

*EXTRACT FROM*

A Personal History of the  
Royal Greenwich Observatory  
at Herstmonceux Castle  
1948 – 1990

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Sidford, Devon: 2009

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## 7 THE MOVE TO CAMBRIDGE AND CLOSURE – 1990 TO 1998

### 7.1 Introduction

Some staff moved to Cambridge during the autumn of 1989 and the move was completed during April 1990. I do not appear to have any notice about the final timetable and arrangements. The new building was formally opened by the Duke of Edinburgh on 14 June 1990. A coach was provided to take invited ex-staff from Sussex to Cambridge and lunch was served in a marquee in the grounds. It was cloudy, but dry. We were able to visit the adjacent Institute of Astronomy (via a connecting corridor) as well as to look around the new building. I also took the opportunity to deal with some incoming and outgoing correspondence.

I subsequently visited the RGO while I was in Cambridge to work on the RGO archives in the Cambridge University Library or for other reasons. My visits were brief and I spoke to only a few members of the staff, but my general impression was that those who had moved their homes were quite happy with their new surroundings and life in a university environment. Andrew Sinclair, for example, felt that the move had had positive results. Not unexpectedly on the other hand, those who had left their families in Sussex were resentful of the disruption of their lives that the move had caused. The flexible working hours arrangements were stretched so that such staff need spend only 4 days in Cambridge each week, this was poor compensation and retirement was eagerly awaited.

Since I made only short visits to the RGO and did not have direct involvement in its activities this chapter contains only brief notes on a selection of the activities of the observatory during this period, which was unexpectedly brought to an end by the decision to close it completely. It had been widely assumed that the move from the historic castle, the drastic cuts in the levels of staffing and the success of the La Palma operations would free the RGO from the succession of reviews that had dominated the previous decade. Unfortunately this was not to be the case, as the costs of providing and operating top-quality observing facilities overseas rose faster than the funds that were made available by the government as it favoured applied research over ‘blue-skies’ research on which it could not see any immediate return.

One of the actions of the government was to split (in 1994) the Science and Engineering Research Council into the Engineering and Physical Sciences Research Council (EPSRC) and the Particle Physics and Astronomy Research Council (PPARC). By this means it could determine the relative levels of the research funding without having to interfere directly in the running of the councils. This left ground-based astronomy in direct competition with the particle-physics and space-research communities, both of which participated in very expensive international projects in CERN, ESA and NASA. Moreover, it appears that the administrators and many of the university members on the committees took the views that it was wasteful to have two Royal Observatories responsible for supporting the overseas facilities and that universities gave better value for research-council funds since their overheads were met, at least partially, by other funding agencies.

## 7.2 Reviews of policy by SERC and PPARC

The next review of the future of the RGO started within less than one year of the move to Cambridge and in 1991 the ‘Hughes Panel’ of SERC recommended that the RGO and the ROE should have a unified management structure with both observatories under one director. This idea was extended in 1992 when Boksenberg was given the oversight of both of the Royal Observatories and also of the Joint Astronomy Centre on Hawaii and the Isaac Newton Group on La Palma. This arrangement was, however, short-lived as the PPARC panel for the ‘strategic review of optical infrared and millimeter astronomy’ recommended in 1995 that the island sites should be given greater autonomy and that an Astronomy Technology Centre should take over the functions of both RGO and ROE. As a consequence Boksenberg moved to the Institute of Astronomy and Jasper Wall became the Director of RGO in November 1995.

The decision on the site for the Astronomy Technology Centre took longer to resolve, but in July 1997 it was announced that it would be at the ROE. The RGO was encouraged to develop a proposal for it to become an independent institute that would be funded by contracts from research councils and from commercial activities, such as the development and sale of robotic telescopes. The Council of PPARC rejected the proposal in December 1997 and decided that the RGO should close at the end of October 1998. Protests by almost the whole of the astronomical community, including the Astronomer Royal, then Martin Rees (*A&G* 39), and by many others were ignored and so the arrangements for the continuation of some of the activities and for the disposal of its assets had to be made in an incredibly short time.

## 7.3 Activities at Cambridge

The principal activity of the RGO at Cambridge was the support of the telescopes of the Isaac Newton Group on La Palma, but in addition some RGO staff were involved in the new Gemini project. This involved the construction of two 8-m telescopes, one of which would be set up in Hawaii, while the other would be in Chile. One minor consequence of this project was that the RGO house journal *Gemini* was renamed *spectrum*. Articles about this project and of the development of instruments for La Palma are given in the final issue of *spectrum* for October 1998. There are also articles about other aspects of the work such as is shown by the following summary of the contents. Further details are given in appendix F.6.

The RGO 1978-98; A Personal View. Jasper Wall, Director, 1995-1998.

Gemini - RGO's Contribution. Neil Parker.

Report of the ING Visiting Panel, April 1998. Rene Rutten, ING.

Prime Time Telescope Stories. Sue Worswick.

RGO CCDs - Review, Highlights and Update. Paul Jorden, Paddy Oates, Percy Terry.

The Evolution of Computers at the RGO. Ralph Martin.

The INT Wide Field Camera. Derek Ives, ATC (formerly RGO).

Fun and Games with WYFFOS/AUTOFIB-2. Terry Bridges, IoA (formerly RGO).

Extending the Wavebands at ING. Shaun Hughes, IoA (formerly RGO).

RGO, AAO, and the City of London. Paul Jorden.  
 The ING Archive and RGO Data Centre. Jim Lewis and Ed Zuiderwijk.  
 Astronomy Research at the RGO. Max Pettini.  
 A Staff Photograph 1996.  
 The Herstmonceux Conference Series. Margaret Penston.  
 RGO Preprints. Julie Loaker.  
 Holding the PATT baby. Bill Martin.  
 Towards a 3D Stellar Reference Frame. F. van Leeuwen.  
 The UK Satellite Laser Ranging Facility. Graham Appleby.  
 Eclipses and the Rotation of the Earth. L. V. Morrison (RGO) and F. R. Stephenson (Durham University).  
 The NAO - Past and Present. Catherine Hohenlerk.  
 New Generation Robotic Telescopes. Anon.  
 All Astronomers Royal; the legacy of Airy. Adam Perkins.  
 Historical Artefacts at the RGO. Robin Catchpole.  
 Public Understanding of Science. Margaret Penston.  
 The Interview. Margaret Carter (ex-RGO) and Robin Catchpole.  
 Spelling Existence. A poem by Anne Reynolds.  
 The Equatorial Group, Herstmonceux, 1958-63. Derek Jones (IoA, formerly RGO).  
 Views of Gemini. Two photographs.  
 Bread and Cheese Lunch. Andrew Johnson.  
 First Sighting. An appreciative letter.  
 Friday the 13th. Bernard Yallop (RGO, retired)  
 Cambridge Young Astronomers at the RGO. Peter Ingram, Cambridge Young Astronomers.

I hope that copies of this issue *spectrum* have been distributed widely and will be available to readers of this account. **Consequently, I have made no reference to the activities on La Palma.** The remainder of this chapter is concerned only with activities in the UK and, in particular, with some topics that are of particular interest to me.

### 7.3.1 H. M. Nautical Almanac Office

Catherine Hohenkerk's article in *spectrum* gives an interesting and comprehensive account of the work of the Office in Cambridge and so this section is only intended to summarise the principal aspects. After the move the scientific staff of the NAO was reduced to three: Bernard Yallop, Catherine herself and Don Taylor. In addition, Joy Hamblyn assisted with the secretarial and other work involved in the preparing the 'copy' for the printer. TOPPS was used for the tabular pages (see section 6.3.3.1), while a word-processor system was used for the explanatory pages. Steve Bell and David Harper were added to the staff in 1993 and 199? respectively.

PPARC had insisted that the work of the Office should be completely self-financing and this was made possible because the returns from the sales of the *Nautical Almanac* were sufficient to make good the losses on other publications and data

services. This had been the case in earlier years when the almanacs were published by H. M Stationery Office, which was concerned only with recovering the printing costs and not the costs incurred in the production of the copy. We then did not have to concern ourselves with the financial arrangements for the publications as all the costs of salaries and equipment were met by the Admiralty and later by SRC/SERC. (At that time the work that was concerned directly with the publication of the almanacs was only a small part of the activities of the Office.) Even with the reduced staff at Cambridge Don Taylor was able to continue his research on the orbits of satellites.

The production and publication of the almanacs was critically dependent on the cooperation with the Nautical Almanac Office of the U.S. Naval Observatory. All the copies of the *Astronomical Almanac* and of *Astronomical Phenomena* were printed in America, but the separate printing of the *Nautical Almanac* and the *Air Almanac* continued in both countries. The Royal Air Force decided that had no use for the daily tabulations in the *Air Almanac* and so from the edition for 1998 an abridged version containing mainly rising and setting for the Sun and Moon was published as *The UK Air Almanac*. The Office continued to produce *The Star Almanac for Land Surveyors* and five-yearly editions of *Compact Data for Navigation in Astronomy*. The edition of the latter for 2001-2005 was largely prepared at Cambridge and was renamed *NavPac and Compact Data 2001-2005*. It contained a CD-ROM and a printed manual for the use of the NavPac software package for astronavigation with the aid of a marine sextant and an IBM-compatible PC.

In 1996 the Office published *A Guide to the 1999 Total Eclipse of the Sun*. This was written by Steve Bell and proved to be a 'best seller'. Its reprinting in 1997 as *The RGO Guide to ...* was an indication of the commercialisation of the NAO's activities. It included a mylar eclipse viewer. Unfortunately, many people, including me, were disappointed when cloud covered almost the whole of Cornwall for the period of the eclipse! The Office continued to prepare astronomical and calendrical data for distribution by the Public Information Unit of the RGO. Data for observers and observatories was also made available on the world-wide web. There was growing demand for information for legal purposes and David Harper was given the task of preparing statements of witnesses that would be accepted as authoritative statements of fact by the courts.

Bernard Yallop retired in September 1997 and his place was taken, as an interim measure on a part-time basis, by Andrew Sinclair, who had moved from the Office in 1989 to take charge of the SLR Department. He used the term 'Head' rather than 'Superintendent'. He had the unenviable task of trying to ensure that the work of the Office could be continued under appropriate conditions after the closure of the RGO. It was eventually decided that the Office should become part of the Space Science and Technology Department of the Rutherford Appleton Laboratory. It was then headed by Patrick Wallace, although Steve Bell supervised the day-to-day work. The staff, except David Harper who took a post at the Sanger Institute, moved to Chilton in 1999. The Office formally became part of the UK Hydrographic Office in Taunton, Devon, on 1 April 2006, but the Steve Bell and Catherine Hohenkerk did not move until later. Don Taylor is still at RAL.

### 7.3.2 The RGO Library

The library was in a large pleasant room opposite to the main entrance. It held mainly recent books and current issues of journals and this was probably sufficient for

most purposes as the library of the Institute of Astronomy was not far away. Moreover older volumes were stored in the tower of the Cambridge University Library; they were, however, moved later to shelves in a newly built part of CULib. where they were not freely accessible. The new building did not have a suitable place for the Airy Collection of rare books and these were stored in their boxes. The newly appointed librarian was Ingrid Howard. Unfortunately, when the closure of the RGO was imminent she moved to PPARC central office and this may account for the absence of any article about the library in the final issue of *Spectrum*.

In 1991 the library was formally named the *Michael Penston Library*. (See *Gemini* 32) Michael had been one of the RGO's leading research astronomers and had been promoted on individual merit to grade 6 (formerly SPSO) in 1985. He died from cancer in December 1990 at the age of 47 and his obituary in *The Guardian*, which was written by Martin Rees, was headed 'Astronomy's bright quasar'. He had been chairman of the Education Committee of the Royal Astronomical Society and a Michael Penston Astronomy Prize is now awarded annually for a thesis on an astronomical topic. (This complements the Blackwell Prize for a geophysical thesis.)

The library needed space for new material and so weeding of the stock that had been selected in haste during the move from Herstmonceux took place. It was decided that the collections of the RGO and IoA should be merged and so a large number of duplicate items became available for disposal. This process had not been completed when Ingrid left and the IoA librarian, Julie Nicholas, continued the task. So far my attempts to find out what decisions were made about the library when the RGO was closed have been unsuccessful. Some other books, including the Airy Collection, went to the (Old) Royal Observatory at Greenwich. My enquiries have, however, revealed that large numbers of books were dumped in skips for disposal. Some were rescued by a member of the staff of the IoA, who regarded this episode as one of the darkest in an altogether shameful saga.

### 7.3.3 The RGO Archives

The RGO archives that were transferred from Herstmonceux were stored in crowded conditions in a large room on the 6th level of the tower of the Cambridge University Library. Adam Perkins was appointed to a post in the Manuscripts Division of the Library and was able to continue as the RGO archivist. He was, however, expected to undertake other duties in the Division and he no longer had the resources of the Laurie Project Team to continue sorting and listing the archives. I understand that SERC/PPARC paid part of his salary.

The archives are arranged in 'classes' and there are numbered boxes for each class. For the classes that were catalogued by the Laurie Project the documents are listed in 'pieces' and each 'folio' is numbered. A piece may consist of few or many pages, or it may be special item such as a photograph or visitors book. The lists are in computer files and print-outs are available in the library. For other classes, such as departmental records and recent acquisitions, there are no detailed lists.

I have made 8 visits, each of several days, to the RGO archives since the move in 1990. I was then privileged to have direct access to the collection so that I did not have to request items to be brought to the Reading Room. At first, I was particularly interested in the archives of the NAO. I found, for example, that the batches of correspondence files were scattered throughout the boxes in which they had been placed

for the move. Consequently, I spent much of my time sorting the files into sequence and arranging other material in a more logical way. On my return home, I revised the lists of the contents of the boxes and sent copies of my computer files to Adam. I also used to make manuscript notes about the contents of the listed pieces or unlisted classes of particular interest to me. Most of these notes are, however, still in manuscript. (I hope, however, that they will eventually be deposited in the archives and be of use to later researchers.)

Adam encouraged the staff of the RGO at Cambridge to transfer their out-of-date files to the archives and it appeared that the NAO staff did this, but I do not know whether this was true of the other departments. When the RGO was closed a large number of boxes of files were passed to CULib and are in store there. As far as I am aware, Adam has not been able to examine them in any detail. I fear that a lot of archival material went into the skips with the unwanted library books!

#### **7.3.4 The RGO collection of astronomical plates**

The collection of astronomical plates and photographs did not go to the Cambridge University Library with the archives, but instead were transferred to the new RGO building where appropriate accommodation was provided for their storage and for access by interested astronomers. In this respect the move gave some benefit, but the closure of the RGO certainly did not. The plates were put into a commercial store and it was reported at first that they were not accessible to users. My enquiries in 2003 elicited, however, the following response from Dr C Vincent of PPARC central office.

With respect to the collection of glass plates, these are still in storage in London. The reasons for this are that the company which houses them is able to provide ideal conditions for storage, whilst also allowing limited access for users through request to PPARC). We did not inherit a proper inventory for the plates from RGO Cambridge but have undertaken a full assessment since they have been in store. Most of the plates are still in their wrappings from the move to Cambridge from Herstmonceux. [sic]

We get about 2-3 requests for plates per year from the community and try to meet these by offering access to the plates required through Cambridge or Edinburgh Universities, where suitable plate measuring machines are housed. Neither Cambridge nor Edinburgh have the space nor facilities to house the collection.

In the longer term, we have been talking to our colleagues in Europe (through the IAU) about options for either scanning the plates or setting up a central European plate facility. To date, attempts to fund such a scheme have not been successful.

So whilst we remain committed to keeping the plates in as good a condition as possible, I am afraid that the majority of astronomers would not give a high priority to developing this facility (against, say, access to the latest world-class telescope facilities).

It would be of interest to know whether information is readily available about the content and accessibility of the collection. Elizabeth Griffin (at or c/o IoA) is playing a major role in an international effort to ensure that collections of observatory plates are not lost, but are made available to the whole community.

#### **7.3.5 Satellite Laser Ranging Department**

Andrew Sinclair became head of the SLR Department and Graham Appleby moved with him to Cambridge to assist in the analysis of the data and in similar tasks. Roger Wood, who had not previously been involved in the SLR work, was made officer-in-charge of the team at Herstmonceux. There were other changes of staff, but the team continued to hold its place in the international 'league tables' for SLR stations.

The team was also responsible for monitoring the GPS transmissions in the area. A small hut was built by the dome to provide office accommodation to replace that lost by the move from the West Building. (See *Gemini* 32)

When the RGO closed the responsibility for the SLR work was transferred from PPARC to the Natural Environment Research Council (NERC). Sinclair took VPR and Appleby and Roger Wood became joint heads of the team. Appleby moved to the NERC Centre for Ecology and Hydrology at Monks Wood in Huntingdon, although the team was attached to the Science Programmes Directorate in the Swindon office for administrative purposes. The team made no less than 8 presentations at the 12th International Laser Ranging Workshop in 1999 and Appleby was elected to the governing board of the International Laser Ranging Service. Clearly, the decision that the observations should continue at Herstmonceux after the move of the RGO to Cambridge was justified by the subsequent results. When Wood retired in 2001 his place as station manager was taken by Philip Gibbs.

I do not know what happened to the Met Office observers, but I believe that the observations were continued.

### **7.3.6 The RGO Club, reunions and the RGO Society**

As compensation for the loss of the Clubhouse and sports facilities at Herstmonceux, the RGO Club was provided with limited accommodation at the end of the engineering wing of the new building. I gained the impression that this was used mainly at lunch-time and that the activities of the Club were much more less than those at Herstmonceux.

A reunion for current and former members of the NAO was held at the National Maritime Museum at Greenwich on 22 May 1993. RGO staff who had close connections with the NAO were also invited, as were family members. Many arrived in time to meet informally for lunch in the Museum's cafeteria before the main get-together in a room that was generously made available by the Museum. Some brought photographs to enhance the conversations. Bernard Yallop, the Superintendent, described the current staffing of the Office and the requirement for the work to be self-financing. After tea many walked up the hill to look around the Old Royal Observatory. Amongst the 99 persons present were Marion Rodgers and Flora Sadler, both of whom worked in the NAO from before the war until their retirements. Unfortunately, both have since died: Flora on 25 December 2000 at the age of 88 and Marion on 3 April 2003 at the age of 93. There is an illustrated report on the reunion in *Gemini* 42.

An RGO staff reunion was held in Herstmonceux Castle over the weekend of 5 & 6 October 1996. Peter Willmoth, who had stayed in Sussex, was the principal organiser. It was interesting to see the changes that had been made to the Castle as well as to meet again many friends. On the Saturday afternoon we were able to go around the gardens and visit the Science Centre in the Equatorial Group. After tea I gave a slide show on "The RGO at Herstmonceux Castle 1949–1990". I had also set up a display of photographs. Later in the evening there was a Buffet Supper and drinks at the bar in the Long Gallery. On Sunday morning there was chance to visit the West Building and I saw that my office was now an executive bedroom with TV and en-suite facilities. Then I repeated my slide show. We had coffee and lunch in the dining room, which was in the Great Hall that had been used for the RGO Library. My diary shows that David Spencer Jones was there.

One of the last events organised by the RGO Club was a staff reunion on 21 June 1998. This proved to be a warm, sunny day and a barbecue was held in the grounds behind the RGO building.

When the RGO closed the sports trophies and some other memorabilia were transferred to the SLR station at Herstmonceux. One large item was the plaque that commemorated the building of the Clubhouse at Herstmonceux. It had been remounted on the wall in the clubroom at Cambridge. [Philip Gibbs sent me a list in email on 28 April 2003.]

On the first anniversary of the closure of the RGO Jasper Wall, who then had a position in the University of Oxford, sent a letter to recent staff members inviting them to form an RGO Society. This must have produced a positive response as it was followed up on 20 February 2000 by a letter of invitation to a much larger number (234) of ex-members. It suggested that there should be annual dinner at about the time of the anniversary of the closure. The first, and so far only, such dinner was held on 28 October 2000 at Jesus College Cambridge. This was enjoyed by those who attended (I did not), but the following year a much larger number attended a reunion in Herstmonceux Castle on 30 September 2001.

Jasper Wall has returned to Canada and Neil Parker took his place as chairman of the Society. Further successful reunions, or ‘gatherings’, were held at the Castle on 23 October 2005 and 30 September 2007. Roger Wood has set up a web-site for the Society and this contains several articles giving recollections by members about their experiences in the RGO.

#### **7.4 Herstmonceux Castle and the International Study Centre**

The developers who bought Herstmonceux Castle had difficulty in obtaining planning approval for the changes that they wished to make and there was massive fall in the property market in the early 1990s. Consequently they eventually decided to sell the Castle and the estate. It was bought by the Queen’s University of Ontario, Canada, and converted for use as an international study centre by 1994. The Castle was used for the lecture facilities, offices and the refectory. This was in the Great Hall, but the balcony that had been built for the RGO Library was removed, so restoring the hall to its original form. The West Building was converted for use for accommodation for the students. The Equatorial Group became the Herstmonceux Science Centre, covering a variety of topics in addition to astronomy.

The Centre published *A History of Herstmonceux Castle* in 1994. This was written by David Calvert and Roger Martin of the Queen’s University. It complements Calvert’s earlier *History*, since each contains text and illustrations that are not in the other.

In January 1997, Dr Anthony Wilson (formerly at the Science Museum) wrote to me about plans for the “Herstmonceux Memoirs Project”. This led in 1999 to the publication of the booklet *Astronomers at Herstmonceux: in their own words*. The recollections of 8 former members of the RGO staff of their experiences were linked together by Wilson to give an account of the activities and of some of the events that would not have found their way into formal reports. He used some paragraphs from the article that I wrote for *Gemini* just before my retirement. The booklet contains much that was quite new to me and it may be strongly recommended to all with an interest in the RGO while it was at Herstmonceux.

In 2001 the Centre obtained a large lottery grant (c.£800000?) for the refurbishment of the telescopes and domes of the Equatorial Group. Brian Mack, who had succeeded John Pope as the RGO's senior telescope engineer, had moved back from Cambridge and was acting as a consultant for the project. He was seeking more information about some of the telescopes, but he mentioned that he arranged for all the engineering drawings to be transferred to the Centre from Cambridge when the RGO closed.

The original mirror for the Isaac Newton Telescope is now displayed in the Equatorial Group at the side of the steps leading up the pool. The laboratory blocks and the courtyard now contain a larger number of hands-on science exhibits for children, Special events, open evenings and courses in astronomy for beginners are arranged. The words 'and Discovery Park' have been added to the name on its leaflets and the Science Centre is now a popular tourist attraction.

### **7.5 Old Royal Observatory at Greenwich**

As far as I can recall there were very few links between the RGO and the Old Royal Observatory except at the times of special anniversaries, such the bicentenary of the *Nautical Almanac* in 1967, the tercentenary of the Observatory in 1975 and the centenary of the adoption of the Greenwich meridian to define 'longitude zero' in 1984. There was, however, one indirect link in that Stuart Malin, who had worked in the RGO in geomagnetism as well as in astronomy, was Head of the Department of Navigation and Astronomy in the National Maritime Museum from 1982 to 1996?. (His wife, Irene, and I were tennis partners until she went to South Africa in 1963, shortly after her marriage. We later won the SRC mixed-doubles tournament at Chiswick in 1974, 1975 and 1976 before she and Stuart moved to Edinburgh with the Magnetic Department. Tragically, she died of cancer in 1997.)

When the RGO closed the Old Royal Observatory was renamed the 'Royal Observatory Greenwich', without the comma that had been customary before 1948. Robin Catchpole transferred to a joint appointment with ROG and the Institute of Astronomy in Cambridge. I believe that he is primarily concerned with the public information work, which the ROG took over from RGO.

My understanding is that the following items were transferred from RGO to ROG: the Airy Collection of rare books; various artefacts, such as the bust of Isaac Newton and paintings; and some library books, although the ROG did not expect to keep them all. I wonder what happened to the Harrison clock that was on loan from the RAS and that used to hang in the main entrance to the West Building.

### **7.6 Conferences relating to the RGO and NAO**

During this period and the first few years after the closure of the RGO I attended several conferences that included papers relating to the history of the RGO and/or NAO. In some cases I presented a paper and I hope that the following personal notes will be of general interest.

In 1993 I prepared a poster paper about "the contributions of L. J. Comrie to dynamical astronomy" and this was displayed at conferences in both Cambridge (in June) and Oxford (in September). The first was an international conference on Optical Astrometry and Solar System Mechanics at Robinson College, Cambridge, while the second was a conference organised by the British Society for the History of

Mathematics on the History of Computation at Rewley House, Oxford. At the latter I also gave a demonstration of my simulation program for the Babbage Difference Engine at the Science Museum. Unfortunately, the engine lacks some of the features of the National accounting machines that Comrie introduced so successfully for the work of the NAO.

There was a conference at the National Maritime Museum at Greenwich with the title *Flamsteed at Greenwich* on 28 October 1995. This marked the publication of the first volume of Flamsteed's letters; the book had been edited by Frances Willmoth, the daughter of Peter Willmoth, a long-serving member of the RGO staff. The speakers included Adam Perkins, the RGO archivist.

In December 1995 I gave a paper on "An historical review of the variations in the rotation of the Earth, with special reference to the contributions of the Royal Greenwich Observatory" during a special session on earth-rotation studies at the fall meeting of the American Geophysical Union. The organiser of the session was Jean O. Dickey from JPL, who had been a member of the MERIT Working Group.

In March 1999 I attended the sesquicentennial symposium of the Nautical Almanac Office of the U.S. Naval Observatory in Washington, D.C.; my expenses were covered by USNO. I gave a talk about the history of H. M. Nautical Almanac Office and a paper with greater detail was published in the proceedings of the symposium. An annex gives a short account of my period of duty at USNO in 1957. At USNO the NAO became part of the Astronomical Applications Department and its staff list in 1999 contained only four names, whereas the list in the *American Ephemeris for 1957* contains 19 names.

On 8 January 1999 the Royal Astronomical Society held a special meeting to mark the contributions of the Royal Greenwich Observatory and the Royal Observatory Edinburgh to astronomy. Among the speakers was Sir Francis Graham Smith for whom I provided a note on A&T activities. (See appendix A.2) Bernard Pagel gave a few reminiscences of early days of the RGO at Herstmonceux. Some 25 former members of the RGO signed a special attendance sheet, but only Professor Malcolm Longair signed for ROE.

In September 1999 I attended IAU Colloquium 178 on 'Polar Motion: Historical and scientific problems' at Cagliari in Sardinia. and presented a paper on 'Project MERIT and the formation of the International Earth Rotation Service'.

At a meeting of IAU Commission 41 on the history of astronomy at Manchester in August 2000 I spoke about the archives of the Norman Lockyer Observatory, but I also distributed copies of a note by Adam Perkins and myself about the RGO archives.

In September 2001 I gave a paper on "the making of tables in H. M. Nautical Almanac Office" at another BSHM conference in Oxford. The proceedings were published by OUP in 2003 under the title *The making of mathematical tables: from Sumer to spreadsheets*.

The British Society for Mathematics held a conference with the title *Greenwich: some mathematical connections* in the Museum on 29 May 2002. Amongst the speakers was Mary Croarken who spoke about some of the computers of the *Nautical Almanac* in the 18th century. (Her book on *Early scientific computing in Britain* included two chapters about Comrie and the developments in the NAO in the first half of the 20th

century.) An extended version of her Greenwich paper was published in 2003 in the *IEEE Annals of History of Computing*.

A meeting to celebrate the 50th anniversary of the last observation with the Airy Transit Circle was held at Greenwich on 30 March 2004. It was organised by Gilbert Satterthwaite, who had made that observation. There is an account of the event in *The Observatory* for August 2004.

In response to an invitation from Andre Heck of the Strasbourg Astronomical Observatory I wrote an account of ‘the Genesis of the IAU Working Group on Astronomical Data’. This was published by Springer in 2006 in volume 7 of the series on *Organisations and Strategies in Astronomy*.

At the autumn meeting of the Society for the History of Astronomy in October 2007 I gave ‘a personal review of the Royal Greenwich Observatory at Herstmonceux Castle, 1948–1990’. This was subsequently published in issue 4 of *The Antiquarian Astronomer*, which is the journal of the Society. In effect this is an illustrated summary of this volume!

During 2008 I drafted an article on my “Personal links with astronomers of the USSR and Eastern Europe, 1970-1989” for inclusion in issue 5 of *The Antiquarian Astronomer*, but publication has been delayed owing to illness of the editor.