

U.K. ASTRONOMY ON LA PALMA

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SUMMARY

After British astronomers had, in 1969, initiated a review of their optical activities in the northern hemisphere, the UK sought sites for a large optical telescope as the central feature for a new observatory. In 1974, the Spanish authorities issued an invitation for a programme of site testing in the Canary Islands, which was completed on La Palma by the Royal Observatory, Edinburgh, in 1975. International agreements were concluded in 1979 between Spain, the UK, Sweden and Denmark, between organisations for scientific research in these countries and between institutions wishing to set up telescopes in the Canaries and the Instituto de Astrofísica de Canarias, the overall proprietor of the new Observatory on La Palma. The Netherlands and Ireland joined the UK as partners to establish the Isaac Newton Group and Denmark to establish the Carlsberg Automatic Meridian Circle, these telescopes inaugurated in 1985 together with the Canary Islands' observatories.

1. NORTHERN HEMISPHERE REVIEW

The opening of the Roque de los Muchachos Observatory on La Palma in June 1985 is the start of a new era both in Spanish and in British astronomy. In sad contrast to the days of Sir William and Sir John Herschel in the first half of the nineteenth century and the possession by Great Britain of what was then the largest optical telescope in the world (the Rosse reflector), observational optical astronomy in the UK suffered a decline in the first half of the twentieth century. The turning point came in 1946, when plans for the Isaac Newton Telescope were first discussed: it was, however, a very slow recovery as the telescope was not completed until 1967, by which time the concept of building a large telescope anywhere in the British Isles began to seem less appropriate. The history of the long process of design and construction of the INT has been set out by Smith and Dudley (1982).

Interest in the southern hemisphere was originally stimulated by Sir John Herschel's expedition to the Cape of Good Hope (1834-1838). Plans for a new large telescope to observe the southern sky started in 1955: again a long process of discussions and negotiations started, this time concerning international collaboration rather than design (Lovell 1986). The result was the 3.9m Anglo-Australian Telescope (AAT), opened in 1974, which has proved to be an outstanding success.

An imbalance between the southern and northern hemispheres had now developed. In the north, radio astronomers were making demands for time on large optical telescopes to follow up their discoveries of distant extragalactic objects: some help for this was available in the USA, but the rapid growth of astronomy as a whole was increasing the pressure for time on all large telescopes. In 1967 Prof H Brück, Astronomer Royal for Scotland, proposed that a new observatory should be built for UK astronomers. It would be on an excellent site, yet to be identified, probably in the Mediterranean area and it would have a large optical telescope as its central feature.

The Science Research Council, formed in 1965 in an era of expanding budgets, decided in 1968 to review the possibilities for such a Northern Hemisphere Observatory (NHO). The Review Committee first met in 1969 under the Chairmanship of Sir Fred Hoyle. Its 1970 report contained two main conclusions, only one of which was universally acceptable. The acceptable conclusion was that the

NHO was a vital necessity for UK astronomy. The less acceptable conclusion, from which the two Astronomers Royal (Sir Richard Woolley and Prof H A Brück) not unnaturally dissented, was that neither of the Royal Observatories was suitable as a home base for the NHO and consequently that a new centre should be built. As we note at the end of this account, this latter proposal is still being debated in 1985. Action on the NHO was, however, faster and more decisive than for either the old INT or the AAT.

2. CHOICE OF SITE

The first action stimulated by the Review Committee was a survey of possible sites. Brück had already extended the observational work of the Royal Observatory Edinburgh (ROE) to Monte Porzio in Italy and he encouraged further surveys of the Mediterranean region. It happened that a group of solar astronomers in Europe, the Joint Organisation for Solar Observations (JOSO), led by Prof K O Kiepenheuer, was also looking for a new observatory site. Both solar and stellar observations require excellent seeing conditions, so both were looking for sites with very little atmospheric turbulence, minimum cloud cover and minimum atmospheric pollution. In 1971, JOSO visited Tenerife, where the Observatorio del Teide had already shown that their site at Izaña offered excellent opportunities for both solar and stellar observations (Murdin 1985, Brandt and Righini 1985). Prof J Ring of Imperial College was already making infrared observations at Izaña in 1969.

British site exploration was initially a joint effort between the two Royal Observatories: J B Alexander of RGO made the first visit to the Canary Islands in April 1971, while B McInnes of ROE organised the pioneering teams of site testers which were to visit mountain top sites in the Mediterranean and eventually to establish consistent and continuous observations on a selected set of the most promising sites. Advice was sought from Prof M F Walker of Lick Observatory, who was engaged in a survey of available sites in the USA and who was interested in extending his objective assessments to a selection of good sites over the whole world. McInnes and Walker (1974) pointed out that island sites on the east of the major oceans offered some of the best possibilities: it was a combination of their recommendations and a very encouraging report by Alexander that led to the tests on La Palma. The Mediterranean sites were abandoned and the testing was concentrated on Tenerife, La Palma, Hawaii and Madeira. These tests showed that Madeira was an inferior site compared to the other three and that La Palma was preferable to Tenerife for night work because of the small amounts of dust and light pollution. Problems of working at altitude and at such a distance from the UK ruled out Hawaii for optical observing, but its height is an advantage for work in the infrared and submillimetre range: the UK Infrared Telescope and the Millimetre Telescope are being sited there.

An enthusiastic reception by astronomers for the NHO proposal led to the formation of the NHO Planning Committee (NHOPC), which first met in 1971 July also under the Chairmanship of Sir Fred Hoyle. Leaving aside the contentious problem of the UK base, the Committee concentrated on the two main issues of the proposed telescopes and the site. It was already becoming clear that the Canary Islands offered the most attractive possibilities technically and economically, but it was also uncomfortably clear that international politics might make the realisation of these possibilities very difficult indeed. There were very good personal relations with the Spanish astronomers in Tenerife and site testing at Izaña was easy to arrange. The extension of activities to La Palma and any proposal for an international agreement for the use of Spanish territory by British nationals were, however, outside the category of mere scientific activity.

In 1972 the site testers, already at work at Izaña, visited La Palma, camped on the mountain top and started some simple observing. A few months later, the SRC was sending urgent advice to them asking them to retire to Tenerife while diplomatic activity via the British Embassy in Madrid attempted to obtain formal permission for their activities. It was soon made clear, both from the

Spanish and the British sides, that bilateral agreements, even for the extension of site testing, were not available in the present state of relations between the two countries. At this point, and to the eventual great benefit of all, the project became multilateral and truly international.

3. INTERNATIONAL COLLABORATION

In 1974 August the Spanish authorities issued an invitation to form a Joint Astronomical Site Survey to undertake an international programme of site testing on the Canary Islands. A momentous meeting took place in 1974 December, when representatives of Denmark, Sweden, Germany and the UK were invited by the Rector of the University of La Laguna and the Presidents of the Local Governments (Cabildos) of Tenerife and La Palma to discuss arrangements for the survey programme. Meanwhile, arrangements had already been made for the setting up of Polaris trail telescopes and meteorological equipment on La Palma and observations began on 1974 November 25 (McInnes 1981).

This encouraging progress came after a period of deep pessimism about the prospects for agreement on the use of La Palma. At the sixth meeting of the NHOPC in 1973 May, Sir Martin Ryle complained about the lack of progress and suggested that UK universities could themselves move faster and more effectively both on the international and the technical questions. Dr M J Smith, who acted as a consultant to the Planning Committee, reported on Hawaii as almost the only possible site. Testing on Madeira as an alternative started in 1973 October. Spanish sites were no longer to be considered.

Recovery from this deep gloom obviously depended on international politics, but it appears that several personal initiatives were also partially responsible. In 1974 March Prof S Edwards (Chairman of SRC) and Prof M F Walker visited the Consejo Superior de Investigaciones Cientificas (CSIC) in Madrid and discussed the problem with Prof Masia, who was already well known for his help in international scientific affairs. Walker followed this visit with another in June. Prof F Sanchez, Director of the Observatory in Tenerife, had been encouraging the CSIC, the University and the local authorities to issue a joint invitation. A senior Spanish astronomer, Padre Romãña, was also active in overcoming the various political problems.

At the meeting of 1974 December, representatives of the various countries involved: Prof K O Kiepenheuer (Germany), Prof A A Wyller (Sweden), Dr K Gyldenkerne (Denmark), Prof H A Brück and myself (UK) were shown the La Palma site from a light aircraft. A small hut with the waving figures of two site testers was the only sign of human activity on what is now a major European observatory. The weather was good and we were assured that this was typical. Everyone felt that this must be the site for the new observatory. From that time onwards there was intensive action on three fronts: site testing, telescope design and the necessary international agreements.

4. INTERNATIONAL AGREEMENTS

The meeting of 1974 December also revealed the intention of the Spanish astronomers and authorities to provide the basic facilities, ie a road, electric power and water for the new observatory site. The project was to be regarded from the start as a cooperative venture, with the overseas participants providing telescope time and training for research astronomers in return for the use of the site and of its facilities. The formal agreements necessary to secure the rights and specify the duties of the international participants were formulated two years later, when Prof Primo, President of the CSIC, invited representatives of research institutes in the various countries involved to Madrid.

An inter-Government Convention (IGC) was obviously essential to ensure right of access, freedom from import duties etc. This Convention would then specify the matters which would be dealt with by a multi-lateral Inter-Institution Agreement (IIA), including allocation of telescope time and financial arrangements; a third level would comprise bi-lateral agreements between each overseas

participant and the newly-formed Astronomical Institute of the Canary Islands (IAC), which would be the overall proprietor of the new Observatory. This structure, although logical, was complex: in the only recently relaxed political atmosphere it took some years to agree the detail and the agreements were eventually signed on La Palma on 1979 May 26.

Most details of the negotiations are unimportant: Spain presented drafts of the IGC and IIA in 1977 February; the UK consulted its international partners and returned new drafts in 1977 September; Spain proposed in 1977 October that the IIA should be replaced by a series of bilateral agreements: this was withdrawn after discussions led by myself. A revised Spanish draft IGC was received in 1978 February and I discussed some problems in it with Prof Sanchez, leading to a further Spanish draft in 1978 March. At this stage Spain again introduced a proposal for bilateral Protocols instead of the single IIA: this was only withdrawn at a major inter-Governmental discussion in Madrid on March 7, 8 and 9. Although all the participants left this meeting with reservations in some areas the main points were now established.

A central problem in the discussions was the question of authority and control over scientific activities at the observatory. An International Scientific Committee was set up, the English name abbreviated to its Spanish initials of CCI, by now the well-established convention of the observatory. It was to decide on the obvious common interests, such as the allocation of the 5% of observing time on each telescope which was set aside for international use, the preparation of a budget for costs of shared items such as site maintenance and recommendations about access by other countries and institutions. The problem was to agree the method of decision. Was it to be a simple majority, or were votes to be weighted according to level of investment, possibly on a logarithmic scale? (The latter proposal caused consternation among the various Foreign Offices represented at the discussions). Evidently Spain needed an over-riding vote on some aspects: the same was true for the other participants. The only solution was a requirement for unanimity, which was adopted and which has proved to work well.

Provision for the possibility that unanimity could not be reached in the CCI involved two stages: a recall of the meeting after a month, followed in cases of continuing disagreement by an appeal to the International Chamber of Commerce in Paris. Such an appeal would be an expensive and slow process: the only occasion of severe disagreement, over the budget in 1980, was therefore resolved instead by adjourning the meeting of the CCI sine die. It was reconvened some months later after informal discussions had reached an amicable solution which could be agreed easily and without the risk of invoking the appeal.

The essential provision of 20% of observing time to Spain has proved to be an ideal arrangement for recognising the essential and outstanding contribution by Spain of the site of the Roque de los Muchachos Observatory with all its excellent facilities. It is already leading both to a rejuvenation of astronomy within Spain and to some very fruitful international collaborations.

Further details of the agreements have been set out elsewhere (Smith 1981a). A report on the NHO project at this time can be found in Smith (1981b).

5. THE ISAAC NEWTON GROUP OF TELESCOPES

The NHOPC had intended throughout to equip the new observatory with a large telescope of aperture 4m or 5m and to supplement this major telescope with smaller ones, possibly with apertures 1.5m and 2.5m. The only decision required at the time of the formal presentation of the project to the SRC, whose Council was to consider the proposals on 1974 November 20, was whether to ask for a new 2.5m telescope or to move the Isaac Newton Telescope from Herstmonceux. At this time I, as Director Designate of the RGO, was given responsibility for the project and for preparing the case. The decision to move rather than build was not obvious: the change of latitude and the

improved site conditions would require considerable changes and improvements, not least of which would be a new primary mirror. The three telescopes, including the moved INT, are described in other papers in this volume (Laing and Jones 1985, Boksenberg 1985). The decision to move rather than replace had the incidental advantage that the NHO could be properly renamed as the Isaac Newton Group (ING), leaving the observatory site to be named by its Spanish proprietors.

6. CARLSBERG AUTOMATIC MERIDIAN CIRCLE

A fourth telescope, in which the UK has a half share, is the Carlsberg Automatic Meridian Circle (Morrison and Helmer 1985). This telescope is the subject of the Danish participation in the international agreement, but it was conceived from the start as a collaboration with RGO. Discussions of this project started in Copenhagen in 1977 September; the UK was to provide a suitable building, Denmark would provide the telescope and the operation and analysis would be shared. The problem of allocating 20% of time on such a specialised instrument to Spain was easily resolved: Prof A Orte of the Instituto Marino de San Fernando at Cadiz soon became a full partner of the enterprise and Spain is taking an equal share both in the science and the organisation.

7. PARTNERSHIP: THE NETHERLANDS AND IRELAND

As the design of the telescopes and domes progressed, it became clear that the costs of building, maintaining and improving the ING would be too high for UK resources alone. We had to choose between either reducing the scale of the UK installations or finding international partners who could help both with money and with manpower. Fortunately two such partners were easily found.

Our Dutch colleagues had already helped with site testing and we were aware of a forward-looking plan in which they hoped to build or gain access to new large telescopes overseas. The architect of the plan was Prof H van der Laan, a colleague since we were in radio astronomy together in Cambridge. At the IAU General Assembly in Montreal (1977), over a casual glass of beer, we found a meeting of interests and a momentous agreement was signed between the Netherlands Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO) and the UK SRC on Cooperation in Astronomy. Our Dutch colleagues became full partners, contributing both in cash and in manpower in proportion to the astronomical manpower in each country. The addition of 20% to the budget, with the addition of manpower to help commission the telescopes and to undertake the design and construction of instruments, allowed the project to continue undiminished. Furthermore, the two communities have merged their interests both at a technical and at a scientific level: it is more of a marriage than a partnership and it is symbolised by the naming of the 1m telescope as the Jacobus Kapteyn Telescope (JKT).

The Director of Dunsink Observatory, Prof P Wayman, provided the introduction to the second partnership. A former staff member of the RGO and Secretary of the International Astronomical Union, he had no inhibitions about international partnerships. It happened that the arrangements for Irish astronomers to use the Boyden Observatory in South Africa were terminating and it also happened that the Dunsink astronomers were particularly interested in the kind of astronomy that could be done with the new 1-metre telescope. The result was an agreement between the Dublin Institute of Advanced Studies and the SRC, whereby Ireland would pay a proportion of the cost of the telescope and its running costs in return for observing time. Technical help would also be provided by Dunsink; this agreement was immediately put into action with great benefit to the UK instrument designers.

Both these agreements are working so well that the documents never need to be consulted. Both Dutch and Irish astronomers attend meetings of the UK Panel for the Allocation of Telescope Time: the Dutch astronomer as a full member and the Irish as an advisor who presents recommendations for the use of the Irish time on the JKT. All insist that the Panel should allocate time primarily on

the basis of the scientific merit of the proposals and only attempt as a secondary issue to keep the long term average allocations in line with the agreements.

With the three Spanish agreements, these two partnership agreements now complete an impressive pile of documentation. The negotiations and seemingly endless series of drafts that were involved have well justified by the harmony in which all partners are now working.

8. THE HOME BASE

It will be recalled that the Northern Hemisphere Review Committee proposed, although not unanimously, that a new home base should be established with responsibility for constructing and running the NHO. Both Royal Observatories already had considerable experience overseas: ROE at Monte Porzio and RGO at the Cape Observatory, but they were both still perceived as too inward-looking and unadventurous to be given such a vital task on behalf of the universities. As the Director-Designate of RGO, I was instructed in 1974 to change any such attitude within the Observatory. In fact, the main thrust of design for the new telescopes and their instruments was already there: in particular J D Pope had been at work on the design of the large telescope for several years after completion of the AAT for which he was one of the senior design engineers. W A Goodsell was recruited as Project Manager in 1975 after completing the AAT in the same capacity and an expert and experienced team built up rapidly. The Observatory has, in the event, consistently put its main efforts into the construction of the NHO, now designated the Isaac Newton Group, part of the Roque de los Muchachos Observatory.

In 1985, as the construction nears completion, there is again discussion of the roles to be played by the two Royal Observatories in running the major UK overseas telescopes on La Palma, Hawaii and in Australia. The proposal for a separate new institution has withered away in the face of the efficient and professional work of the Royal Observatories in building front-rank telescopes and instruments for the overseas observatories. Maintaining and enhancing these facilities will prove to be an equally demanding task and it will be an important matter of debate to decide on a structure of the home base which can as effectively serve UK astronomy as have the Royal Observatories over the last decade.

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