated Agencies are the Australian Department of Education, Science and Training (DEST) and the Particle Physics and Astronomy Research Council (PPARC) of the United Kingdom. These agencies are jointly responsible for implementing the Agreement.

Structure of the AAO

The AAT Board oversees the operations of the Anglo-Australian Observatory, as Figure 1.1 shows. Apart from an active research group, the Observatory has internationally recognised optical, mechanical, electronics and engineering groups as well as a specialised software group. These five groups are critical to the maintenance and the day-to-day operations of both the telescopes and to the development of state-of-the-art instrumentation. A small administration group contributes significantly to the effective operation of the Observatory.

Figure 1.1 General structure of the AAT Board and the AAO



Above: Allan Lankshear (AAO) supervising a crane operation from the top of the telesocpe dome. Photo courtesy Kristin Fiegert

Board members

The AAT Board has six members, three appointed by each country, and the role of Chair alternates between the two countries. At 30 June 2004 the members were:

Australia
Professor R D Ekers (Chair), Professor K C Freeman, Professor L Cram

United Kingdom
Professor M Birkinshaw (Deputy Chair), Dr P Roche, Mr G Brooks

Further details of Board members, special responsibilities and Board meetings are included in Appendix C.

AAO Director

The AAO Director, Dr Matthew Colless, is responsible for the successful operation of the telescopes, for providing the best possible facilities for all telescope users and for ensuring that the Observatory maintains its high standing in the international scientific community. The Director also actively pursues his own scientific research. In 2004 Dr Colless became a Fellow of the Australian Academy of Science.

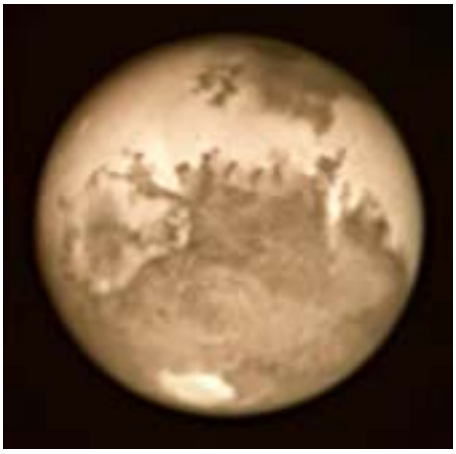
Advisory committees

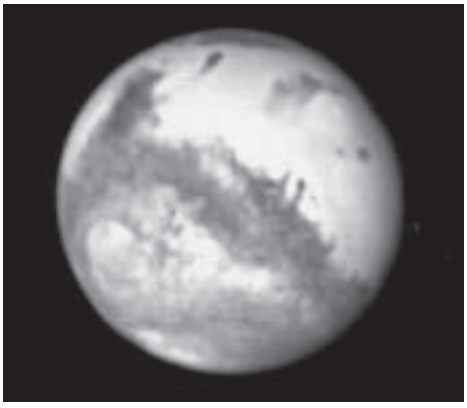
The Anglo-Australian Observatory Users' Committee (AAOUC) advises the Director on aspects of the Observatory's operation.

Observing time on the AAT is allocated by two national committees: the Australian Time Assignment Committee (ATAC) and the UK Panel for the Allocation of Telescope Time (PATT).

Details of these committees are also included in Appendix C.

2 Scientific highlights





These images of Mars were obtained using the UIST camera/spectrograph on the United Kingdom Infrared Telescope at Mauna Kea. Jeremy Bailey (AAO) is involved in a program of observations of Venus and Mars using IR spectral imaging. The observations are being used to study the structure and composition of the atmosphere and of the surface of Mars. The work is a collaboration with scientists at Macquarie University's Australian Centre for Astrobiology and NASA's Jet Propulsion Laboratory. Photos courtesy Jeremy Bailey

Introduction

Both the 3.9-m Anglo-Australian Telescope (AAT) and the 1.2-m UK Schmidt Telescope (UKST) have produced significant scientific results in the past year.

The AAT continues to carry out a very wide range of scientific programs utilising the four main instruments on the telescope: the 2dF wide-field multi-object optical spectrograph, the IRIS2 infrared imager and spectrograph, the UCLES high-resolution echelle spectrograph and the WFI wide-field optical imager. A number of visitor instruments were also used on the AAT, providing additional capabilities and broadening the scientific grasp of the telescope.

Most of the time on the UKST is given over to the 6dF Galaxy Survey, which in March 2004 made public its first major data release. This release includes spectra and redshifts for over 52,000 galaxies covering about one-third of the southern sky. Future releases are planned at yearly intervals, with the final release including over 150,000 galaxy spectra and redshifts. The survey observations are planned to finish at the end of July 2005.

There were 64 observing programs using the AAT this year, continuing the decrease in the number of programs seen in recent years. This decrease is the result of an increasing emphasis on larger, survey-style

observing programs. These programs are very productive, converting telescope time into scientific papers at a high rate, so that this year saw an all-time high in the number of papers resulting from AAT observations. The papers from the 2dF galaxy and quasar surveys have had particularly strong impact, with approximately 100 papers directly using 2dF survey data generating over 2000 citations; the 29 papers produced to June 2004 by the 2dF Galaxy Redshift Survey team have been cited over 1600 times.

As well as providing support for the Observatory, astronomical staff carry out their own research programs, with strong links to the world-wide astronomical community. In addition to AAO facilities, they make use of major international facilities such as the Hubble Space Telescope, the VLT, and other facilities of the European Southern Observatory, the Gemini North and South telescopes and the Australia Telescope Compact Array.

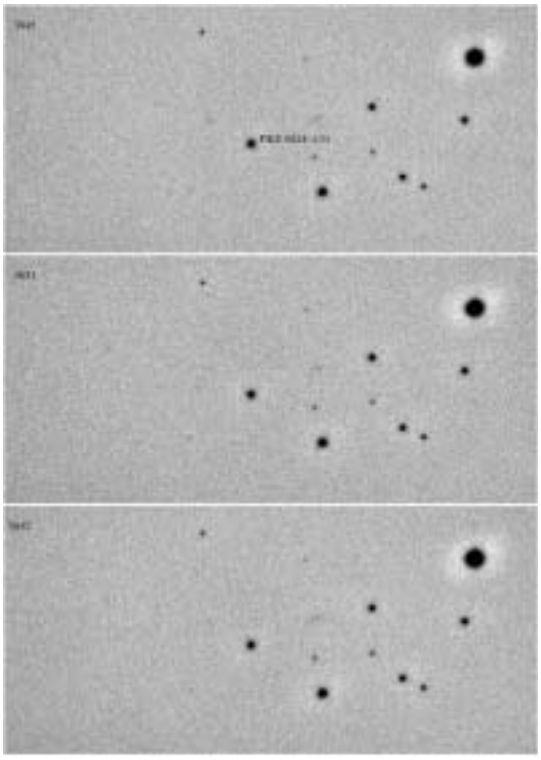
A number of scientific highlights from the past year follow, showing the significant contribution made by the AAO to a wide range of scientific questions.

Photo-destruction of galaxies by a QSO?

We know that there is a lot of neutral gas in the high redshift universe – we see it in the spectra of high redshift quasi-stellar objects (QSOs). Any moderately dense, mostly neutral gas cloud between us and a high-redshift QSO will show up as absorption lines in the QSO spectrum. We do not, however, know what these gas clouds are like. They could be the ancestors of disk galaxies today, very large and flattened in shape, or small and irregular fragments from an earlier stage of galaxy formation. Measuring the shapes and sizes of these clouds would tell us which of these models is correct. The high redshift universe is full of UV radiation from QSOs and young stars. This radiation will be absorbed by dense gas clouds, and re-emitted in the strong hydrogen emission line of Lyman-alpha. So one method of measuring the gas clouds is to search for the dim glow of Lyman-alpha. Unfortunately, this glow is very faint, and so far searches have not been successful.

How to go really deep

Paul Francis (ANU) and Joss Bland-Hawthorn (AAO) have developed a method to detect this faint emission even with a 4-m class telescope. Instead of trying to observe very high redshift galaxies (z=4) at red wavelengths, they have targeted z=2 galaxies in the UV and blue. The bluer wavelengths, and the high resolution used, dramatically reduce the sky background of the observation. They also observed near to a QSO, a region which should have about ten times greater UV radiation than the diffuse UV background, making detection more likely.

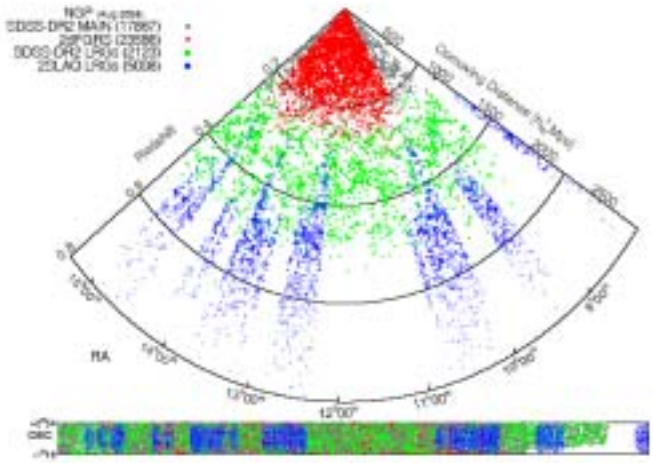


Three TTF frames of the region of sky near a QSO, at three wavelengths in the UV. Surprisingly few objects are seen, raising the possibility that the QSO has destroyed its nearest neighbours.

In December 2003, observations were made of a small region near a bright z=2.168 QSO using the Taurus Tunable Filter (TTF) on the AAT. From QSO absorption line statistics, detection of at least five clouds was expected. In fact, no clouds were detected. Not only that, but even the usual background population of Lyman-alpha emitting galaxies was missing. About ten or more galaxies should have been visible. And while it is possible to explain the lack of Lyman-alpha from gas clouds, it is much harder to understand the lack of background galaxy detections. If anything, we expect QSOs to be in regions with large populations of such galaxies.

Photo-destruction?

So what is going on? Why is the region near this QSO so different from the average at this redshift? One possible cause is photo-destruction by the extremely high UV luminosity in the region of the QSO. This UV flux can destroy nearby gas clouds and dwarf galaxies, as the energy can fully ionize the formerly neutral gas, or heat the gas so much that it escapes from the cloud or galaxy. This surprising result shows the power of this method of investigating the high-redshift universe.



New 2dF surveys

This wedge plot shows the much larger region of the universe to be sampled by the two new surveys. The 2dFGRS (near the tip of the wedge) extended to redshift~0.2. The LRGs will show up structure out to redshift~0.5, and the QSOs will extend far beyond that to redshift=3.

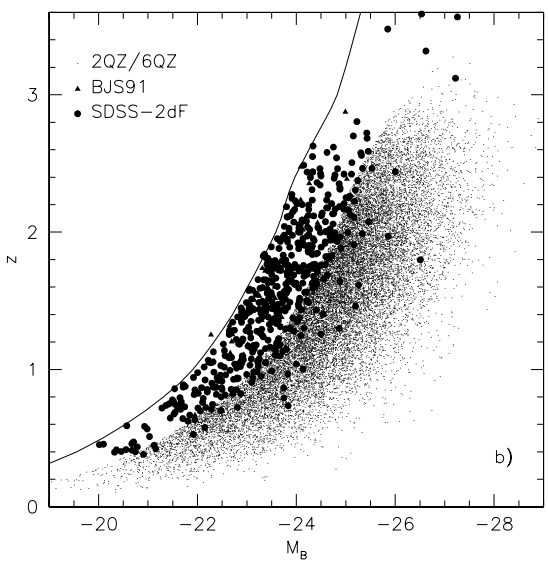
The 2dF spectrograph at the AAT is being used to carry out two new redshift surveys, as extensions to the recently completed and highly successful 2dFGRS and 2QZ surveys. One survey consists of faint Luminous Red Galaxies (LRGs). As these giant elliptical galaxies are bright enough to be observed at redshift ~0.5, it will be possible to compare the large-scale structure of the universe at that earlier epoch with what is seen 'here and now' in the 2dFGRS data. The second survey consists of faint quasars (QSOs), to study QSOs which are less luminous than the ones included in the 2QZ survey. Both new surveys depend on Sloan Digital Sky Survey (SDSS) multi–band photometry to select their relatively rare targets. As with the earlier surveys, the two new surveys cover two narrow strips in the sky. Since up to 400 objects can be observed at once using 2dF, it is most efficient to combine the two surveys, observing ~ 200 LRGs and ~200 QSOs every 4 hours. The two surveys together have been dubbed the 2SLAQ (2dF-Sloan LRG and Quasar) project.

2SLAQ on track

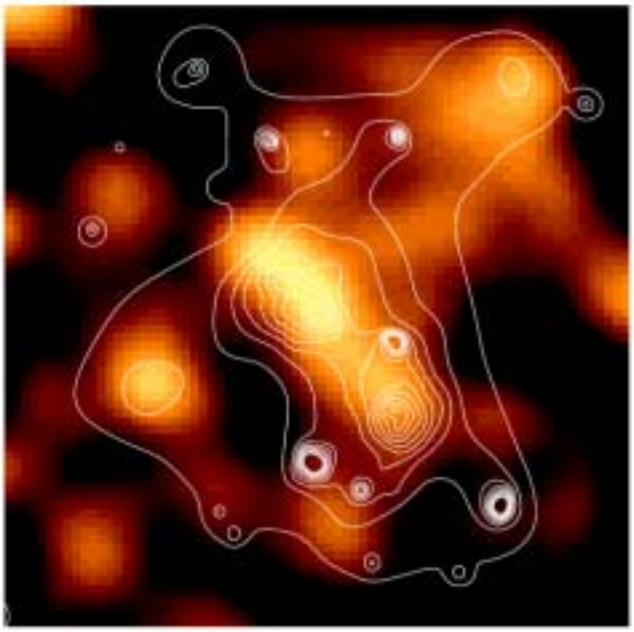
The objective of 2SLAQ is to obtain redshifts for at least 10,000 galaxies with $0.45 < z < 0.7$, and 10,000 faint QSOs which are likely to span $0 < z < 3$. The surveys are expected to run for three years. The surveys are being carried out by a consortium of AAO, Australian, British and American astronomers and are supported by both PATT and ATAC. 41 nights were allocated to the project between March 2003 and April 2004. The 2SLAQ surveys were approximately half–complete by mid-2004 and are on track for meeting their goals. The cosmological analysis of the data is beginning, now that a substantial fraction of the sample has been observed.

Looking further into the past

The first galaxy survey, 2dFGRS, showed that galaxies in our local universe cluster together, and that the material and energy that we can detect is only a small proportion of the material and energy in the universe. This second galaxy survey will investigate whether galaxies cluster in the same way at larger redshifts, which correspond to early epochs. In addition, astronomers will investigate how the brightness and colour of these early-type galaxies evolve with redshift. By surveying fainter QSOs, clustering of these massive black-hole-powered galaxies can be measured at much larger redshifts. At present, the spread in brightness of QSOs at one particular redshift is limited by the sample, so by going fainter, this survey will obtain a more accurate spread in intrinsic brightness, and the evolution of QSO brightness can be studied for redshifts between one and three. When galaxies and galaxy clusters fall in the line of sight of more distant QSOs, we see distorted or even multiple images of a single QSO. This is known as gravitational lensing, and through the QSO survey astronomers hope to detect more of these systems. The teams hope to further extend both surveys once AAOmega is built. Surveys will be able to go even fainter, and to make use of the greater efficiency to cover larger regions of the sky.



This diagram shows QSO luminosity (brighter to the right, fainter to the left) against redshift (increasing distance). The many small spots are the members of the 2QZ survey, with a sharp cutoff caused by the sensitivity limit of the survey. The larger spots indicate how the new SDSS-2dF QSO survey will provide a view of fainter QSOs.



A massive high redshift cluster of galaxies in the process of formation

Overlaid images in infrared (greyscale) and X-ray light (contours) of a massive, high redshift cluster of galaxies. The infrared K-band light has been smoothed.

Clusters of galaxies are the most massive gravitationally-bound objects in the universe. By modern theories of the evolution of the universe, this makes galaxy clusters the most recent objects to have formed, as it is thought that clusters are formed through the aggregation of smaller sub-clusters. We therefore expect that there will be fewer massive clusters in the earlier universe, at higher redshift.

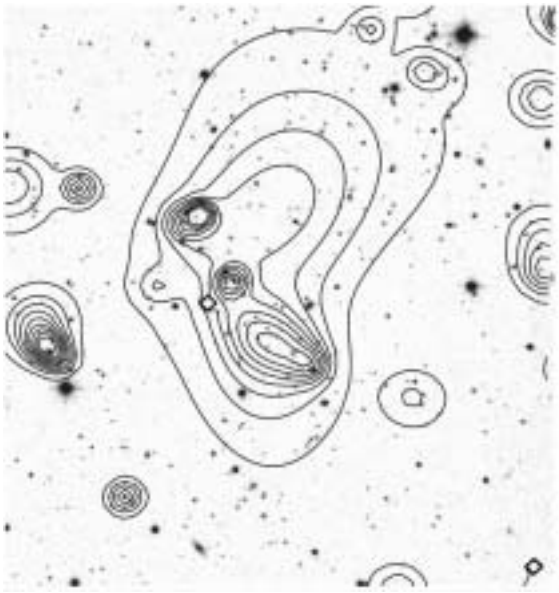
A very massive, high-redshift cluster was independently discovered in three X-ray surveys. At z=0.83, the cluster appears to be in the process of formation, and provides a very interesting opportunity to study this process. Observations have shown that the cluster is resolved into two major sub-clumps, each of which is very massive, and which appear to be in the process of merging.

Building along filaments

Simon Ellis (AAO), Laurence Jones and Ben Maughan (Birmingham), Keith Mason (Mullard, UCL), France Cordova (California) and William Priedhorsky (Los Alamos) have investigated the high-redshift galaxy cluster in X-rays and the infrared. The X-ray observations, taken using the XMM-Newton satellite, cover a wider field of view and have greater spectral sensitivity than the discovery observations. They show an

extended filament of X-ray-emitting gas running to the north-west of the cluster. This gas is much cooler than the main subclumps, which supports the idea that this cluster is still forming. It also suggests that cluster assembly forms along filaments, which has been predicted by complex computer models of galaxy formation.

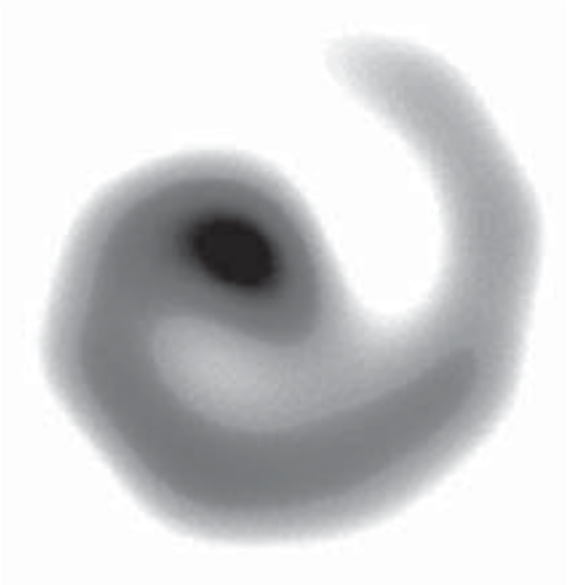
The Big Picture, from IRIS2



The K-band image of a distant galaxy cluster in the process of formation. The contours show the distribution of galaxy density, indicating that the outlying filaments and clumps are part of the system.

To test whether the X-ray structure, and in particular the filament, is also present in the galaxy distribution, the cluster was observed in the infrared K-band with IRIS2 on the AAT. This band is sensitive to the distribution of old stars, the bulk of the mass in early-type galaxies. The distribution of galaxies showed a very similar distribution to the X-ray-emitting gas. The two main subclumps are present, as is the new filament. More features are seen, including a group of galaxies to the east which are now recognized to be more members of the cluster. A comparison of K-band light with X-ray emission shows that the filament contains a group of galaxies, just as expected from the computer models. Also, the cluster lies at the junction of two major filaments of galaxies and X-ray gas, suggesting that cluster formation really does occur along filamentary structures.

This ancient galaxy cluster provides an interesting opportunity to study how the properties of galaxies change during the process of cluster formation. Properties such as the rate of star formation, galaxy shape and colour could be studied as a function of the galaxy's position along the filaments.



What was Supernova 2001ig?

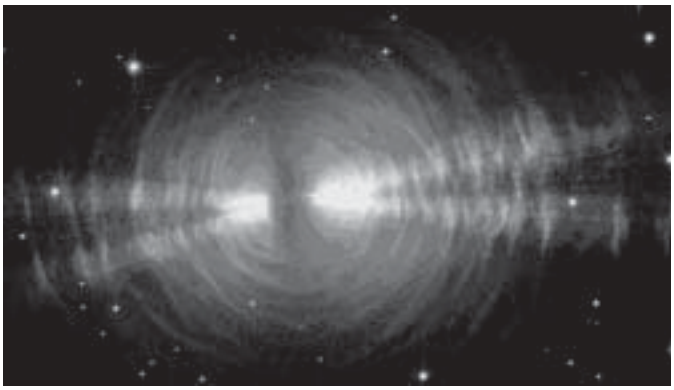
The unusual supernova (SN) 2001ig was discovered by Australian amateur supernova hunter Robert Evans in the nearby galaxy NGC 7424. Early observations at ESO suggested that the SN was a Type IIb. This rare type of supernova has unusually weak hydrogen lines, and usually the hydrogen lines fade after a few weeks to result in a Ib or Ic supernova spectrum. The best-studied IIb SN is SN 1993J, and SN 1979C is a well-studied Ib SN. SN Type II, IIb and Ib supernovae are all believed to be the core-collapse and explosion of massive stars. However, it is still unclear what differences in star properties and environment result in the different types of supernovae.

The Pinwheel Nebula WR 104. The cause of the spiral shape is believed to be the interaction of two massive stars. Unusual radio variations from Supernova 2001ig suggest that it may have occurred in a similar system. (Credit: Tuthill, Monier & Danchi, 1999, Nature, 398, 487.

SN 2001ig was detected at the Australia Telescope Compact Array in December 2001, five days after discovery. Since then, Stuart Ryder (AAO), together with Elaine Sadler (Sydney), Ravi Subrahmanyan (ATNF), Kurt Weiler and Christopher Stockdale (NRL) and Nino Panagia (STScI) have mounted a radio monitoring campaign at the Australia Telescope Compact Array covering a range of frequencies. Nine months after discovery optical observations taken by Raylee Stathakis (AAO) with the RGO spectrograph at the AAT showed that SN 2001ig had transformed to a Ib SN. The spectrum has a complex emission line structure similar to SN 1993J which is now known to have been in a massive binary system, like the Pinwheel Nebula at left.

Running off the rails

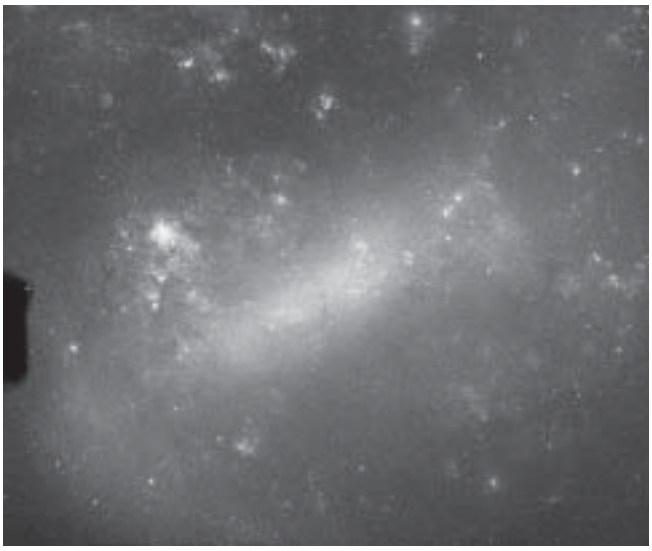
Instead of rising smoothly, peaking and decreasing smoothly as expected, the radio light curve of SN 2001ig shows a bumpy decrease since day 30. The radio emission is released when the expanding SN shock wave runs into the surrounding gas and dust. Radio light curves models fit well for a smooth environment up to day 30, but indicate a clumpy environment after that time. Model parameters from a fit to the light curve show more similarity to Ib/c SNe than IIb SN 1993J, and Type Ib SN 1979C also had a bumpy radio curve.



The Egg Nebula, believed to be the result of a star periodically throwing off sections of its outer envelope. This is another possible environment for SN 2001ig. (Credit: NASA and the Hubble Heritage Team (STScI/AURA), HST ACS, STScI-PRC03-09)

Single star or binary?

One possibility is that, before it exploded, the star shot off its red supergiant envelope in a series of mass loss episodes. The bumps in the light curve are fairly regular, about every 150 days, which would mean that the material was shot off every 40 years. This suggests that the star was at the lower end of the mass range of stars which form supernovae. Another possibility also suggested for Ib SN 1979C is that the star was high mass, and part of a binary system with another massive star. Gas is streamed into a pinwheel shape around the system, forming a spiral gas outflow. Such an outflow would be consistent with the radio curve of SN 2001ig if viewed edge-on, peaking each time the expanding shock wave hit each arm of the pinwheel.



A new population of LMC planetary nebulae

Above: The Large Magellanic Cloud, at 50 Kpc distance, is one of our nearest neighbours. A huge new population of PNe has been discovered in this galaxy.

Stacked for maximum sensitivity

The Large Magellanic Cloud (LMC) is a neighbouring galaxy, best observed from the southern sky. Quentin Parker (Macquarie/AAO) and PhD student Warren Reid (Macquarie University) have combined data from 12 independent observations of the LMC, taken in H-alpha, a bright emission line of hydrogen. These multiple exposures of the same field were made as a special add-on to the UKST H-alpha survey, completed last year, which used a monolithic, high quality H-alpha filter – the world's largest interference filter used in astronomy. The 12 best 2-hour H-alpha LMC films were scanned by SuperCOSMOS and converted to digital images. They were carefully aligned and combined to obtain maximum sensitivity – at least 2.5 x as sensitive as previous surveys. An added advantage is that small imperfections caused by plate flaws and processing are eliminated during combination. An adaptation of a technique developed for radio astronomy at ATNF is used to pick out objects with strong emission lines, such as planetary nebulae (PNe) and compact emission sources.

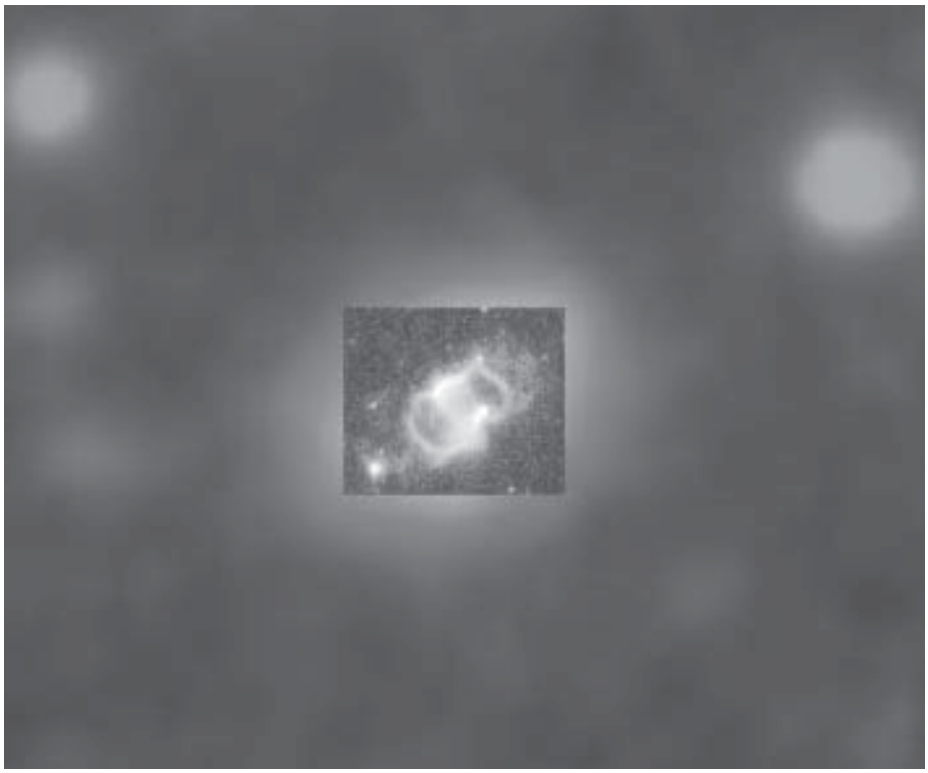
1000 new planetary nebulae?

In total, ~ 100 sources per square degree have been identified as possible PNe in the LMC. A planetary nebula is the end product of a low to moderate mass star, which expels its outer gas envelope to form a gaseous nebula around the star. Eventually the remaining star becomes a white dwarf. A spectrum of each object is required

to confirm this identification. 2dF on the AAT has been used to observe 262 of the preliminary candidates, and, of the 188 detected emission line objects, 130 are confirmed PNe. The rate of detection triples on the main bar of the galaxy, suggesting that there may be more than 1000 new LMC PNe, tripling the previous known sample collected over the previous 50 years. More AAT observations are scheduled for December 2004.

New understanding

One advantage of studying objects in the LMC is that there is not much intervening dust, and all LMC objects are at the same distance of 50 kpc. This means that there is a large population of PNe with known distance, so the real range in luminosity can be calculated. It will allow astronomers to better understand the evolutionary types of planetary nebulae in the LMC, and to probe the structure and origin of the LMC itself.



Right: A Hubble Space Telescope Broad Band image of LMC PN SMP93 placed to scale over the UKST stacked H alpha and SR merged image. The UKST image reveals the extended AGB halo while the HST image shows the details of the inner PN and its shell structure. HST insert courtesy Letizia Stanghellini and Robert Shaw

3 The year in review

Above: Interest in the 2dF exhibit at the Anglo-Australian Telescope's Open day held in May 2004. Left to Right: Shaun James (AAO) Prof. Penny Sackett (RSAA), Mrs Julie Shinton, Cllr Peter Shinton (Mayor of Coonabarabran), and Dr Fred Watson. Photo courtesy Chris McCowage

Operational environment

Astronomy excites the imagination of scientist and lay-person alike and it provides an important framework for many of the major ideas that underpin our society. The long-term nature of the scientific questions being investigated demands exceptional intellectual and scientific skills and sophisticated equipment. To be effective, astronomical research requires stable, long–term funding.

The British and Australian Governments demonstrated a substantial commitment to astronomical research by establishing the Anglo-Australian Telescope Board, which has operated the Anglo-Australian Observatory for thirty years.

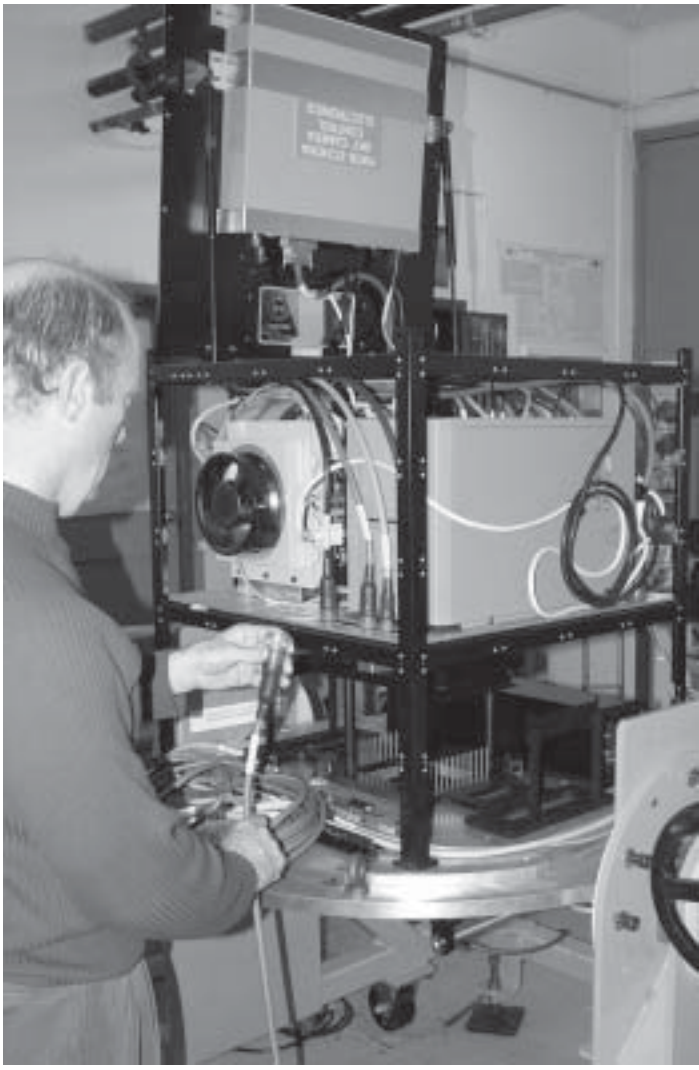
Above: Public interest in the AAO's Echidna exhibit at the Society of Photo-Optical Instrumentation Engineers (SPIE) Conference in Glasgow in June 2004. Photo courtesy Keith Shortridge

The Observatory provides world-class optical astronomy facilities for scientists from both countries. The telescopes of the AAO have been responsible for many fundamental discoveries and continue to provide a large portion of the data used by astronomers in Australia and the UK. The results of the observing programs carried out using these facilities are published in the scientific and technical media for the benefit of other scientists and the academic community. They are also widely publicised in more accessible places for the general public.

The intellectual challenge of astronomical research attracts some of the finest scientific minds. Astronomy is both international and highly competitive. The AAO maintains strong links with other scientific organisations on astronomical and technical matters, particularly in the development of new instrumentation, and therefore plays a major role in the international astronomical community. AAO staff collaborate on a range of scientific research programs with other astronomers around the world. Through its strong links with the universities in both Australia and the United Kingdom, the Observatory also plays an active role in higher education.

The AAT is the largest optical telescope in Australia and remains one of the world's most scientifically productive telescopes. The UKST is the most productive survey telescope in operation anywhere. Both telescopes were state-of-the-art when observing commenced in the early 1970s. Thirty years later, as a consequence of the vision of their designers, a long period of stable funding and a continuing program of enhancements, the telescopes of the AAO remain at the leading edge of astronomical research, against considerable international competition. The Observatory's expert scientific and engineering staff have constantly upgraded the telescopes by incorporating the latest technological developments into instrument design. Staff are considered world leaders in many areas of astronomical instrumentation and are often asked to provide advice to other organisations and build instruments for their telescopes.

The new generation of telescopes with mirrors 8 metres or more in diameter are now achieving maturity and producing a steady stream of high-quality results. The AAO has demonstrated that a 4-metre class telescope such as the AAT can be scientifically competitive with the large 8-metre telescopes if it has leading-edge instrumentation and concentrates on strengths relative to the larger telescopes. For example, the wide field of view and large multi-object capability of the 2dF spectrograph make it one of the world's most effective survey spectroscopy facilities. Similarly, the IRIS2 infrared imager and spectrograph has a wide-field of view and was one of the first infrared instruments to achieve multi-object spectroscopy. The 6dF facility on the smaller UK Schmidt Telescope provides an extreme wide-field spectroscopy capability that is unique in the world and enables all-sky survey programs. These powerful facilities ensure that the AAO telescopes will continue to carry out high-impact scientific programs for years to come.



Right: AAO Senior Electronics Technician Ed Penny terminates another cable in the electronics enclosure. Visible in the electronics enclosure are the cooling unit (left) & the Echidna Control Computer (right). The FPI is barely visible on the underside of the base plate.

Dr Matthew Colless pictured with the Anglo-Australian Telescope, took up the position of Director of the Anglo-Australian Observatory in January 2004. Photo courtesy Jonathan Pogson

Strategic directions

The AAO is not exclusively responsible for the scientific results that arise from use of its facilities: external users do most of the research. The AAO nevertheless makes a significant contribution to the quality of the results in the following ways:

- First, by running the telescopes efficiently and providing good support during observing runs, the likelihood of good results is maximised.
- Second, by ensuring that the best mix of instrument and software development is undertaken, the Board, the AAO Users' Committee and AAO staff contribute very positively to the kind of science possible with AAO facilities.
- Third, by recruiting first-class research astronomers to support visiting astronomers and encouraging and supporting the AAO astronomers in their own research, the Observatory creates a climate which facilitates the best possible scientific output from all astronomers using the AAO's telescopes.

The AAO is committed to achieving results in five key areas, with the principal aim of obtaining the best possible science for its user communities.

These five key result areas are:

- Telescope operations
- Research
- Instrumentation
- Use of AAO resources
- External communications

The range of strategies adopted to achieve the AAO's objectives fall into two main groups. The first group involves staying in touch with developments in astronomy, instrumentation, telescope operations and management; listening to, and anticipating, the needs of the astronomy community; and publishing and publicising the research and other outcomes achieved. The second group encompasses technical, professional and administrative excellence and an ethos of continuous improvement.

Key result area (1) Telescope operations

Key outcome

Satisfied users and good data

Strategies

An important strategy is to listen carefully to the astronomy community, especially the users of the AAO's telescopes, to assess and anticipate their needs. Several avenues are available for this. The time assignment panels, the AAO Users' Committee and the Board all have a strong influence on the strategic directions of the AAO and are representative of the astronomy community. AAO astronomers and other staff are encouraged to observe at or visit major telescopes overseas and to provide feedback on world best practice. Informal networks and attendance at conferences, seminars and colloquia are also important ways of staying in touch.

A second strategy is to ensure that users' needs are met. This is achieved by maintaining and consolidating existing instrumentation and associated software; by developing first-rate new instrumentation; by providing good support in setting up the instruments, operating the telescope and with observing; and by soliciting users' comments.

The third strategy for achieving satisfied users is to seek ever greater efficiency in running the telescopes.

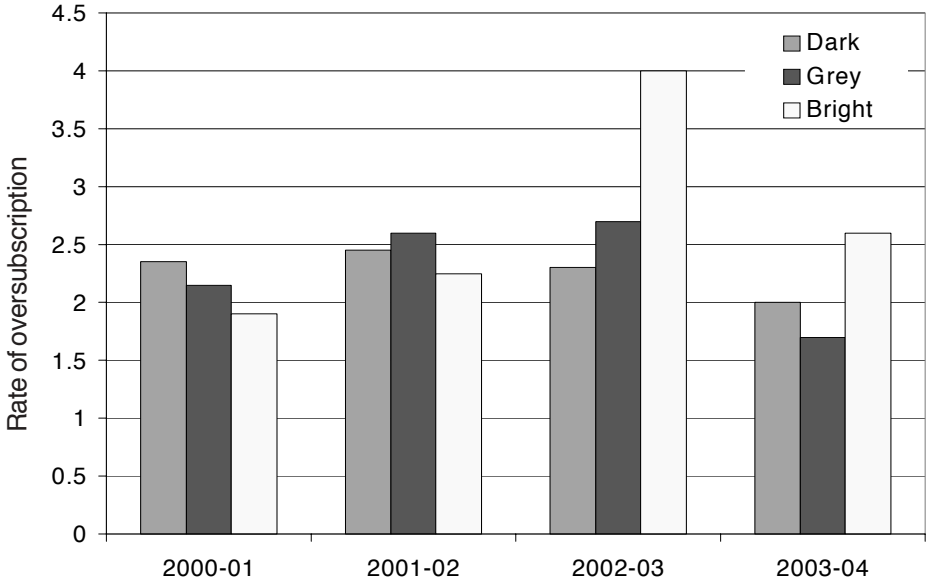
AAT organisational statistics

The high standard of the AAO's facilities and new developments in its instrumentation ensure that observing time on the AAT is always over-subscribed. Figure 3.1 shows the oversubscription rates for the AAT over the past four years, sorted by moon phase. In 2003–04 the over-subscription rates were similar to previous years. The bright-time over-subscription rate has now returned to average levels after the peak in 2002–03 due to the commissioning of IRIS2. Grey time oversubscription has dropped due to the decommissioning in 2003–04 of several instruments which are traditionally assigned during grey time. This has increasingly enabled the scheduling of bright time instruments like IRIS2 and UCLES in grey time, which effectively evens out the over-subscription rates. AAT users belong to a wide range of institutions from Australia, the U.K., U.S.A., and many other countries.

AAT performance indicators

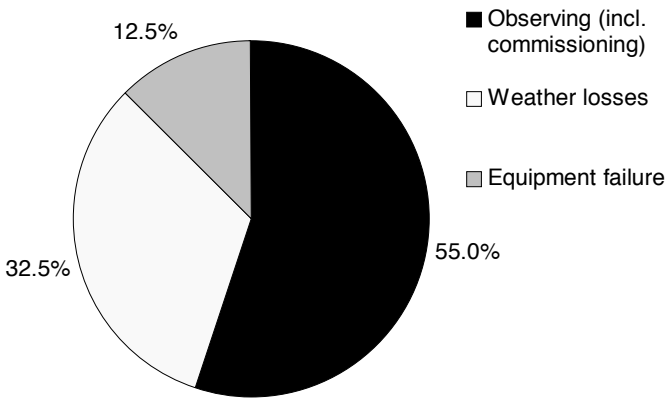
The use of observing time for the period 1 July 2003 – 30 June 2004 is shown in Figure 3.2. This year there were 3235 night hours available. In addition, a further 42 hours of commissioning time were used. The continuation of good weather during this period is still evident in Figure 3.3, which compares the use of observing time for the past four years.

Figure 3.1 Oversubscription rates for the AAT



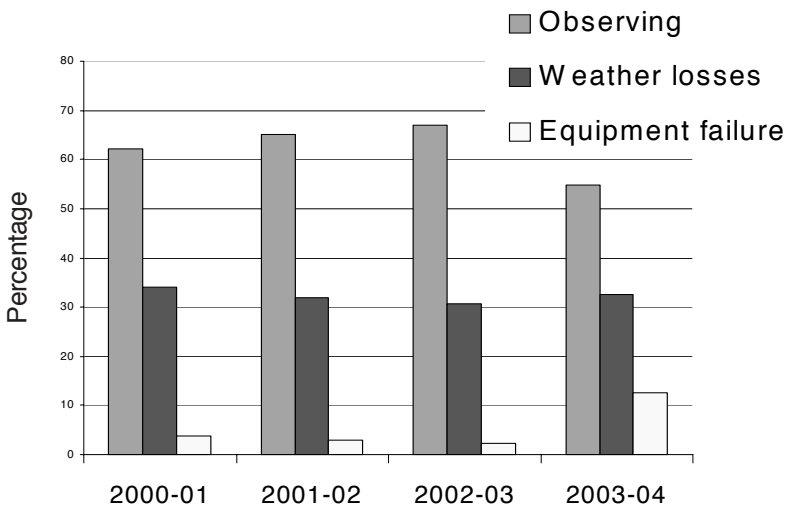
One measure of the extent to which users are likely to be satisfied with the levels of service provided at the AAT is the amount of available observing time lost through AAT equipment failure. 2003–04 saw the first major failure of the AAT in its thirty-year history. A main driveshaft for the dome shutter snapped. Heavy machining was required to fix the equipment which powers the 17-tonne sliding shutter. A country-NSW firm normally catering to the mining industry was able to carry out the machining and work was carried out at the

Figure 3.2 The use of observing time at the AAT in 2003–04



highest speed consistent with safety. The downtime was used as an opportunity to carry out upgrades that could not be done when the telescope is in operation, including improvements to the computer systems and the control room. In total, the telescope was out of commission for 40 nights, resulting in 12.5% loss of time lost to equipment failures, well above the corporate goal of three percent, but remarkably small given the seriousness of the dome shutter failure.

Figure 3.3 The use of observing time at the AAT over the last four years



User feedback

All AAT and UKST observers are encouraged to complete the WWW-based feedback form, which asks how well the AAO has fulfilled its obligations under its Client Service Charter. The responses cover key areas of observing support, instrumentation, technical manuals, administration and web pages. They are ranked in five steps ranging from well below (1) to well above (5) acceptable. Users are also asked to flag key items and to comment on any issues of concern.

During the period 1 July 2003 to 30 June 2004, 52% of users completed feedback forms for the AAT. This response rate is lower than last year's (59%), mostly because of the extended down period caused by the dome shutter failure. Nevertheless, it remains slightly higher than the long-term average. Users are actively encouraged to submit feedback forms at the end of their observing runs.

The average scores over the year are shown in Table 3.1, together with those for the previous two years. The statistical error on these mean grades is ~0.2. They show that the level of user satisfaction is generally high, and fairly consistent over the three years.

The AAO Corporate Plan sets a goal of a score of at least 3.5 in all categories. All performance areas have met that target in 2003–04 with the exception of general computing. This was addressed in June 03 by the appointment of a new IT Manager to oversee the Systems Groups at Epping and Siding Spring. It is expected that the strategic initiatives taken as a result will take some time to make themselves felt in average feedback scores. Many of the feedback reports contain suggestions for improvements, most of which have been acted upon. Usually, they involve small, instrument-specific changes to improve ease of observing. All comments, both positive and negative, are followed up through appropriate management channels and acknowledged.

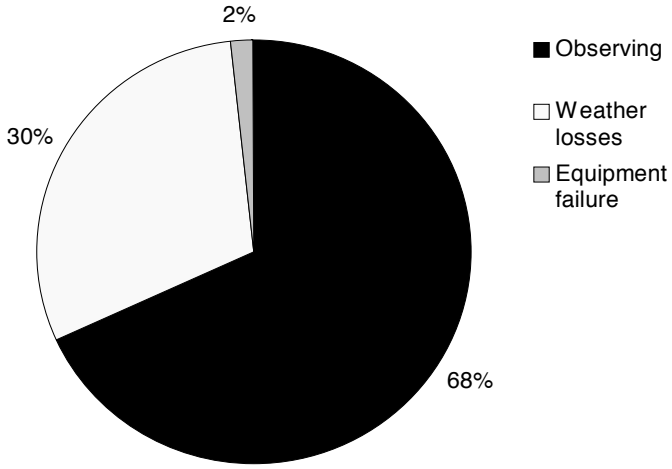
Table 3.1 User feedback at the AAT

Average rank (maximum 5)	2001–02	2002–03	2003–04
Night assistant support	4.8	4.7	4.7
Staff astronomer support before observing	4.6	4.5	4.3
Staff astronomer support during observing	4.7	4.6	4.5
Other technical support	4.6	4.3	4.1
Instrumentation and related software	4.0	3.8	3.7
General computing	3.7	3.7	3.4
Working environment	4.1	3.8	3.9
Travel and admin support	4.2	4.4	4.1
Data reduction software	4.1	4.2	3.9
Instrument manuals	4.0	3.8	3.9
Library facilities	4.1	3.9	3.7
AAO Web pages	4.0	3.9	4.0

UKST Organisational Statistics and Performance Indicators

Statistics for the use of the UKST during Semesters 03B and 04A are presented in figures 3.4 and 3.5 together with statistics for the previous years.

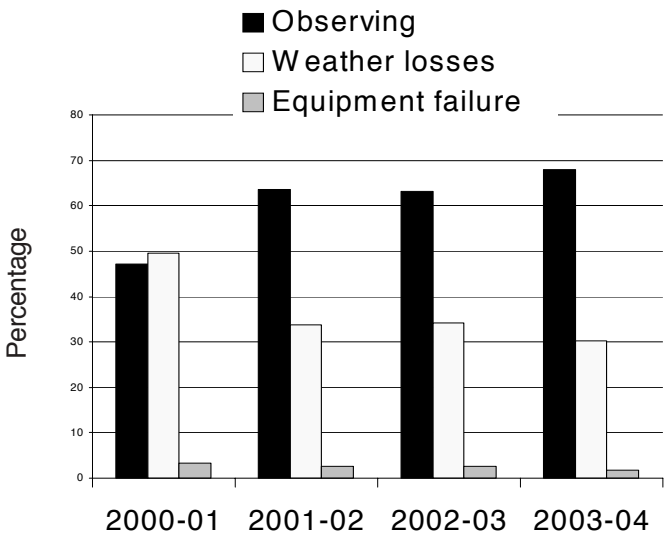
Figure 3.4 The use of observing time at the UKST in 2003–04



The year 2003–04 has seen exceptionally good weather conditions at Siding Spring. The April/May lunation was the best on record at the Schmidt Telescope, with 86.1% of time used. Down time due to system failure has also been extremely low, with 6dF attaining a very stable operating mode.

Although the Schmidt Telescope's photographic program has ended, one photographic exposure was made during the year to fulfil an award of photographic non-survey time. Two further similar exposures remain outstanding.

Figure 3.5 The use of observing time at the UKST



Since the beginning of 2003, essentially all observing time has been used for the 6dF program. The following table summarises the data obtained with 6dF during the period 2003–04, together with the two previous years in which 6dF was operating.

Table 3.2 6dF observations

	6dFGS Fields	RAVE Fields	Non-survey Fields	Total Fields	Total exp. (hours)
2001-02	261		124	385	713.6
2002-03	351	47	162	560	1078.6
2003-04	349	305	114	768	1116.6

The 6dF Galaxy Survey (6dFGS) is progressing satisfactorily, and is now well past the half-way stage. The early data release of December 2002 was followed by the first full public release in March 2004. Non-survey programs were also undertaken for the following Principal Investigators: Bessell (ANU), Drew (Imperial College), Gaensicke (University of Warwick), Parker (Macquarie/AAO), Peyaud (Macquarie) and Vaughan (Macquarie). The fraction of scheduled observing time devoted to the 6dFGS is approximately 75%, the target recommended by the TACs.

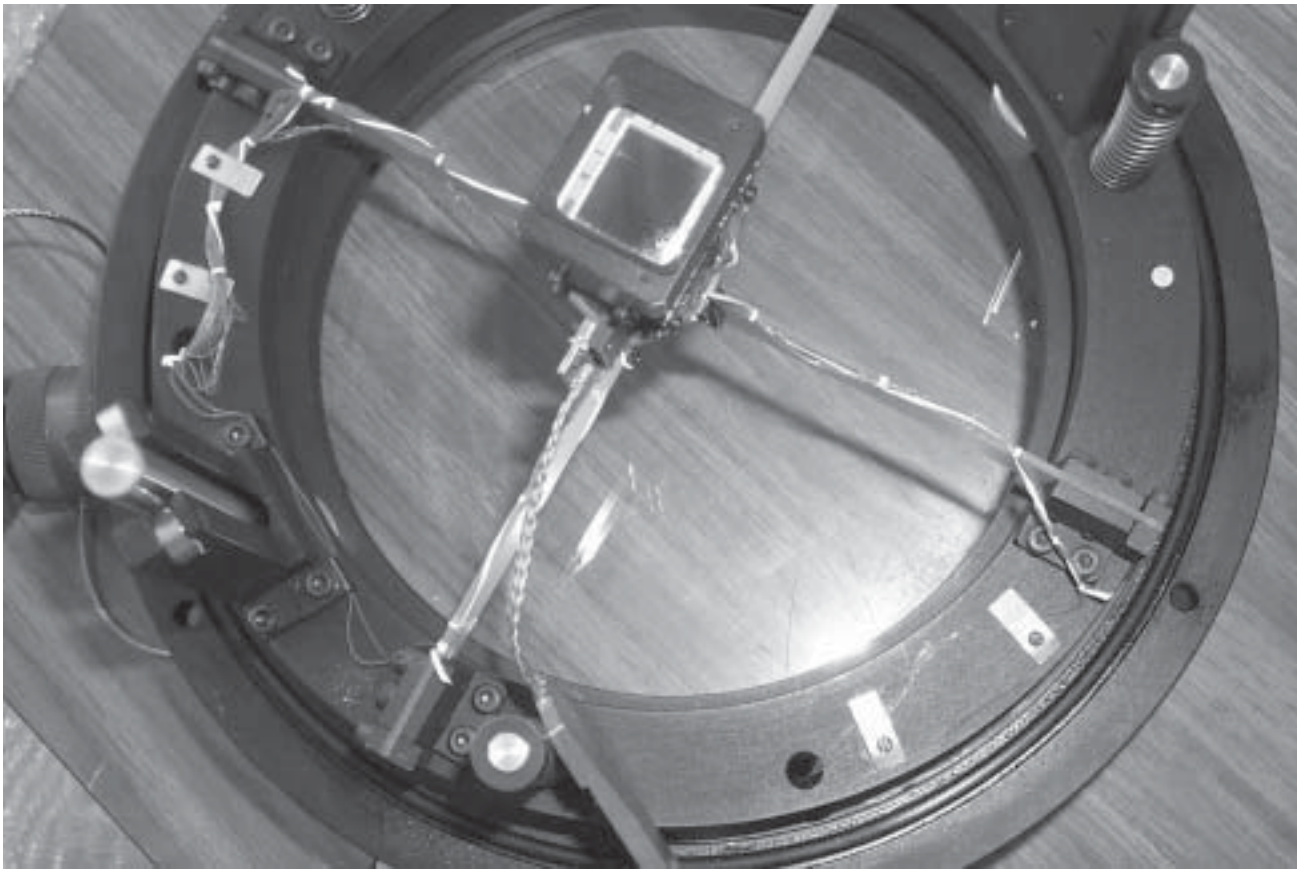
Since 11 April 2002, seven unscheduled Bright-of-Moon nights per month have been allocated to the international RAVE survey (RAdial Velocity Experiment), which is progressing well. By 30 June 2004, over 40,000 spectra had been obtained.

All performance targets for 6dF were met although a slow attrition of science fibres continues. The scheduled program of fibre repairs (which involves removing each of the two field plates in turn from service for short periods) has

been very successful with a relatively small loss of efficiency being experienced during single-plate operations.

6dF continues to be offered with 425R, 580B, 1201B, 1516R and 1700I VPH gratings. A long-standing problem with oil contamination inside the spectrograph camera was essentially cured during the year by dismantling and decontamination together with a new viscous-flow pumping regime using a dry vacuum pump.

The program to incorporate the Comsoft PC-TCS (telescope control system) into the Schmidt telescope was formally abandoned during the year, and no further in-house work on a new TCS will take place unless a Ukidna multi-fibre positioner is built and implemented.



Above: Focal plane assembly of the 6dF spectrograph camera showing oil contamination on the field-flattening lens. Darren Stafford, who took this photo, decontaminated the assembly

Key result area (2) Research

Key outcome

Good science

Strategies

Most research using data from AAO telescopes is undertaken by external users. The time assignment committees, which are peer review panels independent of the AAO, are the most important factor in the achievement of the desired research outcome: their strategy is to ensure that only projects likely to result in good science are awarded time.

The AAO also has an effect on the achievement of this outcome. The first AAO strategy for achieving good science mirrors the first strategy for telescope operations: it is for the research astronomers to keep thoroughly in touch with developments in the astronomy community.

A second strategy is to publish research results and to publicise more broadly the work and achievements of the Observatory. Research astronomers spend about half of their time on research, are encouraged to publish, and have the financial costs of publication met by the Observatory.

Finally, the AAO seeks to keep its research outcomes at the forefront by inviting distinguished visiting scientists to work at the Observatory for extended periods.

Research and organisational statistics

There were 12 research astronomers on the staff of the AAO at 30 June 2004. Four of them, while spending about half of their time on Observatory duties such as supporting visiting astronomers, spend the rest of their time on research. The other eight are research astronomers but have significant responsibilities not directly related to their own research. These include the Director, the Astronomer-in-Charge and a shared position with Macquarie University. The full-time equivalent research effort is about 4 people. In addition, there are three emeritus astronomers.

The total number of AAT observing programs for the past five years is shown in Figure 3.6. The decreasing number over the period reflects the promotion of survey-style and longer-term programs at the AAT. Figure 3.7 shows the distribution of AAT observing programs by location of the Principal Investigator (P.I.). In Figure 3.8, the number of nights allocated at the AAT is distributed by the location of all the investigators in proportion. In both figures we see that users from the U.K. continue to make active use of the telescope, although they lead the program less frequently. This may reflect the increasing use of the AAT for surveys, which are run by large consortia of astronomers. This also

Figure 3.6 Total number of scheduled AAT observing programs

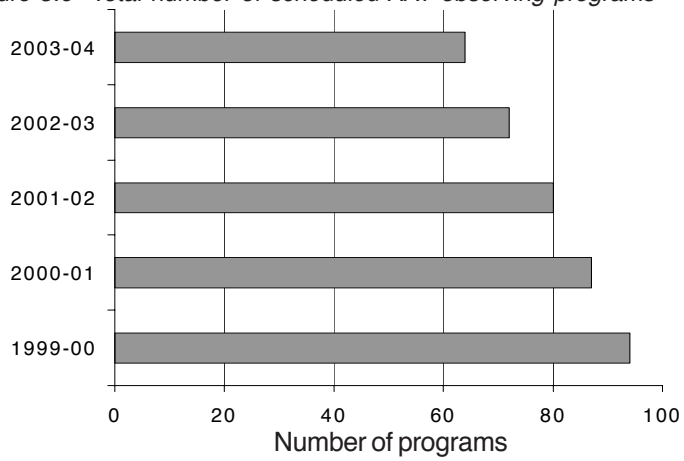


Figure 3.7 Number of scheduled AAT observing programs by location of Principal Investigator

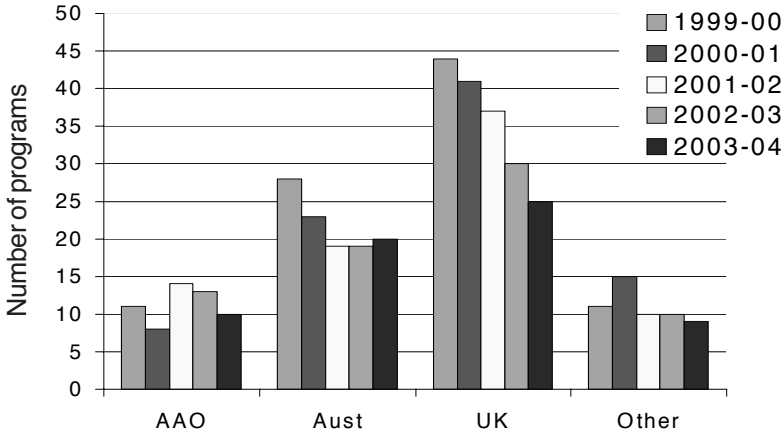
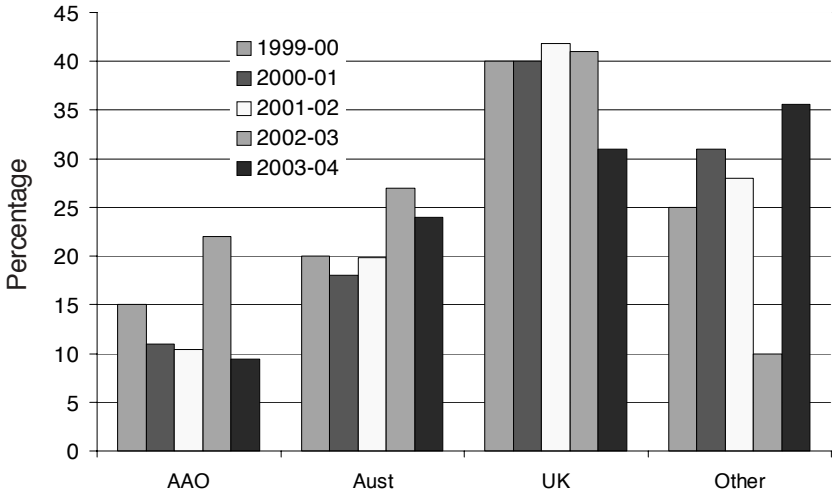


Figure 3.8 Percentage use of the AAT by location of all investigators



explains the large jump in percentage use by investigators from other countries, now the user group with the largest effective share of AAT time, despite the low numbers of programs with P.I.s from this group.

Figure 3.9 shows the total numbers of research papers published in refereed journals and conference proceedings using data from the AAT and the UKST. Also shown are the total number of AAO papers, published by AAO staff, students and visitors. In total, 112 AAT data papers, 30 UKST data papers and 75 AAO papers were published. AAT publications reached an all-time high this year. The results from the 2dF redshift surveys are largely responsible for this, with a shift this year to a stream of secondary investigations based on the

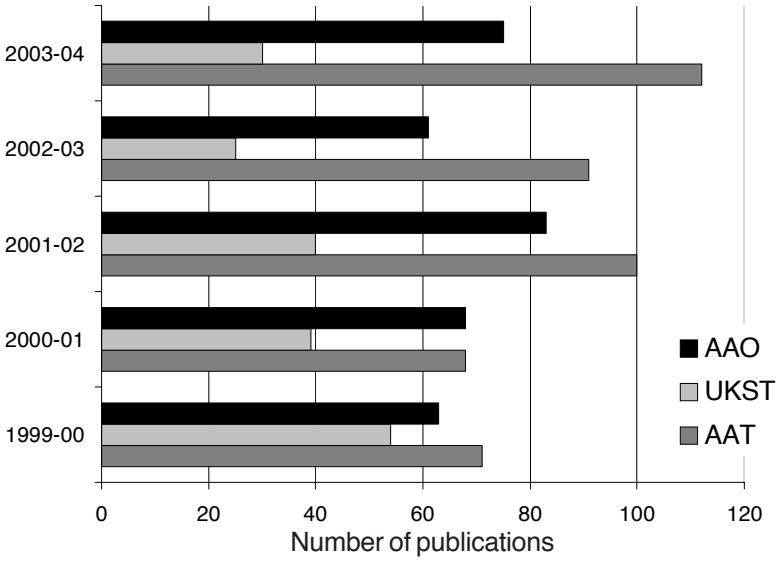


Figure 3.9 Total number of publications using AAT and UKST data, and AAO publications

Figure 3.10 Research papers published using AAT data by location of First Author

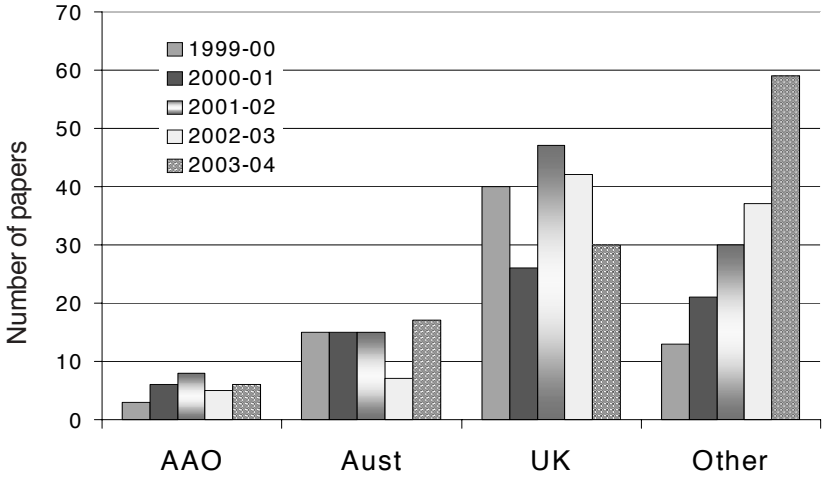
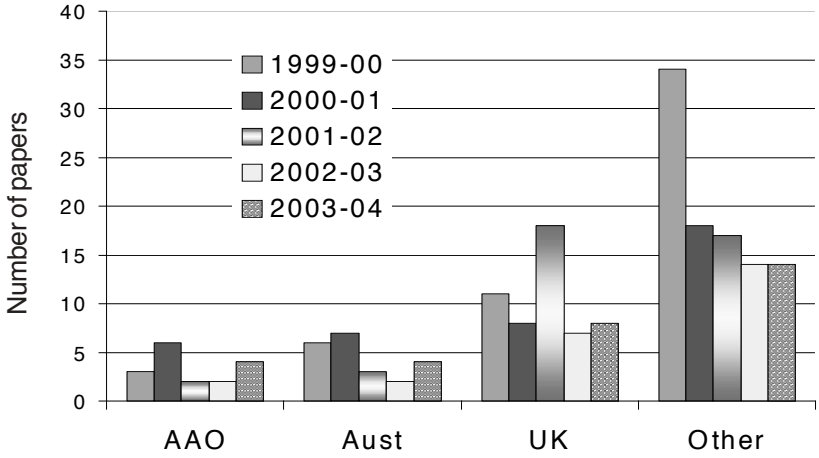


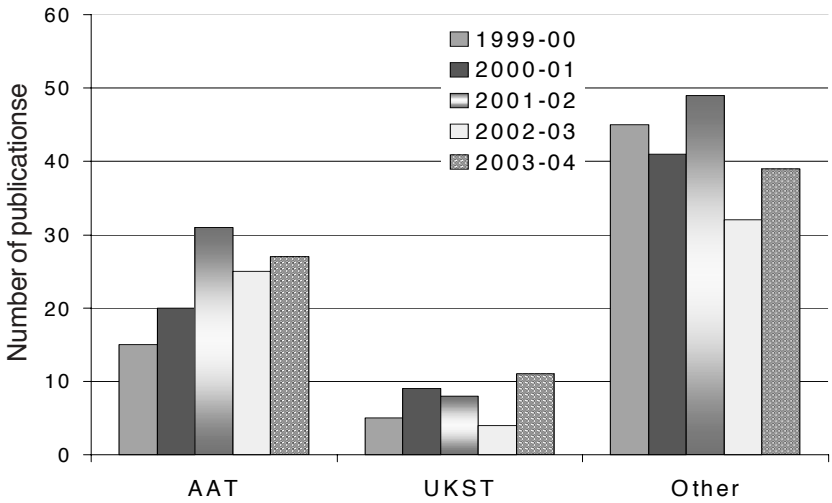
Figure 3.11 Research papers published using UK Schmidt data, by location of First Author.



survey data. AAO staff consistently produce a large number of high–quality publications, demonstrating the strong links between AAO astronomers and the international community, as well as the strong AAO involvement in the redshift surveys.

The distribution of publications in refereed journals by location of the P.I. is shown in Figures 3.10 and 3.11 for papers using AAT data and UKST data respectively. Papers making use of UKST survey data only are not included. There is an increase in many areas and the AAT publications from other countries have sharply risen again due to secondary 2dF Survey papers. Figure 3.12 gives the number of AAO publications produced by staff, students and visitors, sorted by papers including AAT data, UKST data, and other papers.

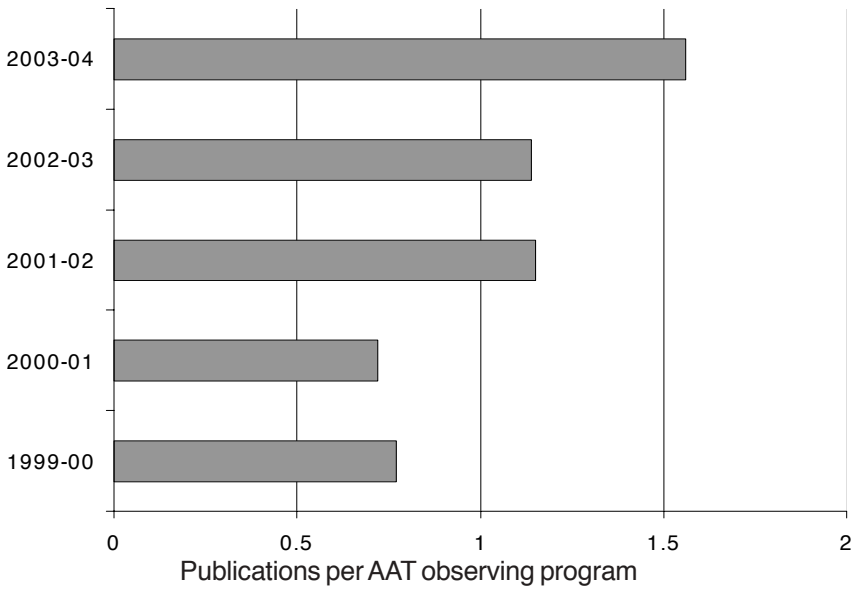
Figure 3.12 AAO publications by AAO staff, students and visitors



Publication numbers have risen in all areas. The trend to papers without AAT and UKST data continues but the number of AAT and UKST papers with AAO authors is also well up.

Figure 3.13 shows how well AAT observing programs are converted into scientific papers. To allow for the delay between observations and publications, the statistic given here is the number of publications in a given year divided by the number of proposals in the *previous* year. Typically between 0.7 and 0.9, this year sees a huge 1.6 papers per program, an all-time high. This figure reflects the impact of the move to survey observing programs, in the fact that the total number of observing programs has dropped, the longer time needed to complete and publish results from major surveys and the high rate of secondary research. Averaged over the past five years, an impressive rate of 1.04 papers per AAT observing program was achieved.

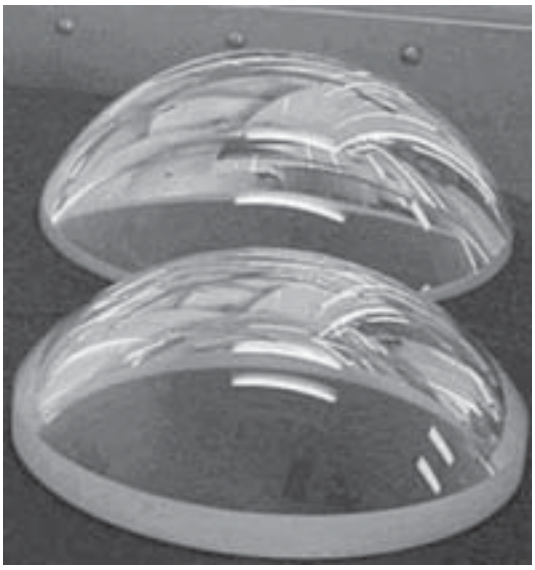
Figure 3.13 Publications per AAT observing program



Key result area (3) Instrumentation

Key outcome

For AAO instrumentation an integrated suite of instruments and telescope controls that best meet, in a timely fashion, the needs of the astronomical community, with the instruments working as well as they need, without being over-engineered. For external projects, satisfied customers



In September 2003, the AAO completed a design study for the Dark Ages "Z" Lyman Explorer (DAZLE) which is now being manufactured by the Institute of Astronomy (IoA) in Cambridge Above: the completed lenses. Photo courtesy IoA, Cambridge

Strategies

A key strategy in achieving the instrumentation objective is always to remain very much aware of developments in astronomy and instrumentation and of the needs of the astronomy community. The AAO Users' Committee (AAOUC) plays a key role here. The AAOUC's terms of reference include advising the Director on a development program which best meets the needs of the astronomy community bearing in mind AAO staff and financial constraints.

Two further strategies are vital to the implementation of the instrumentation development plan. The first is quality project management. Significant improvements in this area have been made in recent years, with the filling of two specialist project manager positions. Throughout 2003–04 the focus has been on improving procedures for the initiation, design review and tracking of future projects. This is supported by the provision of project management and risk assessment training for scientific and engineering staff to assist in their roles.

The second key implementation strategy is involvement at all stages, and at both sites, of all of the Observatory's highly innovative and world class astronomers, engineers, software specialists and technicians. This includes conception, design, construction and commissioning of instruments.

Table 3.3 Use of AAT instruments for the last three years
Percentage of nights allocated

Instrument	2001–02*	2002–03*	2003–04*
2dF	33.8	22.6	33.9
UCL coude echelle spectrographs (UCLES & UHRF)	23.2	29.7	23.9
Infrared imager/ spectrograph (IRIS2)[1]	7.6	11.5	24.5
Wide field imager (WFI)	6.0	7.4	2.8
Taurus II & Taurus tunable filter (TTF)[2]	12.7	9.9	4.7
RGO spectrograph[2]	8.0	10.9	4.3
SPIRAL integral field spectrograph[2]	4.7	4.6	0
Instruments supplied by users	4.3	3.8	5.9

*Years indicated are not financial years, but two AAO Semesters running from 1 February to 31 July and 1 August to 31 January

[1] *IRIS2 was first used in 2001–02.*
[2] *TTF, RGO and SPIRAL were decommissioned in 2003–04.*

Organisational statistics AAO instrumentation

The AAO spends about 15 per cent of its budget each year on new instruments and associated software and detectors. Table 3.3 summarises the use made of instruments on the AAT over the last few years. It does not include time used for aluminising the primary mirror, and the time the AAT dome was out of operation.

The Two-degree Field (2dF) facility continues to attract the most observing proposals and still receives a large allocation of telescope time. This year we have seen a resurgence in 2dF surveys, including projects designed to complement mid-infrared surveys and galaxy redshift surveys on other telescopes. IRIS2 is now in use for a large range of programs, and the multi-object mode for IRIS2 was commissioned this year. Demand for the high-resolution UCLES and UHRF spectrographs also remains high with 35% of allocated UCLES time devoted to the ongoing search for extrasolar planets. The instruments supplied by users were the Semel Polarimeter and CIRPASS. Two projects were carried out using the Semel Polarimeter, which attaches to UCLES, to study variations in nearby stars. The Cambridge Infra-red Panoramic Survey Spectrograph (CIRPASS) was mounted at the AAT, using the old plate-mounted fibre input of FOCAP at Cassegrain, to carry out surveys of brown dwarfs in nearby clusters and star formation rates at redshift z=1.

At the close of semester 2003B the AAO reached the completion of the rationalisation of the AAT's instrument suite in order to increase operational efficiency and make way for new instrumentation. The decommissioned instruments include Taurus, SPIRAL and the RGO spectrograph, leaving the AAT with a streamlined suite of four instruments: 2dF, UCLES/UHRF, WFI and IRIS2.

Detector use: Charge coupled devices (CCDs) remain the astronomical detector of choice. 2dF, WFI and IRIS2 have a fixed detector. Users have a choice of CCDs on UCLES, either the blue-sensitive EEV or the red-sensitive MITTL3. The new AAO-2 optical controller has been commissioned with 2dF in November 2003 and is in routine use. The new controllers for EEV and MITLL3 are due to be commissioned in August 2004.

There is an increasing emphasis at the AAO in instrumentation design and construction. AAOmega, the next major instrument intended for the AAT, successfully navigated the final design review – the instrument is on track for first light near the end of 2005 (see page 36).

Instrument Science

The Instrument Science group is exploring new technologies on several fronts. The main projects can be divided into four categories: photonic devices; smart focal planes; ELT design; and inertial drive compensation for wind shake. The group is currently engaged in positioning mechanisms for beam steering and fibre optic relays, work that is funded by the European FP6 program. This is a continuation of the cryobot positioner study mentioned in last year's report.

Michael Kanonczuk of the mechanical section at the telescopes is shown dismantling IRIS2 in preparation for adjusting the grisms

The Instrument Science group works hard to establish important contacts across Australia and overseas. Currently, they have industrial partners in eight countries, with links to six universities which carry out technology development. Some of the most important developments at the AAO have come from these close links with industrial groups. Examples are the 'echidna' spines which lie at the heart of FMOS, the ultra narrowband filters used in DAZLE, and the VPH gratings used in several of the AAO's existing and planned instruments. The Instrument Science group is currently seeking links to assist with new development work on centimetre-sized cryogenic autonomous robots.

The group has coined the expression "astrophotonics" to describe one of its latest development areas. Here it seeks to advance astronomical instrumentation by clever use of photonic mechanisms which came out of the recent boom in telecommunications. One example is the use of tapered fibres where the input beam is efficiently converted to a different f/ratio on output. Photonics is a key strength of the Australian industrial landscape. The group maintains close links with several companies located at the Australian Technology Park in Sydney. A very promising development since February 2004 is photonic suppression of the near-infrared background by shining light through fibre Bragg gratings imposed on optical fibre bundles.

Internal Projects

AAOmega

The AAOmega project (http://www.aao.gov.au/AAO/local/www/aaomega/) proposes to replace the two 2dF top end mounted fibre fed spectrographs with a new coude mounted dual beam spectrograph. Some upgrade work to the 2dF robotic fibre positioning system is also planned. The new spectrograph uses large format detectors, volume phase holographic gratings and will be able to carry out "red" and "blue" observations simultaneously, providing a facility that will enable much fainter and more detailed observations. The project has recently passed its final design review and is in the construction phase. Commissioning is anticipated at the end of 2005.

IRIS2

IRIS2 (http://www.aao.gov.au/AAO/iris2/iris2.html) is the near infrared spectrograph/imager for the AAT. The multi-object spectroscopic mode for the IRIS2 instrument was fully implemented and released for scientific use at the end of 2003.

Dome Air Conditioning

The project to air condition the AAT Dome in an effort to sharpen the images obtainable at the telescope is close to completion. The Summer mode has been implemented. The Winter mode is nearly finished and should be implemented in the coming year.

AAT Infrastructure Project

The AAO infrastructure project consists of a number of small but high-priority tasks, using a small percentage of staff and time and aiming to increase telescope productivity with the minimum outlay for the maximum return. The AAO2 controllers have been commissioned on 2dF and have been reliably used on 2dF observing runs since early 2004. Commissioning of the two controllers for UCLES will be completed by the end of August 2004.

The design stage for upgrades to the AAT's telescope and instrument control systems are now moving forward into their phase 2 programs. The upgrade will be carefully managed over the next 2 years to ensure alteration causes minimal "down time" for the telescope.

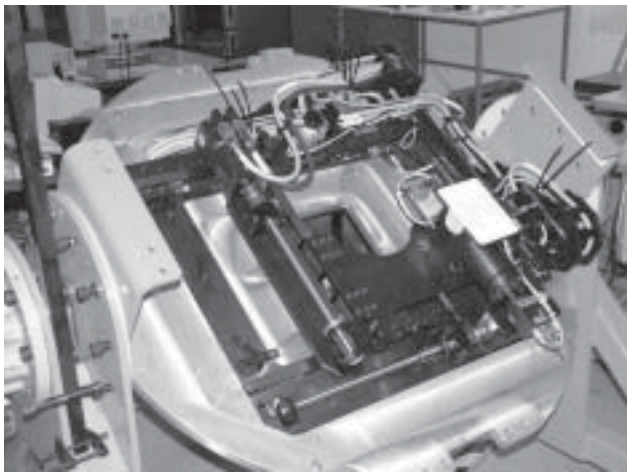
External Instrumentation

OzPoz

OzPoz (http://www.eso.org/instruments/flames/OzPoz.html), a robotic fibre positioner built by the Anglo-Australian Observatory to feed the FLAMES facility at the Very Large Telescope (VLT) in Chile, is in routine use and performing very reliably.

FMOS/Echidna

FMOS/Echidna is a 400 optical fibre robotic positioning system for the Japanese Subaru telescope in Hawaii and is part of the FMOS system (http://www.naoj.org/staff/akiyama/FMOS/) that will provide a highly efficient near infrared spectroscopic facility. The principle of operation for Echidna is different from 2dF, 6dF and OzPoz in that all 400 fibres can be moved



Right: The Echidna Focal Plane Imager (FPI) is used for spine position feedback

simultaneously to their required positions. Echidna is in the fabrication stage. All components were effectively fabricated by the end of the fiscal year. The project is currently awaiting delivery of the fibres for installation and testing in the instrument. Delivery of the instrument is now set for the first half of 2005.

MOMFOS

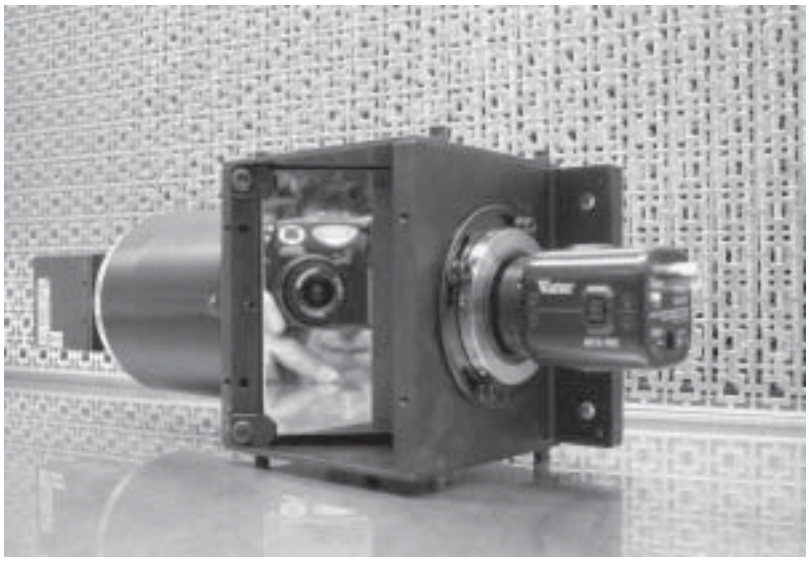
The MOMFOS concept design project http://aaossi.aao.gov.au/AAO/momfos/ is for an FMOS Echidna style multi-object spectrograph for the 30m GSMT. It has been funded through the AURA New Initiatives Office. The project was completed and submitted to AURA in November 2003.

Gemini WFMOS Feasibility Study

The AAO submitted a proposal to Gemini to do a feasibility and cost study for a Wide-Field, Fibre-Fed, Optical, Multi-Object Spectrograph (WFMOS). This instrument will have a 1.5 degree diameter field of view and will allow the simultaneous spectroscopic observation of several thousand objects. The AAO is serving as the prime contractor to Gemini, working in collaboration with the US National Optical Astronomy Observatory (NOAO), The University of Oxford, the University of Durham, the University of Portsmouth, John Hopkins University, and the Canadian Astronomical Data Centre (CADC). The study was awarded by the Gemini Board, and this instrument will move into a conceptual design phase by mid-2005.

Performance indicators

The instrumentation program is informed by the advice given to the Director by the AAO Users' Committee. The committee consists of experienced representatives of the user communities who are responsible for ensuring that the agreed program does indeed meet the needs of the astronomical community. The best way to judge this after the event is to survey telescope users as to their satisfaction with the suite of instruments and the way the instruments, software and detectors perform. As mentioned above, this information is compiled from the user feedback survey responses (see Table 3.1). The level of user satisfaction with instrumentation and related software has remained fairly steady, dropped slightly from 3.8 last year to 3.7 this year, still however meeting the performance indicators as outlined in the corporate plan.



Left: Urs Klauser (AAO) takes a photo of the spine & sky (Watec) cameras. The 45° mirror is used to image in opposite directions. The spine camera has a 0.33x telecentric lens attached to ensure images of tilted (ie. defocussed) spines are optimally acquired.

Key result area (4) AAO resources

Key outcome

AAO funds are to be used optimally and to stimulate productive, creative and focused staff working in a safe environment

Strategies

Perhaps the best strategy for achieving this objective is the involvement of all staff in corporate planning and other reviews. Their involvement means that many different perspectives can be taken into account, leading to a more rounded approach. It also means that everyone understands the final outcome of such a process and feels more commitment to, and ownership of, the results than would otherwise be the case.

The Observatory is committed to equal employment opportunity and occupational health and safety best practices as a way of meeting its objective of stimulated, productive, creative and focused staff working in an environment in which they feel secure. Training in these concepts and practices is a well-established part of AAO life.

Organisational statistics (People)

Staff numbers

The AAO employs research scientists, technical staff, software engineers, electronics engineers, optical and mechanical engineers, administrative and library staff. There are 10 full–time equivalents (FTE) on fixed term contracts, one of them part-time, and 57.25 FTE on indefinite appointments, five of them part-time. Staff members are located at both the Epping Laboratory and at Siding Spring Observatory. Table 3.4 shows staff numbers by tenure.

Most of the FMOS-Echidna Project team gathered in the laboratory. Back row: Neal Schirmer (Mech. Eng.), Peter Gillingham (Proj. Eng.), David Correll (Elec. Eng.) Middle row: Rolf Muller (Elec. Eng.), Scott Smedley (Soft. Eng.), Scott Croom (Astron.), Anna Moore (Instr. Sci.), John Dawson (Mech. Eng.), Roger Haynes (Instr. Sci.), Jurek Brzeski (Mech. Eng.) Front row: Ed Penny (Elec. Eng.), Dwight Horiuchi (Mech. Eng.), Gabriella Frost (Proj. Manager), Greg Smith (Mech. Eng.) Photo taken by David Smyth.

Table 3.4 Staff numbers by tenure

At 30 June 2004 the staff positions were:

	Full–time	Part–time	Part–time FTE
Director	1		
Research astronomers (fixed term)	4		
Instrument scientists (fixed term)	-		
Other fixed term	5	1	0.50
Research astronomers (indefinite)	1	1	0.60
Instrument scientists (indefinite)	5	1	0.75
Other indefinite	48	3	1.90
Total	64	6	3.75

Performance indicators (People)

Equal employment opportunity (EEO)

The *Equal Employment Opportunity (Commonwealth Authorities) Act 1987* requires the Board to develop an EEO program for each of the four designated groups identified within the Act.

Staff of the UK Schmidt Telescope at the dinner celebrating its 30th anniversary of operations Left to right: John Dawe, Paul Cass, Fred Watson, Kristin Fiegert, Ken Russell, Malcolm Hartley. Photo courtesy Chris McCowage

Only a fifth of the Observatory's staff is female. In earlier years, most of the women were employed in the administrative or research areas. In the past three years, more women have been recruited to the technical areas. As well, there have been several recent recruits from non-English speaking backgrounds. This is an encouraging outcome to a campaign over several years to ensure that the Observatory's recruitment processes did truly offer equal opportunity to all.

Occupational health and safety

The Anglo-Australian Telescope Board's safety policy and its agreement on health and safety with the Community and Public Sector Union are set out in Appendix B.

Comcare is a statutory authority established to administer the *Commonwealth Employees' Rehabilitation and Compensation Act 1988.* The premium the Board has to pay is a function of staff numbers and claims history. There was a jump in compensation claims in 2002–03 reflected in higher premiums for 2003–04, even though all the claims were very minor. There have been no notifications of dangerous occurrences for the last five years.

Table 3.5 Workers' compensation and dangerous occurrences

	1999-00	2000-01	2001-02	2002-03	2003-04
Comcare premium	$19 200	$23 751	$16 926	$15 612	$32 500
No of claims	3	0	1	5	2
Payments made	$635	0	$75	$12,400	$2,735
Dangerous occurrences	0	0	0	0	0

Organisational statistics (Financial)

The financial statements in Appendix A outline the AAO's financial position.

Performance indicators (Financial)

The Australian National Audit Office (ANAO) has audited the financial statements of the AATB and has found them to be acceptable. The auditor's report is contained in Appendix A.

Key result area (5) External communications

Key outcomes

A lively awareness of astronomy in general, and the AAO's role in particular, by all stakeholders

The AAO is aware that good two-way communication is central to all its activities. While it must listen to its stakeholders, it must also communicate with the wider community. The stakeholders are the AAO staff, the astronomy community, responsible Ministers, funding agencies, the Board and its advisory committees and the time assignment panels. The community includes the general public, hence the broad term 'Public Relations.'

Strategies and performance indicators

World Wide Web and digital images

The AAO's primary conduit for external communication, the website, has recently been upgraded. It continues to attract a large audience, with a consistent hit rate of over a million a month. These figures do not include the Cambridge (UK) mirror of the AAO site. Most of the Internet visitors are attracted by the images pages, which now support a total of about 220 photographs.

A newsletter is published three times a year on the web, and distributed as a hardcopy, to over 1000 subscribers and institutions. It caters to a wide range of readers, including professional astronomers, instrument scientists, users of the observatory and local AAO staff.

The science web page has the aim of attracting students towards collaborative work at the AAO either through vacation positions or thesis study.

A wealth of more technical information is also available and is constantly being updated and developed.

Publicity and outreach

In line with the AAO's increased need to win instrumentation contracts, this year there was greater emphasis on presenting AAO's technical capabilities to the international astronomical community. Two major undertakings of this nature were exhibits of the AAO's work at the International Astronomical Union's 25th General Assembly held in Sydney in July 2003, and the SPIE Astronomical Telescopes and Instrumentation meeting held in Glasgow in June 2004. About two thousand people attended each meeting, and at both the AAO display attracted a steady stream of interest. A highlight of both displays was a hands-on working model demonstrating the principle of the Echidna instrument: for the SPIE meeting this set-up was also used to demonstrate the 'starbugs' concept.

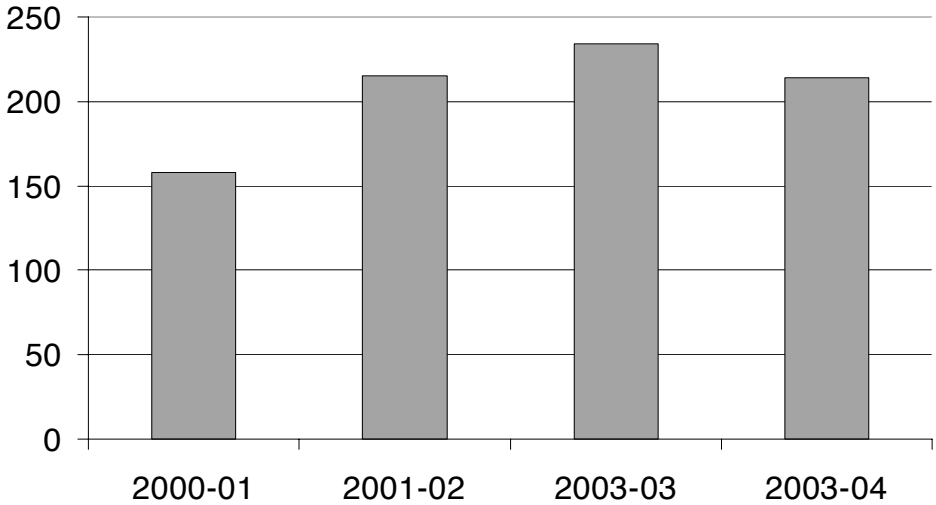
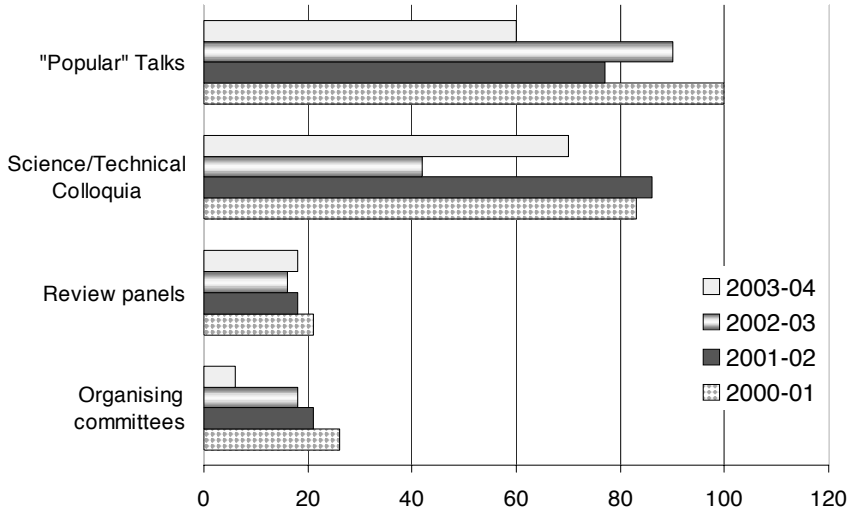


Figure 3.14 Media Interviews

Dr Fred Watson, winner of the 2003 David Allen Prize for communicating astronomy. The award was given at the IAU General Assembly in Sydney in 2003. Fred's "double" was used in the Coonabarabran Shire Exhibit at the General Assembly. Photo by Keiran Dobbin

This year the AAO issued media releases on five subjects: one (on observations of Mars from Earth) led to a front-page picture in the London Times (27 August 2003). Work led by AAO staff member Scott Croom was the subject of a further release issued by the Gemini Observatory in Australia, the UK and Canada. Staff gave 60 popular talks, 70 talks to professional audiences (many of them outside Australia), and 214 media interviews. Staff member Fred Watson has been a particularly tireless communicator, and his efforts were recognised in July 2003, when he was awarded the Astronomical Society of Australia's David Allen Prize for communicating astronomy. Dr Watson is a regular radio interviewee, writes a column for Australian Geographic, and has written a book on the history of the telescope, due for launch in September 2004. He also took part in two sessions of "Science in the Pub" (a moderated discussion with a set format) in Sydney during the July General Assembly: "What is a planet?", for professional astronomers, and "Life, the Universe and Everything", for the general public.

Figure 3.15 External Communications



Public events for the International Astronomical Union (IAU) General Assembly also included the inaugural Allison-Levick Memorial Lecture. Mr Jack Allison-Levick, who died in 2001, was a Melbourne psychiatrist with a life-long interest in astronomy. He had seen photographs taken with the Anglo-Australian Observatory's telescopes by former AAO staff member David Malin and was moved to leave a bequest. The bequest funds an annual public lecture enhancing the public understanding of astronomy and furthering the reputation of the Anglo-Australian Observatory. Given the background of the bequest, it was appropriate that the inaugural lecture was given by David Malin.

In 2002 Fred Watson and David Malin had worked with Australian composer Ross Edwards, contributing to Edwards' fourth symphony, "Star Chant". Described as "a musical fusion of art and science", this choral work incorporates words by Watson and images – extensively reworked for the Sydney performance – by Malin. In January 2004, the work had its first Sydney performance in the Opera House as part of the Festival of Sydney.

The AAO took part in the special "Open Night" of Siding Spring Observatory on 28 May 2004, to mark a series of simultaneous anniversaries of important instruments: the ANU's 40-inch telescope (celebrating 40 years), the AAT (30 years) and the ANU's 2.3-m telescope (20 years). This event was the first time the Observatory had been opened to the public at night.

As in previous years, the AAO contributed to the Coonabrabran Festival of the Stars, held in November 2003, by running the commemorative Bok lecture. The speaker for 2003 was Dr David MacKinnon of Charles Sturt University, who is embarking on a project to set up a "park" of small optical telescopes near Bathurst, NSW, accessible to the general public. The Festival also saw a reprise of the "What is a planet?" Science in the Pub discussion, again compered by Fred Watson.

Appendix A

Financial statements

FINANCIAL STATEMENTS

As provided for in the Anglo-Australian Telescope Agreement, the accounts, records and financial transactions of the Board are audited by the Australian Auditor-General. The form of the Board's financial statements for the year ended 30 June 2004 is in accord with orders made by the Finance Minister under the *Commonwealth Authorities and Companies Act 1997*.

Statement by the members of the Board

In our opinion, the attached financial statements for the year ended 30 June 2004 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Anglo-Austr*alian Teles*cope Board will be able to pay its debts as and when they become due and payable.

This statement is made in accordance with a resolution of the Board.

Chair of the Board
11 November 2004

Deputy Chair of the Board
11 November 2004

Australian National
Audit Office

INDEPENDENT AUDIT REPORT

To the Minister for Education, Science and Training

Scope

The financial statements comprise:

- Statement by Directors;
- Statements of Financial Performance, Financial Position and Cash Flows;
- Schedules of Commitments and Contingencies; and
- Notes to and forming part of the Financial Statements

of the Anglo-Australian Telescope Board for the year ended 30 June 2004.

The Directors of the Anglo-Australian Telescope Board are responsible for the preparation and true and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the Commonwealth Authorities and Companies Act 1997. This includes responsibility for the maintenance of adequate accounting records and internal controls that are designed to prevent and detect fraud and error, and for the accounting policies and accounting estimates inherent in the financial statements.

Audit approach

I have conducted an independent audit of the financial statements in order to express an opinion on them to you. My audit has been conducted in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing and Assurance Standards, in order to provide reasonable assurance as to whether the financial statements are free of material misstatement. The nature of an audit is influenced by factors such as the use of professional judgement, selective testing, the inherent limitations of internal control, and the availability of persuasive, rather than conclusive, evidence. Therefore, an audit cannot guarantee that all material misstatements have been detected.

While the effectiveness of management's internal controls over financial reporting was considered when determining the nature and extent of audit procedures, the audit was not designed to provide assurance on internal controls.

Procedures were performed to assess whether, in all material respects, the financial statements present fairly, in accordance with the Finance Minister's Orders made under the Commonwealth Authorities and Companies Act 1997, Accounting Standards and other

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mandatory financial reporting requirements in Australia, a view which is consistent with understanding of the Board's financial position, and of its performance as represented b Statements of Financial Performance and Cash Flows.

The audit opinion is formed on the basis of these procedures, which included:

- examining, on a test basis, information to provide evidence supporting the amo and disclosures in the financial statements; and
- assessing the appropriateness of the accounting policies and disclosures used, a reasonableness of significant accounting estimates made by the Directors.

Independence

In conducting the audit, I have followed the independence requirements of the Austra National Audit Office, which incorporate Australian professional ethical pronouncements.

Audit Opinion

In accordance with subsection 19(1) of the Anglo-Australian Telescope Agreement Act 1970, now report that the financial statements are in agreement with the accounts and records Anglo-Australian Telescope Board, and in my opinion:

(i) the financial statements are based on proper accounts and records;

(ii) the financial statements give a true and fair view, in accordance with applic Accounting Standards and other mandatory professional reporting requiremer Australia and the Finance Minister's Orders, of the financial position of the Ang Australian Telescope Board as at 30 June 2004, and its financial performance anc flows for the year then ended;

(iii) the receipt, expenditure and investment of moneys, and the acquisition and dispo assets, by the Board during the year have been in accordance with the Anglo-Australian Telescope Agreement Act 1970 and

(iv) the financial statements have been prepared in accordance with the Finance Mini Orders made under the Commonwealth Authorities and Companies Act 1997.

Australian National Audit Office

P Hinchey
Senior Director

Delegate of the Auditor-General

Sydney
15 November 2004

Australian National
Audit Office

INDEPENDENT AUDIT REPORT

To the Minister for Education, Science and Training

Matters relating to the Electronic Presentation of the Audited Financial Statements

This audit report relates to the financial Statements of the Anglo-Australian Telescope Board for the year ended 30 June 2004 included on the Board's web site. The Directors of the Board are responsible for the integrity of the Anglo-Australian Telescope Board's web site.

The audit report refers only to the statements named below. It does not provide an opinion on any other information which may have been hyperlinked to/from the audited financial statements.

If the users of this report are concerned with the inherent risks arising from electronic data communications they are advised to refer to the hard copy of the audited financial statements to confirm the information included in the audited financial statements presented on this web site.

Scope

The financial statements comprise:

- Statement by Directors;
- Statements of Financial Performance, Financial Position and Cash Flows;
- Schedules of Commitments and Contingencies; and
- Notes to and forming part of the Financial Statements

of the Anglo-Australian Telescope Board for the year ended 30 June 2004.

The Directors of the Anglo-Australian Telescope Board are responsible for the preparation and true and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*. This includes responsibility for the maintenance of adequate accounting records and internal controls that are designed to prevent and detect fraud and error, and for the accounting policies and accounting estimates inherent in the financial statements.

Audit approach

I have conducted an independent audit of the financial statements in order to express an opinion on them to you. My audit has been conducted in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing and Assurance Standards, in order to provide reasonable assurance as to whether the financial statements are free of material misstatement. The nature of an audit is influenced by factors such as the use of professional judgement, selective testing, the inherent limitations of internal control, and the availability of persuasive, rather than conclusive, evidence. Therefore, an audit cannot guarantee that all material misstatements have been detected.

While the effectiveness of management's internal controls over financial reporting was considered when determining the nature and extent of audit procedures, the audit was not designed to provide assurance on internal controls.

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Procedures were performed to assess whether, in all material respects, the financial statements present fairly, in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, Accounting Standards and other mandatory financial reporting requirements in Australia, a view which is consistent with my understanding of the Board's financial position, and of its performance as represented by the Statements of Financial Performance and Cash Flows.

The audit opinion is formed on the basis of these procedures, which included:

- examining, on a test basis, information to provide evidence supporting the amounts and disclosures in the financial statements; and
- assessing the appropriateness of the accounting policies and disclosures used, and the reasonableness of significant accounting estimates made by the Directors.

Independence

In conducting the audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate Australian professional ethical pronouncements.

Audit Opinion

In accordance with subsection 19(1) of the *Anglo-Australian Telescope Agreement Act 1970,* I now report that the financial statements are in agreement with the accounts and records of the Anglo-Australian Telescope Board, and in my opinion:

(i) the financial statements are based on proper accounts and records;

(ii) the financial statements give a true and fair view, in accordance with applicable Accounting Standards and other mandatory professional reporting requirements in Australia and the Finance Minister's Orders, of the financial position of the Anglo-Australian Telescope Board as at 30 June 2004, and its financial performance and cash flows for the year then ended;

(iii) the receipt, expenditure and investment of moneys, and the acquisition and disposal of assets, by the Board during the year have been in accordance with the *Anglo-Australian Telescope Agreement Act 1970*; and

(iv) the financial statements have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*.

Australian National Audit Office

P Hinchey
Senior Director

Delegate of the Auditor-General

Sydney
15 November 2004

ANGLO-AUSTRALIAN TELESCOPE BOARD

STATEMENT OF FINANCIAL PERFORMANCE
for the year ended 30 June 2004

	Notes	**2004**	2003
		$'000	$'000
REVENUE			
Revenues from ordinary activities			
Revenue from Australian government	*4A*	**4,032**	3,929
United Kingdom government contribution	*4B*	**3,700**	3,700
Goods and services	*4C*	**1,403**	1,694
Interest	*4D*	**47**	56
Other revenues	*4E*	**268**	311
Revenues from ordinary activities		**9,450**	9,690
EXPENSE			
Expenses from ordinary activities			
Employees	*5A*	**5,740**	5,028
Suppliers	*5B*	**2,669**	2,913
Depreciation and amortisation	*5C*	**2,626**	2,739
Write-down of assets	*5D*	**686**	-
Net foreign exchange (loss)/gain	*5E*	**(2)**	3
Expenses from ordinary activities		**11,719**	10,683
Net (deficit)		**(2,269)**	(993)
Net (debit) credit to asset revaluation reserve	*10*	**-**	1,379
Total revenues, expenses and valuation adjustments recognised directly in equity.		**-**	1,379
Total changes in equity other than those resulting from transactions with owners as owners		**(2,269)**	386

ANGLO-AUSTRALIAN TELESCOPE BOARD

STATEMENT OF FINANCIAL POSITION
as at 30 June 2004

	Notes	**2004**	2003
		$'000	$'000
ASSETS			
Financial assets			
Cash	*6A*	**996**	619
Receivables	*6B*	**1,163**	304
Total financial assets		**2,159**	923
Non-financial assets			
Land and buildings	*7A, 7C*	**22,240**	23,164
Infrastructure, plant and equipment	*7B, 7C*	**23,480**	24,272
Other non-financial assets	*7D*	**116**	80
Total non-financial assets		**45,836**	47,516
Total assets		**47,995**	48,439
LIABILITIES			
Provisions			
Employees	*8A*	**2,019**	1,684
Total Provisions		**2,019**	1,684
Payables			
Suppliers	*9A*	**73**	138
Other	*9B*	**2,111**	556
Total Payables		**2,184**	694
Total liabilities		**4,203**	2,378
NET ASSETS		**43,792**	46,061
EQUITY			
Reserves	*10*	**35,975**	35,975
Retained surpluses	*10*	**7,817**	10,086
TOTAL EQUITY		**43,792**	46,061
Current liabilities		**3,100**	1,495
Non-current liabilities		**1,103**	883
Current assets		**2,275**	1,003
Non-current assets		**45,720**	47,436

ANGLO-AUSTRALIAN TELESCOPE BOARD

STATEMENT OF CASH FLOWS
for the year ended 30 June 2004

	Notes	**2004**	2003
		$'000	$'000
Operating Activities			
Cash received			
Goods and services		**1,222**	1,601
Revenue from Australian Government		**4,032**	3,929
Contributions from UK Government		**4,625**	3,700
Interest		**47**	57
GST recovered from ATO		**226**	363
Other		**268**	308
Total cash received		**10,420**	9,958
Cash used			
Employees		**(5,405)**	(4,997)
Suppliers		**(3,042)**	(3,234)
Total cash used		**(8,447)**	(8,231)
Net cash from operating activities	*11*	**1,973**	1,727
Investing Activities			
Cash used			
Purchase of property, plant and equipment		**(1,596)**	(2,140)
Total cash used		**(1,596)**	(2,140)
Net cash (used by) investing activities		**(1,596)**	(2,140)
Net increase/(decrease) in cash held		**377**	(413)
Cash at the beginning of the reporting period		**619**	1,032
Cash at the end of the reporting period	*6A*	**996**	619

ANGLO-AUSTRALIAN TELESCOPE BOARD

SCHEDULE OF COMMITMENTS
as at 30 June 2004

	2004	2003
	$'000	$'000
By Type		
Capital commitments	**-**	-
Other Commitments		
Operating Leases [1]	**57**	97
Total Other Commitments	**57**	97
Commitments Receivable	**(5)**	(9)
Net commitments	**52**	88
By Maturity		
Other commitments		
One year or less	**48**	61
From one to two years	**9**	27
Commitments receivable		
One year or less	**4**	-
From one to two years	**1**	-
Net Commitments	**52**	88

1.Operating leases exist in relation to motor vehicles. The leases are non-cancellable and for fixed terms of two or three years.

SCHEDULE OF CONTINGENCIES
as at 30 June 2004

	2004	2003
	$'000	$'000
Contingent liabilities and assets	**-**	-

Note 1. Summary of Significant Accounting Policies

1.1 Basis of Accounting

The financial statements are required by subsection 19(1) of the *Anglo-Australian Telescope Agreement 1970* and are a general purpose financial report.

The statements have been prepared in accordance with:

- Finance Minister's Orders (being the *Commonwealth Authorities and Companies Orders (Financial Statements for reporting periods ending on or after 30 June 2004));*
- Australian Accounting Standards and Accounting Interpretations issued by the Australian Accounting Standards Board; and
- Consensus Views of the Urgent Issues Group.

The Statements of Financial Performance and Financial Position have been prepared on an accrual basis and are in accordance with the historical cost convention except for certain assets which, as noted, are at valuation. Except where stated, no allowance is made for the effect of changing prices on the results or on the financial position.

Assets and liabilities are recognised in the Statement of Financial Position when it is probable that future economic benefits will flow and the amounts of the assets or liabilities can be reliably measured. Assets and liabilities arising under agreements equally proportionately unperformed are, however, not recognised unless required by an accounting standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments and the Schedule of Contingencies,

Revenues and expenses are recognised in the Statement of Financial Performance when the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Changes in Accounting Policy

The accounting policies used in the preparation of these financial statements are consistent with those used in 2002-03.

Property, plant and equipment assets are being revalued progressively as explained in Note 1.9. Revaluations up to 30 June 2002 were done on a 'deprival' basis; since that date, revaluations have been done on a fair value basis. Revaluation increments and decrements in each year of transition to fair value that would otherwise be accounted for as revenue or expenses are taken directly to accumulated results in accordance with transitional provisions of AASB 1041 *Revaluation of Non-Current Assets*.

In 2002-03, the Finance Minister's Orders (FMOs) introduced an impairment test for non-current assets which were carried at cost and not subject to AAS10 *Recoverable Amount of Non-Current Assets*. In 2003-04, the impairment test provisions of the FMOs have been extended to cover non-current assets carried at deprival value. There were no indications of impairment for these assets.

1.3 Revenue

Australian government and United Kingdom contributions are recognised at the time the Board receives the revenue.

The AAT Board also builds astronomical instrumentation for other observatories and attempts to recover the full economic cost of so doing. Revenue from these activities is recognised at the time the Board raises the invoice.

Grants are received from the Australian Research Council (ARC) and the Particle Physics and Astronomy Research Council (PPARC) of the United Kingdom (UK) for the specific purpose of employing astronomers at the Observatory. Grants are recognised as revenue on receipt.

Resources Received Free of Charge

Services received free of charge are recognised as revenues when and only when a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

Contributions of assets at no cost of acquisition or for nominal consideration are recognised at their fair value when the asset qualifies for recognition.

The following resources are received free of charge*:*

(i) Use of Land
At Siding Spring Observatory, the 3.9 metre Anglo-Australian Telescope (AAT) building and the 1.2 metre UK Schmidt Telescope (UKST) building are on land owned by the Australian National University (ANU). At Epping, New South Wales, the Board's buildings are on the site of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The Board has entered into a permissive occupancy agreement with CSIRO covering its establishment at Epping. The value of this land is disclosed in Note 7A. The Board has also entered into a permissive occupancy agreement with the ANU for its establishment at Siding Spring, for which a "peppercorn rental" of one dollar is charged.

(ii) Use of the UK Schmidt Telescope
The UK Schmidt Telescope is owned by PPARC and operated by the Anglo Australian Observatory (AAO).

1.4 Employee Benefits

(a) Benefits

Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

Liabilities for wages and salaries (including non-monetary benefits) and annual leave are measured at their nominal amounts. Other employee benefits expected to be settled within 12 months of their reporting date are also measured at their nominal amounts.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

All other employee benefit liabilities are measured as the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

(b) Leave

The liability for employee benefits includes provision for annual leave and long service leave. No provision has been made for sick leave as all sick leave is non-vesting and

the average sick leave taken in future years by employees of the Board is estimated to be less than the annual entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration, including the Anglo-Australian Telescope Board's superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The non-current portion of the liability for long service leave is recognised and measured at the present value of the estimated future cash flows to be made in respect of all employees at 30 June 2004. In determining the present value of the liability, the Board has taken into account attrition rates and pay increases through promotion and inflation.

(c) Superannuation

Employees are members of the Commonwealth Superannuation Scheme and the Public Sector Superannuation Scheme. The liability for their superannuation benefits is recognised in the financial statements of the Commonwealth and is settled by the Commonwealth in due course.

The Anglo-Australian Telescope Board makes employer contributions to the Commonwealth at rates determined by the Commonwealth's actuary to be sufficient to meet the cost to the Commonwealth of the superannuation entitlements of the Board's employees.

The liability for superannuation recognised as at 30 June represents outstanding contributions for the final fortnight of the year.

1.5 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessors to the lessee substantially all the risk and benefits incidental to ownership of leased assets. In operating leases, the lessor effectively retains all such risks and benefits. The Board has no finance leases.

Operating lease payments are expensed on a basis which is representative of the pattern of benefits derived from the leased assets.

1.6 Cash

Cash means notes and coins held and any deposits held at call with a bank or financial institution.

1.7 Insurance

The AAO has, for several years, been insured for risks through the Australian Government insurable risk management fund, Comcover. The Department of Finance has now decided that, as the AAO is not fully controlled by the Commonwealth, the AAT Board will not be eligible to belong to the fund after 30 June 2004. Workers' compensation is insured through Comcare Australia.

1.8 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes fair value of assets transferred in exchange and liabilities undertaken.

1.9 Property (Land, Buildings and Infrastructure), Plant and Equipment

Asset Recognition Threshold

Purchases of property, plant and equipment are recognised initially at cost in the Statement of Financial Position, except for purchases costing less than $3,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

Revaluations

(i) Basis

Land, buildings, infrastructure, plant and equipment are carried at valuation. Revaluations undertaken up to 30 June 2002 were done on a deprival basis; revaluations since that date are at fair value. This change in accounting policy is required by Australian Accounting Standard AASB 1041 *Revaluations of Non-Current Assets.* Valuations undertaken in any year are determined as shown below.

Fair and deprival values for each class of asset are determined as shown below:

Asset class	Fair value measured at:	Deprival value measured at:
Land	Market selling price	Market selling price
Epping buildings	Market selling price	Market selling price
Domes	Depreciated replacement cost	Depreciated replacement cost
Telescope and ancillary equipment	Depreciated replacement cost	Depreciated replacement cost
Telescope instrumentation	Depreciated replacement cost	Depreciated replacement cost
Plant and equipment	Market selling price	Depreciated replacement cost

Under both deprival and fair value, assets that are surplus to requirements are measured at their net realisable value. At 30 June 2004, the Anglo-Australian Telescope Board held no surplus assets. (30 June 2003: $0)

The financial effect of this change in policy relates to those assets recognized at fair value for the first time in the current period where the measurement basis for fair value is different to that previously used for deprival value. The financial effect of the change is given by the difference between the fair values obtained for these assets in the current period and the deprival-based values recognised at the end of the previous period.

(ii) Frequency

Assets are revalued progressively in successive three-year cycles, so that no asset has a value greater than three years old.

The revaluation cycle is as follows:

Date of revaluation	**Assets revalued**
1 July 2001	Telescopes Instrumentation Plant and equipment
1 July 2002	Land Buildings

Assets in each class acquired after the commencement of the progressive revaluation cycle are not captured by the progressive revaluation then in progress.

The Finance Minister's Orders require that all property, plant and equipment assets be measured at up-to-date fair values from 30 June 2005 onwards. The current year is therefore the last year in which the Anglo-Australian Telescope Board will undertake progressive revaluations.

(iii) *Conduct*

Valuations of land, buildings and plant and equipment are conducted by an independent qualified valuer. Valuations of telescopes and instrumentation are conducted in-house.

(iv) Depreciation

Depreciable property, plant and equipment assets are written off to their estimated residual values over their estimated useful lives to the Board using, in all cases, the straight line method of depreciation.

Depreciation rates (useful lives) and methods are reviewed at each balance date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate. Residual values are re-estimated for a change in prices only when assets are revalued.

Depreciation rates applying to each class of depreciable assets are as follows:

Asset class	**2004**	2003
Buildings	**50 years**	50 years
Telescope and Ancillary Equipment	**50 years**	50 years
Telescope Instrumentation	**20 years**	20 years
Personal Computers	**3 years**	3 years
Other Computers	**5 years**	5 years
Other Plant and Equipment	**20 years**	20 years

The aggregate amount of depreciation allocated for each class of asset during the reporting period is disclosed in Note 5C.

1.10 Taxation

The Board is exempt from all forms of taxation except for the goods and services tax (GST).

1.11 Foreign Currency

The contributions from the United Kingdom are converted to Australian dollars at the selling rate quoted by the Bank of England at the time each contribution is made. All other transactions denominated in a foreign currency are converted at the exchange rate at the date of the transaction. Foreign currency receivables and payables are translated at the exchange rates current as at balance date. Associated currency gains and losses are not material.

1.12 Agreements

Under an agreement between the Board and the PPARC, the Board is responsible for the management, care and maintenance, operation and development of the UK Schmidt Telescope. PPARC, the owner of the UK Schmidt Telescope, has entered into a lease with the ANU in respect of use of land for the UK Schmidt Telescope. The revenues, expenses and asset values in respect of the UK Schmidt Telescope form part of the financial statements.

1.13 External Projects

The Anglo-Australian Telescope Board has, in recent years, been invited to build telescope instrumentation for other Australian and international telescope bodies. Sometimes these non-profit contracts are on a time and materials basis, other times on a fixed price basis. The projects are costed to result in break-even results on completion. In the event of a surplus or over-run arising, it is the policy of the Board to absorb these.

2. Adoption of Australian Equivalents to International Financial Reporting Standards from 2005-2006

The Australian Accounting Standards Board has issued replacement Australian Accounting Standards to apply from 2005-06. The new standards are the Australian Equivalents to International Financial Reporting Standards (IFRS) which are issued by the International Accounting Standards Board. The new standards cannot be adopted early. The standards being replaced are to be withdrawn with effect from 2005-06, but continue to apply in the meantime.

The purpose of issuing Australian Equivalents to IFRS is to enable Australian entities reporting under the Corporations Act 2001 to be able to more readily access overseas capital markets by preparing their financial reports according to accounting standards more widely used overseas.

It is expected that the Finance Minister will continue to require compliance with the Accounting Standards issued by the AASB, including the Australian Equivalents to IFRS, in his Orders for the Preparation of Authorities' financial statements for 2005-06 and beyond.

The Australian Equivalents contain certain additional provisions which will apply to not-for-profit entities, including the Anglo-Australian Telescope Board. Some of these provisions are in conflict with the IFRS and therefore the Anglo-Australian Telescope Board will only be able to assert compliance with the Australian Equivalents to the IFRS.

Existing AASB standards that have no IFRS equivalent will continue to apply.

Accounting Standard AASB 1047 *Disclosing the Impact of Adopting Australian Equivalents to IFRS* requires that the financial statements for 2003-04 disclose:

- An explanation of how the transition to the Australian Equivalents is being managed, and
- . A narrative explanation of the key differences in accounting policies arising from the transition.

Management of the transition to AASB Equivalents to IFRS

The Anglo-Australian Telescope Board has taken the following steps in preparation towards the implementation of Australian Equivalents:

- The Executive Officer is tasked with oversight of the transition to and implementation of the Australian Equivalents to IFRS.
- The plan requires the following key steps to be undertaken and sets deadlines for their achievement:

  - Identification of all major accounting policy differences between current AASB standards and the Australian Equivalents to IFRS progressively to 30 June 2004.
  - Identification of systems changes necessary to be able to report under the Australian Equivalents, including those necessary to enable capture of data under both sets of rules for 2004-05, and the testing and implementation of those changeş.
  - Preparation of a transitional balance sheet as at 1 July 2004, under Australian Equivalents.
  - Preparation of an Australian Equivalent balance sheet at the same time as the 30 June 2005 statements are prepared.
  - Meeting reporting deadlines set by Finance for 2005-06 balance sheet under Australian Equivalent Standards.
  - The plan also addresses the risks to successful achievement of the above objectives and includes strategies to keep implementation on track to meet deadlines.
  - To date, all major accounting and disclosure have been identified. The required changes are expected to be implemented by 30 September 2004.

Major changes in accounting policy

Changes in accounting policies under Australian Equivalents are applied retrospectively i.e. as if the new policy had always applied. This rule means that a balance sheet prepared under the Australian Equivalents must be made as at 1 July 2004, except as permitted in particular circumstances by AASB 1 *First-time Adoption of Australian Equivalents to International Financial Reporting Standards*. This will enable the 2005-06 financial statements to report comparatives under the Australian Equivalents also. Changes to major accounting policies are discussed in the following paragraphs.

(i) Property plant and equipment

It is expected that the Finance Minister's Orders will require property plant and equipment assets carried at valuation in 2003-04 to be measured at up-to-date fair value from 2005-06. This differs from the accounting policies currently in place for these assets which, up to and including 2003-04, have been revalued progressively over a 3-year cycle and which currently include assets at cost (for purchases since the commencement of a cycle) and at deprival value (which will differ from their fair value to the extent that they have been measured at depreciated replacement cost when a relevant market selling price is not available).

However, it is important to note that the Finance Minister requires these assets to be measured at up-to-date fair values as at 30 June 2005. Further, the transitional provisions in AASB 1 will mean that the values at which assets are carried as at 30 June 2004 under existing standards will stand in the transitional balance sheet as at 1 July 2004.

(ii) Employee Benefits

The provision for long service leave is measured at the present value of estimated future cash outflows using market yields as at the reporting date on national government bonds.

Under the new Australian Equivalent standard, the same discount rate will be used unless there is a deep market in high-quality corporate bonds, in which case the market yield on such bonds must be used.

(iii) Financial Instruments

Financial assets and liabilities are likely to be accounted for as 'held at fair value through profit and loss' or available-for-sale where the fair value can be reliably measured (in which case, changes in value are initially taken to equity). Fair values will be published prices where an active market exists or by appraisal.

(iv) Cash and receivables are expected to continue to be measured at cost information.

Financial assets, except those classified as 'held at fair value through profit and loss', will be subject to impairment testing.

Note 3. Economic Dependency

The Anglo-Australian Telescope Board was established by the Anglo-Australian Telescope Board Agreement Act 1970. The Board is dependent upon Australian government revenue and contributions from the United Kingdom government for its continued existence and ability to carry out its normal activities.

Note 4. Operating revenues	**2004 $'000**	2003 $'000
4A Australian Government revenues		
Australian government revenue	**4,032**	3,929
4B United Kingdom Government contribution		
The Board received the following contribution during the year from the United Kingdom government	**3,700**	3,700
4C Sales of Goods and services		
Goods - external entities	**1,210**	1,384
Services - external entities	**193**	310
Total sales of goods and services	**1,403**	1,694
Cost of sales of goods	**831**	1,540
4D Interest Revenue		
Interest on deposits	**47**	56
4E Other Revenues		
Grants Revenue	**196**	121
Other Revenue	**72**	190
Total	**268**	311
Note 5. Operating Expenses		
5A Employee Expenses		
Wages and salaries	**4,400**	3,816
Superannuation	**786**	710
Leave and other benefits	**501**	459
Other employee expenses	**39**	29
Total employee benefits expenses	**5,726**	5,014
Workers' compensation premiums	**14**	14
Total employee expenses	**5,740**	5,028

5B Suppliers' Expenses

	2004	2003
	$'000	$'000
Goods from external entities	**624**	589
Services from external entities	**1,706**	1,554
Motor vehicle lease costs	**96**	82
Supply of goods and services: external projects	**243**	688
Total suppliers' expenses	**2,669**	2,913

5C Depreciation

Property, plant and equipment	**2,626**	2,739

The aggregate amounts of depreciation expensed during the reporting period for each class of depreciable asset are:

Buildings	**1,006**	995
Telescopes	**706**	704
Instruments	**596**	667
Plant and equipment	**318**	373
Total depreciation	**2,626**	2,739

5D Write-down of Assets

Plant and equipment – write-down	**686**	-

5E Net Foreign Exchange Loss

Non-speculative	**(2)**	3

Note 6 Financial assets

6A Cash

Cash at bank and on hand	*(Note 17A)*	**996**	619

6B Receivables

Goods and services		**-**	25
Other receivables		**1,097**	239
GST Receivable		**66**	40
Total receivables net	*(Note 17A)*	**1,163**	304

Receivables for Goods and Services

Credit terms are net 30 days (2003: 30 days)

	2004	2003
	$'000	$'000
Receivables (gross) are aged as follows:		
Not Overdue	**1,121**	293
Overdue by:		
-Less than 30 days	**31**	-
-30-60 days	**-**	8
-more than 60 days	**11**	3
Total receivables (gross)	**1,163**	304

Note 7: Non-Financial assets

7A Land and buildings

	2004	2003
	$'000	$'000
Land - at 1 July 2002 valuation (fair value)	**18**	18
Land (the use of which is free of charge) at 1 July 2002 valuation (fair value)	**2,350**	2,350
Total land	**2,368**	2,368
Buildings - at 1 July 2002 valuation (fair value)	**44,910**	44,910
Less accumulated depreciation	**(27,146)**	(26,248)
	17,764	18,662
Buildings at cost	**82**	-
Less accumulated depreciation	**1**	-
	81	-
Total buildings	**17,845**	18,662
Buildings (the use of which is free of charge)		
At 1 July 2002 valuation (fair value)	**5,340**	5,340
Less accumulated depreciation	**(3,313)**	(3,206)
	2,027	2,134
Total land and buildings	**22,240**	23,164

7B Plant and equipment	**2004 $'000**	2003 $'000
Telescope & ancillary equipment at 1 July 2001 valuation (deprival)	**35,137**	35,137
Less accumulated depreciation	**(21,207)**	(20,504)
	13,930	14,633
Telescope and ancillary equipment at cost	**26**	26
Less accumulated depreciation	**(4)**	(2)
	22	24
Telescope instrumentation at 1 July 2001 valuation (deprival)	**11,236**	13,251
Less accumulated depreciation	**(6,876)**	(7,786)
	4,360	5,465
Telescope instrumentation at cost	**3,632**	2,380
Less accumulated depreciation	**(73)**	(29)
	3,559	2,351
Other plant and equipment at 1 July 2001 valuation (deprival)	**2,220**	3,587
Less accumulated depreciation	**(1,357)**	(2,265)
	863	1,322
Other plant and equipment at cost	**1,322**	546
Less accumulated depreciation	**(576)**	(69)
	746	477
Total plant and equipment	**23,480**	24,272
Total property, plant and equipment	**45,720**	47,436

All revaluations are conducted in accordance with the revaluation policy stated in note 1.

7C. Analysis of Property, Plant and Equipment

TABLE A

Reconciliation of opening and closing balances of property, plant and equipment

Item	Land $'000	Buildings $'000	Total land and buildings $'000	Plant and equipment $'000	Total $'000
Gross value as at 1 July 2003	2,368	50,250	52,618	54,927	107,545
• Additions-purchase of assets	-	82	82	1,514	1,596
• Scrap	-	-	-	2,868	2,868
Gross value as at 30 June 2004	**2,368**	**50,332**	**52,700**	**53,573**	**106,273**
Accumulated depreciation as at 1 July 2003	-	29,454	29,454	30,655	60,109
• Depreciation charge for year	-	1,006	1,006	1,620	2,626
• Scrap	-	-	-	2,182	2,182
Accumulated depreciation as at 30 June 2004	**-**	**30,460**	**30,460**	**30,093**	**60,553**
Net book value as at 30 June 2004	**2,368**	**19,872**	**22,240**	**23,480**	**45,720**
Net book value as at 1 July 2003	2,368	20,796	23,164	24,272	47,436

ANGLO-AUSTRALIAN TELESCOPE BOARD

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
for the year ended 30 June 2004

TABLE B

Assets at valuation

Item	Land	Buildings	Telescope	Instruments	Plant & equipment	Total
	$'000	$'000	$'000	$'000	$'000	$'000
As at 30 June 2004						
Gross value	**2,368**	**50,250**	**35,137**	**11,236**	**2,220**	**101,211**
Accumulated depreciation	**-**	**30,459**	**21,207**	**6,876**	**1,357**	**59,899**
Net book value	**2,368**	**19,791**	**13,930**	**4,360**	**863**	**41,312**
As at 30 June 2003 Gross value	2,368	50,250	35,137	13,251	3,587	104,593
Accumulated depreciation	-	29,454	20,504	7,786	2,265	60,009
Net book value	2,368	20,796	14,633	5,465	1,322	44,584

	2004	2003
	$'000	$'000
7D Other non-financial assets		
Prepayments for goods and services - includes insurance premiums, rentals in advance and subscriptions; all pre-payments are current	**116**	80

Note 8. Provisions

8A Employees

Salaries and wages	**209**	159
Leave	**1,529**	1,305
Superannuation	**281**	220
Aggregate employee benefits liability and related costs	**2,019**	1,684
Current	**915**	801
Non-current	**1,103**	883
	2,019	1,684

Note 9. Payables

9A Supplier Payables

Trade creditors	**73**	138

All suppliers' payables are current

9B Other Payables

Non Trade creditors	**1,081**	55
PPARC Contribution in Advance	**925**	-
Institute of Astronomy	**-**	13
ECHIDNA (note 16B)	**94**	488
Durham University (note 16F)	**11**	-
Total Other Payables	**2,111**	556

All other payables are current

Note 10. Analysis of Equity

	Accumulated	Result	Revaluation	Reserve	Total	Equity
	2004	2003	**2004**	2003	**2004**	2003
	$'000	$'000	$'000	$'000	$'000	$'000
Opening balance at 1 July	**10,086**	11,079	**35,975**	34,596	**46,061**	45,675
Net (deficit)	**(2,269)**	(993)			**(2,269)**	(993)
Net revaluation increment/(decrement)				1,379	**-**	1,379
Closing balance at 30 June	**7,817**	10,086	**35,975**	35,975	**43,792**	46,061

Note 11. Cash Flow Reconciliation

	2004	2003
	$'000	$'000
Reconciliation of net deficit to net cash from operating activities:		
Operating (deficit)	**(2,269)**	(993)
Non-Cash Items		
Depreciation/amortisation	**2,626**	2,739
Property, plant, equipment write off	**686**	-
Changes in assets and liabilities:		
Decrease/(increase) in receivables	**(859)**	320
Increase/decrease in prepayments	**(36)**	2
Increase/(decrease) in employee provisions	**335**	31
Increase/(decrease) in supplier payables	**(65)**	38
Increase/(decrease) in other payables	**1,555**	(410)
Net cash from operating activities	**1,973**	1,727

Note 12. Related Party Disclosures and Remuneration of Directors

Members of the Board during the year were:

Professor M Birkinshaw, Mr G Brooks, Professor L Cram, Professor R D Ekers, Professor K Freeman, Dr P Roche.

The Directors do not receive remuneration.

Professor K Freeman is also an employee of the ANU Research School of Astronomy and Astrophysics (RSAA). RSAA provides site services to the AAO at Siding Spring. Professor L Cram is Deputy Vice-Chancellor (Research) at ANU. Professor R D Ekers is an Australian Research Council Federation Fellow, hosted by Australia Telescope National Facility, a Division of CSIRO; CSIRO provides site services to the AAO at Epping.

Note 13. Remuneration of Officers

The number of officers who receive or were due to receive total remuneration of $100,000 or more are as follows:

	2004 Number	2003 Number
$110 000 - $119,999	**-**	1
$120 000 - $129 999	**1**	1
$130 000 - $139 999	**3**	1
$140 000 - $149 999	**2**	-
$160 000 - $169 999	**-**	1
	$	$
Aggregate amount of total remuneration of officers shown above	**813,256**	552,539

Note 14. Remuneration of Auditors

	2004	2003
	$	$
Remuneration to the Auditor-General for auditing the financial statements for the reporting period, excluding GST	**26,500**	26,550

No other services were provided by the Auditor-General during the reporting period.

Note 15. Average Staffing Levels

	2004	2003
The average staffing levels for the AAO during the year were:	**68**	70

Note 16. External Projects

16A. In May 1999, the AAO entered into an agreement with the European Southern Observatory (ESO) to build a positioner for the Very Large Telescope in Chile. This was a natural extension of the work the AAO had done on its own instruments and provided an opportunity for the AAO to enhance its instrumentation building skills. The instrument was delivered to Chile in February 2002 and fully commissioned by April 2004. ESO has made a series of staged payments. The position at 30 June 2004 was as follows:

	2004 $000	2003 $000
Instalments received	**96**	285
Suppliers expenses	**(13)**	(32)
Employee expenses	**(11)**	(216)
Balance from prior year	**(96)**	(285)
Project loss absorbed by AAO	**24**	152
Instalments receivable – included in Debtors	**-**	(96)

16B. The National Astronomical Observatory of Japan contracted the AAT Board to design and build a fibre positioner, *The Echidna*, for the Subaru Telescope. The contract began just before the end of the 1998-99 year and will be completed in 2005. The position at 30 June 2004 was as follows:

	2004	2003
	$'000	$'000
Instalments received	**800**	1,050
Suppliers' expenses	**(345)**	(546)
Employee expenses	**(514)**	(450)
Balance from prior year	**488**	726
On cost credited to other revenue	**(334)**	(292)
Instalments unexpended- included in Other Liabilities	**95**	488

16C. Institute of Astronomy

The AAT Board was contracted in August 2001 to provide a preliminary design for an instrument, *DAZLE* (Dark Ages "Z" Lyman Explorer) for the Institute of Astronomy, University of Cambridge. The project will finish in August 2004.

Instalments received	**41**	255
Suppliers expenses	**-**	(8)
Employee expenses	**(45)**	(161)
On cost credited to other revenue	**(13)**	(85)
Balance from prior year	**13**	12
Project loss absorbed by AAO	**(4)**	-
Instalment unexpended – included in Other Liabilities	**-**	13

16D. MOMFOS

The AAT Board was contracted to provide a concept design study *MOMFOS* (Multi-object Multi-Fibre Optical Spectrograph) for the Association of Universities for Research in Astronomy (AURA) to build an "Echidna" style fibre positioner. The project began in late 2002-2003 and finished in mid 2003-2004.

Instalment received	**44**	-
Suppliers expenses	**-**	(1)
Employee expenses	**(9)**	(13)
On cost credited to other revenue	**(7)**	(11)
Balance from prior year	**(25)**	-
Project gain absorbed by AAO	**3**	-
Instalment Receivable – included in Debtors	**-**	25

16E. WiFES

The AAT Board contracted to provide ANU with a concept design for an instrument called WiFES (a dual beam integral field spectrograph). The contract was started and finished within the financial year 2002-2003.

	2004	2003
	$'000	$'000
Instalment Received	**30**	-
Suppliers Expenses	**-**	(1)
Employee Expenses	**-**	(12)
On cost credited to other revenue	**-**	(12)
Balance from prior year	**(30)**	-
Surplus transferred to AAO budget	**-**	(5)
Instalments receivable, included in Debtors	**-**	(30)

16F. Astrophotonics

The AAT Board and Durham University jointly made an application to PPARC for funding of a research project. Initial funding commenced April 2004. The project aims to investigate and report on the application of photonic technology to astronomical instrumentation. Durham University is the primary grant-holder and will disburse the PPARC funds to the AAT Board as the project progresses.

Instalment Received	**23**	-
Employee Expenses	**(11)**	-
Instalments unexpended- included in Other Liabilities	**12**	-

Note 17. Financial Instruments.

Terms, conditions and accounting policies

Financial Instrument	Notes	Accounting Policies and Methods (including recognition criteria and measurement basis)	Nature of underlying instrument (including significant terms and conditions affecting the amount, timing and certainty of cash flows)
Financial Assets	6	Financial assets are recognised when control over future economic benefits is established and the amount of the benefit can be reliably measured.	
Cash	6A	Deposits are recognised at their nominal amounts.	
Receivables for goods and services	6B	These receivables are recognised at the nominal amounts due less any provision for bad and doubtful debts. Collectability of debts is reviewed at balance date. Provisions are made when collection of the debt is judged to be less rather than more likely.	Receivables are with both Commonwealth and external entities. Credit terms are net 30 days (2002/03: 30 days)
Financial liabilities	9	Financial liabilities are recognised when a present obligation to another party is entered into and the amount of the liability can be reliably measured.	
Trade creditors	9A 9B	Creditors and accruals are recognised at their nominal amounts, being the amounts at which the liabilities will be settled. Liabilities are recognised to the extent that the goods and services have been received (irrespective of having been invoiced).	Settlement is usually made Net 30 days (2002/03: 30 days).

Note 17A. Interest rate risk

Financial Instrument	Note	Floating Interest Rate **2004 $'000**	Floating Interest Rate 2003 $'000	Non Interest Bearing **2004 $'000**	Non Interest Bearing 2003 $'000	**Total 2004 $'000**	Total 2003 $'000
Financial Assets							
Cash at Bank	6A	**963**	588	**-**	-	**963**	588
Cash on Hand	6A	**-**	-	**33**	31	**33**	31
Receivables	6B	**-**	-	**1,163**	304	**1,163**	304
Total Financial Assets		**963**	588	**1,196**	335	**2,159**	923
Total Assets						**47,995**	48,439
Financial Liabilities							
Suppliers	9A	**-**	-	**73**	138	**73**	138
Other	9B	**-**	-	**2,111**	556	**2,111**	556
		-	-				
Total Financial Liabilities				**2,184**	694	**2,184**	694
Total Liabilities						**4,203**	2,378

The weighted average effective interest rate for Cash at Bank is 3.96% (2002-2003 3.65%)

Financial Assets

The net fair value of cash assets is their carrying value as shown.

Financial Liabilities

The net fair values of suppliers and other payables, all of which are short term in nature, are their carrying values as shown.

Note 17B. Credit Risk Exposures

The Anglo-Australian Telescope Board's maximum exposure to credit risk at reporting date in relation to each class of recognised financial assets is the carrying amount of those assets as indicated in the Statement of Financial Position.

The Anglo-Australian Telescope Board has no significant exposures to any concentration of credit risk.

Appendix B

AAO Staff at 30 June 2004

Director:	M M Colless, PhD, FAA
Executive Officer & AAT Board Secretary:	J E Wilcox, MSc (Econ)
Head of Instrumentation:	S C Barden, PhD
Head of Astronomy:	C G Tinney, PhD
Head of Instrument Science:	J Bland-Hawthorn, PhD
Operations Manager:	C J McCowage§
Astronomer-in-Charge:	F G Watson, PhD§
Astronomy & Instrument Science:	J A Bailey, PhD; S M Croom, PhD; S C Ellis, PhD; P R Gillingham, BE; R Haynes, PhD; A J McGrath, PhD; M Oestreich, BE; S D Ryder, PhD; W Saunders, PhD; R Sharp, PhD; R A Stathakis, PhD
Project Management:	C J Evans, MIEAust CPEng; G Frost, BE
Administration:	D Hewawitharana; D R Kingston, CPA; R L Martin§; K Powell, BA; G C Simms; H M Woods, MLitt
Library:	S D Ricketts, BSc
Software Development:	T J Farrell, BSc; R Heald, BSc; P Innes, BA; K Shortridge, PhD; S Smedley, BApp Sc; M Vuong, BE, B App Sc
Information Technology:	H Davies, MEngSc: R G Dean§; D M James, BSc (App); G J Kitley; C Ramage MEngSc§; K M Tapia-Sealey, PhD;
Electronics Group:	J A Collins§; D B Correll, BE; S M James§; D J Mayfield; R Muller; R G Patterson§; E J Penny; J H Stevenson§; L G Waller, BE
Optical and Mechanical:	J K Brzeski, BE; V Churilov, MSc; J P Dawson, BE; D Horiuchi; M M Kanonczuk§; U Klauser; A F Lankshear, BSc§; S Miziarski, DipME; N A Schirmer; G A Smith, BE BSc; D J Stafford§; J D Whittard
Telescope Operations & Maintenance:	UKST: D M Burton§; C J P Cass, BA§; M Hartley, BSc§; K S Russell§ AAT: W C Clarke§; K Fiegert§; F F Freeman§; B Jones§; S Lee§; J Pogson§;
AAO Associates:	R D Cannon PhD; D F Malin, DSc; W Orchiston, BSc PhD

§ denotes staff at Siding Spring, Coonabarabran

Appendix C

Client Service Charter

About us

Who We Are

The Anglo-Australian Observatory consists of the 3.9-metre Anglo-Australian Telescope (AAT) and the 1.2-metre UK Schmidt Telescope (UKST) on Siding Spring Mountain, outside Coonabarabran, NSW, and a laboratory in the Sydney suburb of Epping.

Our Purpose

The main purpose of the Anglo-Australian Observatory is to facilitate the best possible science through the provision of world-class optical and infrared observing facilities for British and Australian astronomers.

Our Clients

Our clients are the astronomers who are awarded, by independent time allocation committees in the United Kingdom and Australia, time to observe on Anglo-Australian Observatory telescopes.

About This Charter

This Charter sets out our commitments towards the service we will provide to you. It also sets out what you can do to make sure you get the best possible outcome from your observing run.

The Observatory is committed to maintaining and improving the quality of its services. We will monitor our performance in meeting the commitments set out in this Charter and change it as necessary. Your suggestions for improvement would be valued.

The AAO will report on its performance in its Annual Report.

If You Have a Complaint

If you have a problem or a complaint, please let the Director know of your concerns and, if possible, how you think improvements might be made. You can phone him on +61 2 9372 4811, fax on +61 2 9372 4880 or email Director@aaoepp.aao.gov.au

What you can expect from us

Courtesy

- We will be helpful and courteous in our dealings with you

Telescope Operations

- The AAT and UKST will be fully operational at the start of each night
- A technician will be on duty during the first part of the night to respond immediately to any technical problems

- At other times there will be a two-hour response time by the afternoon shift technician
- An AAT night assistant will be on duty all night and will operate the telescope. If there are any problems during the night, the night assistant will take immediate action either to fix the problem or arrange for someone else to fix it.

Instrumentation

- An AAO support astronomer will get in touch with you at least four weeks before your observing run to confirm the details of your run
- We will provide the instrumentation at the start of the evening that will enable you to undertake your scientific program as specified
- If requested, a support astronomer will be present for the first night to facilitate your obtaining the best possible data
- We will make available full documentation to guide you in carrying out your observations.

Data Exploitation

- We will provide adequate computer hardware and software to allow you to store, access and analyse all data acquired with AAO instrumentation during your observing run.

General Working Environment

- We will provide office space and facilities for each visiting observer
- We will provide a comfortable and functional control room
- We will provide a library with essential astronomical and technical journals and texts.

Administration

- We will respond by the next working day to your inquiries
- We will make your Lodge bookings for you
- We will make bookings on the airline between Sydney and Coonabarabran for you and arrange a taxi to meet the plane at Coonabarabran airport.

What we would like you to do

- Arrive properly prepared for your observing run
- Make yourself familiar with and follow the safety guidelines
- Be thoughtful and considerate in the demands you make of AAO staff
- Make sure your data is recorded on a suitable backup medium at the end of your observing run
- Give us constructive feedback on how we may improve our service, using the observer report form
- If we do particularly well, let us know.

Appendix D

Occupational health and safety

AATB Policy

The overall aim of the Anglo-Australian Telescope Board's safety policy is that managers and employees at every level and working visitors are provided with a safe and healthy working environment, and every practicable measure is taken to ensure this. In establishing detailed Anglo-Australian Telescope Board safety and health policies the recommendations of bodies such as the National Occupational Health and Safety Commission are followed.

The mechanism for continuing consultation between management and the employees on occupational health and safety issues and for reviewing the effectiveness of the measures taken to ensure the health and safety of the Board's employees are Health and Safety Committees established at Coonabarabran and Epping. The Executive Officer, together with one representative of management at each site nominated by the AAO Director, are members of the Coonabarabran and Epping Health and Safety committees. The health and safety representative and one other elected staff member comprise the remaining membership of each safety committee.

The Safety Committees act as foci for safety issues but their existence does not absolve each employee of the responsibility for safe working consistent with the extent of the employee's control over, or influence upon, working conditions and methods.

It is also each employee's responsibility to report or recommend to the Safety Committee measures which, in the employee's view, are necessary to avoid, eliminate, or minimise safety and health hazards in the workplace of which he or she is aware.

Each employee must observe all instructions issued by supervisors in the course of a job, or written instructions issued by the Director or the Director's nominee, which relate to the health and safety of the employee and others and must make proper use, or to the extent of his or her responsibility, ensure that proper use is made of all safeguards, safety devices, personal protective equipment and other appliances provided for health or safety purposes.

No employee shall, or cause another employee to, interfere with, remove, displace, or render ineffective any safeguard, safety device, personal protective equipment or other appliance provided for safety purposes except when necessary as part of an approved maintenance or repair procedure. The names of the members of each Health and Safety Committee are posted on notice boards at Coonabarabran and Epping.

Appendix E

Board members

The AAT Board has six members, three appointed by each country, and the role of Chair alternates between the two countries. Professor R D Ekers is Chair and Professor Mark Birkinshaw is Deputy Chair.

At 30 June 2004 the Board members and their terms of office were:

Australia

Professor R D Ekers, (Chair), Director, Australia Telescope National Facility (1 July 1997 – 31 December 2004)

Professor K C Freeman, Research School of Astronomy and Astrophysics, Australian National University (1 July 2001 – 30 June 2004)

Professor L Cram, Deputy Vice–Chancellor (Research), Australian National Universityl (1 July 2001 – 30 June 2004)

United Kingdom

Professor M Birkinshaw, (Deputy Chair), William P Coldrick Professor of Cosmology and Astrophysics, University of Bristol (31 December 2003 – 1 January 2005)

Dr P Roche, Department of Astrophysics, University of Oxford (1 Jan 2003 – 31 December 2006)

Mr G Brooks, Head of Astronomy Division, Particle Physics and Astronomy Research Council (Indefinite appointment)

Special responsibilities

Professor Cram and Mr Brooks have been nominated by the Designated Agencies, DEST and PPARC respectively, to represent their agencies on all matters in relation to the operation of the Agreement.

Board meetings

The AAT Board usually meets twice each year. All members attended both meetings.

In September 2003, the meeting was held at Epping. In April 2004, the Board meeting was held at Siding Spring and Epping. The associated symposium was held jointly with the Australia Telescope National Facility (ATNF), in Sydney. These joint symposia help to maintain the strong links which exist between the radio and optical communities in Australia.

Advisory committees

AAO Users' Committee

The AAO Users' Committee (AAOUC) consists of six members: three external members each from the UK and Australia.

Its terms of reference are:

1. To provide advice to the Director on operational and developmental issues relating to the facilities provided by the AAO. These include the Anglo-Australian Telescope, the Schmidt Telescope and all aspects of support provided by the AAO.

2. To make recommendations to the Director that seek to maximise the scientific productivity and maintain the competitiveness of the Observatory, taking into account the likely resources availability.

3. To consult widely with the community, liaising where necessary with national time assignment groups, to establish priorities for both operational and instrumentation initiatives.

4. To interface with the design review panels, commenting on any issues arising from these panels that impact on the delivery of key user science requirements.

5. To provide a written report through the Director for submission to each September meeting of the AAT Board.

At 30 June 2004 the six AAOUC members were:

Australia	United Kingdom
Dr G Da Costa (ANU) (Chair)	Dr S J Warren (ICSTM)
Dr T Bedding (Sydney)	Dr Mark Casali (ROE)
Dr M J Drinkwater (Qld)	Dr S G Ryan (OU)

Time allocation committees

Under Article 5 of the Anglo-Australian Telescope Agreement, observing time and use of associated facilities and services is shared equally by Australia and Britain. The Board has chosen to exercise its responsibility for the allocation of time on the AAT and UKST through arrangements made with the two Designated Agencies. Under guidelines set by the Board, each agency operates through national committees – the Australian Time Assignment Committee (ATAC) and the UK Panel for the Allocation of Telescope Time (PATT) – which allocate time on the AAT on the basis of the scientific merit of proposals submitted by astronomers, including AAO staff.

At 30 June 2004, membership of the committees was:

ATAC	PATT (AAT TAG)
Dr B Gibson (Swinburne) *Chair*	Dr P Best (Edin) *Chair*
Dr M Drinkwater (Qld) *DeputyChair*	Dr S G Ryan (OU)
Dr M Asplund (RSAA)	Dr J van Loon (Keele)
Dr M Burton (NSW)	Dr J Liske (St Andrews)
Dr G Lewis (Sydney)	
Dr S Driver (RSAA)	
Dr R Webster (Melbourne)	