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Personal links with astronomers of the USSR and Eastern Europe, 1970-1989

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During my career in H.M. Nautical Almanac Office within the Royal Greenwich Observatory I developed links with several astronomers of the USSR and Eastern Europe. Some of these links arose directly from the cooperation between the Office and other organisations in the publication of almanacs for international use in astronomy, while others arose from my personal participation in the activities of the International Astronomical Union (IAU). These activities gave me opportunities to visit the USSR and some of the countries of Eastern Europe for meetings and conferences in unusual locations. Consequently, my career as a scientist and the activities in which I was engaged were enriched by the links with astronomers from these countries that developed during these visits.

Introduction

The aim of this article is to describe aspects of my career that would not feature in any formal report of my scientific activities, but which I hope will show that personal relationships played an important role in the development of those activities. They illustrate how science depends on an international exchange of information and ideas and of how significant advances come from international cooperation. It is based largely on my links with astronomers in the USSR and some countries of Eastern Europe as I was privileged to have more opportunities to visit these countries than other members of staff of the Royal Greenwich Observatory (RGO) during my career.[1]

These visits arose in two ways from my varied activities. Firstly, from the work of H.M. Nautical Almanac Office (NAO, which shared with the ephemeris offices of other countries the task of preparing almanacs and related publications for international use.[2] One such office was the Institute of Theoretical Astronomy in Leningrad (as St Petersburg was known at that time). Secondly, from my personal participation in the activities of the International Astronomical Union (IAU), and of other international organisations with which it was associated. The International Astronomical Union is unusual in that the membership is made up of individual astronomers as well as of countries. Most of the activities are organised by specialist Commissions of interested members that meet during the triennial General Assemblies. Most of the Commissions have working groups that are also active between assemblies. The Union arranges conferences on topical subjects proposed by Commissions at and between the assemblies.[3]

My visits are described in chronological sequence following a brief review of my early involvement in international activities to provide the context of the visits. Further details of the organisations concerned are given in the endnotes. It is, however, appropriate to start by recognising my debt to Donald H. Sadler (DHS) who nurtured my career in the Office and supported my early appointments within the IAU.[4] He had played a major role in developing international cooperation in the context of the Office, but also more generally as he served as the General Secretary of the IAU from 1958 to 1964, including the period when V.A. Ambartsumian from Armenia was the President. Sadler's wife, Flora M. McBain (FMS),[5] had been, when a student, on an eclipse expedition to Siberia and had a working knowledge of the Russian language. She was on the staff of the Office and held office within the IAU. When I joined the RGO in 1951 the Astronomer Royal was Sir Harold Spencer Jones (HSJ).[6] He had been President of the IAU from 1944 to 1948 and was still strongly involved in international activities, such as the International Council of Scientific Unions (ICSU) and the International Geophysical Year (IGY). The ICSU was formed in 1931 to encourage international scientific activity for the benefit of mankind. Its members are international scientific unions, national members, and various national and scientific associates. It has many committees for special topics and it organises major international multi-disciplinary projects. The International Geophysical Year took place during 1957-1958 and included world-wide campaigns of observations on various aspects of Earth sciences and solar-terrestrial relations as well as the launches of Sputnik 1 in October 1957 and of Explorer 1 in February 1958. The project for my own Ph.D. thesis had been dependent on international cooperation in the making of geomagnetic observations around the world and so it was natural that I should come to regard participation in IAU activities as an integral part of my job.

Early international activities

I attended the IAU General Assembly (GA) in 1955 in Dublin as 'young astronomer' and so was able to attend some of the meetings of the many commissions that each dealt with a specialised aspect of astronomy. In particular, I was able to meet in Commission 4 on Ephemerides the members of other offices that shared in the preparation of almanacs for general use. I was also able to listen to the invited discourses given by the leading astronomers at that time on the latest research.

The next major event in my career was my secondment to the U.S. Naval Observatory (USNO) in Washington D.C. and then to the Yale University Observatory in New Haven, Connecticut, from February 1957 to February 1958. This had three purposes: firstly to learn more about the USNO work for the almanacs that we prepared jointly; secondly, to gain experience in computer programming and in the organisation of computer operations prior to the acquisition of a computer by the RGO; and thirdly, to learn more about celestial mechanics and the analysis of orbital data. In addition to developing good relations with the staffs of these two organisations I met other American astronomers at meetings of the American Astronomical Society. Quite unexpectedly, I was offered a post at the Adler Planetarium in Chicago, but I did not accept the offer! My work with the staff in Washington proved to be invaluable afterwards when I was editing the joint publication *Explanatory Supplement to the A.E.*[7] My computer project was to analyse observations of the satellites of Mars and this subsequently led to papers at international conferences and to lectures at a summer school in the Italian Tyrol.[8]

I did not attend the IAU GA in Moscow in 1958, but I did go to the next GA in Berkeley, California in 1961, as well as to the symposium on Space Age Astronomy that preceded it. At the GA I presented a short paper about the computation of the lunar ephemeris at a Joint Discussion and this led to an invitation by Professor W. Fricke to give a lecture in 1962 at the Astronomisches Rechen-Institut (ARI) in Heidelberg, West Germany. This institute no longer published a separate astronomical almanac in German, but it took over the publication of A*pparent Places of Fundamental Stars.* The following year I attended IAU Symposium 21 in Paris on the system of astronomical constants and I was appointed as the secretary of a working group under the chair-

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manship of Fricke to prepare a report for the next GA in Hamburg in 1964. The system specified new and consistent values for the many fundamental constants that are used in almanacs and in the reduction of observations of many kinds. For the first time, the value of the solar parallax, which specifies the mean distance between the Earth and the Sun was based on radar observations of the planets instead of on optical observations of minor planets. Our report was adopted, but I was then appointed secretary of a working group on space ephemerides. I was also elected as Vice-President of Commission 4 for 3 years. At about this time I also became secretary of IAU Commission 20 on the motions of minor planets, comets and satellites.

The next IAU GA was held in Prague in 1967 and I was elected President of Commission 4. The following year I was back in Prague for a meeting of the working group on space ephemerides that was held during the ICSU Committee on Space Research (COSPAR) meeting. At this time the General Secretary of the IAU was Lubos Perek, who lived in Prague. He had become a good friend of Donald Sadler and I had met him when he came to Sussex. Then in 1969-1970 I was the chairman of the scientific organising committee of IAU Colloquium 9 on a further revision of the system of astronomical constants. This was held in Heidelberg just before the IAU GA in Brighton in 1970. At the beginning of 1970 I became the Acting Superintendent of the NAO since Sadler was seconded to organise on a full-time basis the IAU General Assembly. He did not resume his position afterwards.

The IAU GA at Brighton gave my wife and me the opportunity to entertain some of the members of Commission 4 (of which I was then President) at our home. Professor G. A. Chebotarev and Victor Abalakin of the Institute of Theoretical Astronomy (ITA) in Leningrad were amongst our guests. We did not then realize that I would visit Leningrad the following year. During the Assembly I was asked to become the chairman of a working group on numerical data that reported to the Executive Committee rather than to an individual commission as it was to cover all types of data used in astronomy. In this capacity I would represent the IAU on CODATA – the ICSU Committee on Data for Science and Technology which was concerned with data for science and technology in general.[9] I was also asked to replace Sadler as the IAU representative on the Council of FAGS – the Federation of Astronomical and Geophysical Services. It was formed by ICSU in 1956 and included 11 'permanent services' that collect and analyse data for astronomy and geophysics. They are operated by national organisations, but receive some international financial support through FAGS.[10] I accepted both requests as the functions clearly overlapped although I did not then realize the role that they would play in my future career.[11]

Fig.1. IAU members with my wife and son in our garden during the IAU General Assembly in Brighton in August 1970.
From left to right: T. Lederle (ARI, Heidelberg), Mrs J. Duncombe (NAO, USNO), Betty and Michael Wilkins., G. Chebotarev, (ITA, Leningrad), R. Duncombe (NAO, USNO), V. Abalakin (ITA, Leningrad). Photograph by author.

Visit to Leningrad and Moscow, August 1971

The main reason for my first visit to the USSR was to attend the meeting of the Council of FAGS, which was to be held in Moscow during the General Assembly of the IUGG (the International Union of Geodesy and Geophysics) that consists of seven associations covering geodesy and different aspects of geophysics,[12] when most of the Directors of the Services would be present. In further justification of the journey, I also visited the Institute of Theoretical Astronomy in Leningrad to better understand their position and to discuss ways in which we might cooperate further. I took my teen-age son along as he was learning Russian for his School Certificate – this was very helpful as he could read the signs and buy tickets etc. We travelled on a Saturday and spent the next day walking around Leningrad with Chebotarev (the director of the Institute) and his son. In the evening we had a very enjoyable supper in his home to celebrate his birthday. I spent much of the next two days in discussions at the ITA. I was able to have discussions with Dr. V. Shor, who was also interested in the satellites of Mars and had access to more data. My son and I were taken on visits to the Pulkovo Observatory and to the Summer Palace at Petrodvorets.

The IUGG meeting was held at Moscow University, with its typical central tower; even from the forecourt there was a good view over the city. Apart from the meeting of the Council of FAGS I was able to attend various scientific meetings. We also went to the space exhibition, including the Space Obelisk and the Vostok rocket, within the Exhibition Park for the Economic Achievements of the USSR. We also went to a football match at the Lenin stadium as tickets were available from the IUGG tours desk.

Visit to Tsachadzor in Armenia, June 1974

There can be very few people in England who have been to the place where CODATA held its General Assembly and Conference in 1974 – a little village, high up in the mountains of Armenia where the USSR athletes trained before the Olympic Games in Mexico City. There were the usual conference facilities and basic living accommodation, but also gymnastic and swimming facilities! I had flown to Moscow and then changed airports and planes to fly to Yerevan, the capital of Armenia, but unfortunately, my luggage continued on the flight to Tokyo and I did not see it again until several weeks later. Even more regrettably, there were no shops in Tsachadzor at which I could buy new clothes, so I had to borrow and wash for a week. Apart from the meetings we had an afternoon coach excursion to Yerevan and I was also invited by an Armenian scientist to go on a short tour in his car with two other participants, including Paul Melchior, who was a director of the service on Earth Tides in FAGS.

When I attended my first CODATA meeting I realized that the main concern was with the data of physics and chemistry and so at the following meetings I and others had argued that it should extend its activities to a wider range of data. In 1974 I was appointed

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chairman of an Advisory Panel on the Geosciences. We met at the Royal Society in London in the following year and later produced guides to the presentation of such data.[13] This experience proved to be useful later when I revised the IAU Style Manual.[14]

Visit to Kiev in Ukraine, May 1977

My third visit was directly connected with my work at the RGO and I was accompanied by N. O'Hora of the Time Department, for which I had been given administrative responsibility. We stayed overnight in Moscow and had to spend most of the evening at the hotel trying to recover our passports as we were due to leave the hotel at 6am the next morning to catch our plane to Kiev. I found that the main details from our passports were copied in longhand into large ledgers.

We attended IAU Symposium 78 on Nutation and the Earth's Rotation, which was held at the Kiev Observatory and in the Physics Department of the University.[15] I was on the Scientific Organising Committee for the meeting and acted as co-chairman with Abalakin of the sessions for the general discussions that preceded the adoption of the resolutions. I later prepared the report on those discussions.

We were taken to the theatre one evening for a concert, with folk dancing, singing, and so on. I had hoped to visit the circus that was just opposite the hotel, but I could not get a ticket – I since wonder whether an offer of a little 'commission' would have helped. We had only a short

Fig.2. Victor Abalakin (ITA, later Director of the Pulkovo Observatory) during IAU Symposium 78 on Nutation & Earth's Rotation at Kiev in May 1977.
Photograph by author.

tour of Kiev, but on the Saturday after the Symposium had ended, we were taken on a hydrofoil down the River Dnieper. This gave further opportunities to talk to other participants, who included many from the USSR, about technical and social matters. As we were going through a lock I was told that it would be inadvisable for me to take photographs as such constructions were of military significance. In 1974 one scientist had had the film taken out of his camera at Yerevan airport as he had been seen taking photographs from the aircraft.

The Director of the Kiev Observatory was Yaroslav Yatskiv, who subsequently became a member of the IAU/IUGG Working Group on the Determination of the Earth's Rotation. This was set-up in 1978 after IAU Symposium 82 at San Fernando, Spain and I was appointed as its chairman.[16] The group organised Project MERIT,[17] which afterwards recommended the establishment of the International Earth Rotation Service (IERS).[18] Project MERIT was an international campaign to 'Monitor Earth Rotation and Intercompare the Techniques of observation'. The original IAU Working Group was extended by geodesists from IUGG. The project led to the replacement of classical optical astrometric techniques by new radio and space techniques for determining the variations in the rotation of the Earth and for establishing terrestrial and celestial reference systems.

Visit to Warsaw, Poland, in 1980

IAU Colloquium 56 on Reference systems for Earth dynamics provided an early opportunity for me to publicise the proposals for Project MERIT and seek wide participation in the Main Campaign that was being planned for 1983.[19] One of the co-chairmen was Barbara Kolaczek, from the Polish Academy Sciences, who was herself a member of the working group. She had a particular interest in the motion of the Earth's pole of rotation within the Earth, for which the classical astrometric measurements were not adequate but which could be determined more accurately by new techniques, such as laser ranging and VLBI.

In 1983 I arranged to hold a meeting of the group at Herstmonceux Castle to complete the preparations for the Main Campaign. Since I knew that Yatskiv would be short of funds I invited him to stay at our home for a few days. It was just before the General Election and he was fascinated by the television coverage, and I am sure that he enjoyed seeing the sights of Eastbourne and the surrounding area, such as Beachy Head.

Visits to Prague, Czechoslovakia, in 1984 and 1986

In March of 1984 I went to Prague for a meeting of the organising committee of a laser ranging workshop that was to be held at the RGO in the following October. The RGO was then operating successfully a satellite laser ranging system (SLR) as its contribution to Project MERIT. The chairman of the committee and of the workshop was Professor Karel Hamal from the Technical University at Prague, and one of the members was Carol Alley, who had proposed that retro reflectors should be left on the surface of the Moon by the Apollo 11 astronauts. At dinner one evening, he produced from his pocket a reflector of the type that has been used successfully for lunar laser ranging. We took the opportunity to visit the Ondrejov Observatory to see, in particular, the SLR system.

I returned to Prague in September 1986 to present a report on Project MERIT at an international symposium on the figures and dynamics of the Earth, Moon and planets.[20] On this occasion I travelled (on annual leave!) by car with my wife and on the way we stayed for the weekend with Lubos Perek and his family at their country cottage and visited them at their house in the city.

Visit to Moscow, October 1987

My next visit to the USSR did not come until 10 years after the Kiev meeting, but in the meantime I had met Yatskiv regularly and I continued to meet Abalakin from time to time at IAU meetings. In the spring of 1987 I was surprised to receive a telex message inviting me to attend a 'Space Future Forum' in Moscow in the October. I did not know the person who sent the telex, nor had I had any previous contacts with his

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Fig. 3. An astronomical clock in the National Library in Prague in March 1984.
Photograph by author.

Fig.4. At the final session of the Space Future Forum in Moscow in October 1987 to mark the 30th anniversary of the launch of Sputnik 1.
The Chairman was Professor Sagdeev. Photograph by author.

organisation. I was not asked to give a paper, and yet I was offered free flights and hotel accommodation in Moscow! I sought and obtained clearance to go and I used my annual leave allowance to cover the time that I would be away.

The Space Future Forum was timed to celebrate the 30th anniversary of the launching of Sputnik 1, the first artificial satellite of the Earth, on 4 October 1957. It was intended to stimulate greater cooperation between the USSR and the West, and in particular the emphasis was on the proposed flights to Mars. The meetings were held in the Sovincentre, which was clearly designed for international trade exhibitions and conferences, and had its own American-style hotel. One surprising name amongst the speakers was that of Susan Eisenhower, a niece of the former President. All was explained a few years later when I saw that the chairman of the conference, Professor Sagdeev, had married her!

Another surprise was that the delegates were listed in groups and a guide was assigned to each group to show us around Moscow and to arrange any visits that we would like to make. Apart from the initial walk around the city, I seemed to be only one in the group to take advantage of this offer. Our guide was a lady research chemist, and we went to the circus, and a ballet, and on the last day she arranged for an official car to take us to the Space Exhibition and then to take me to the airport. What more could you ask? Yaroslav Yatskiv arrived on about the second day of the Forum, and then the penny dropped – it was he who had suggested that I should be invited to the Forum! I was not able to make any contribution to the discussions, but it was a very interesting experience.

The highlight was, however, the visit to Star City, where, amongst other space-related activities, Russian cosmonauts are trained. We started with formal meeting at which no less than 41 Russian cosmonauts and American astronauts were gathered on the platform; they included Valentina Tereshkova, the first lady in space. We then went on a tour to the museum and to some of the training facilities, such a large centrifuge and a replica of the MIR space laboratory. After an animated discussion between two guides we were taken to another building in which there was a water tank containing another replica of MIR. Surprisingly, we were allowed to take photographs of some cosmonauts in training in the tank. A space enthusiast at the RGO claimed that such photographs had not been published and he sent a print from one of my slides to the USA.

Fig. 5. A general view of the Space Exhibition in Moscow in 1987.
Photograph by author.

Visit to Potsdam, August 1988

I presented a report on the development and activities of the IERS at an international conference on geodesy and the physics of the Earth in Potsdam during the following year. By this time the IERS was in operation and, as I was soon to retire from the RGO, I had handed over the chairmanship of the Directing Board to Yatskiv, who was a principal speaker at the conference. I was delighted to meet again Margarita Petrovskaya, from the Institute of Theoretical Astronomy in Leningrad; she had been our guide during our visit in 1971. By chance, I sat at a concert with Wolfgang and Galina Dick, who lived in Potsdam and both worked at ZIPE (Central Institute for the Physics of the Earth). We became good friends and in the following years we were interested to hear from them about the changes in Eastern Germany. Wolfgang has a major interest in the history of astronomy. He has published regularly an Electronic Newsletter for the History of Astronomy and also jointly prepared a volume containing bibliographical information on 16,000 persons whose activities relate to astronomy.[21]

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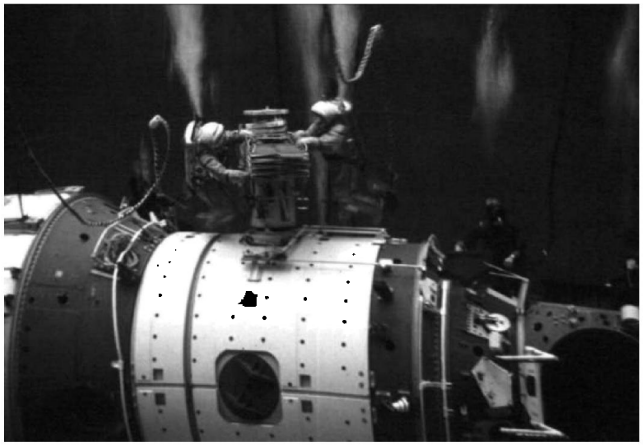

Fig. 6. Cosmonauts training on a MIR space laboratory in a water tank at Star City, near Moscow, in October 1987.
Photograph by author.

Visit to Leningrad and Moscow, October 1989

My final visit to the USSR came after my retirement when I attended IAU Symposium 141 on the Inertial Coordinate System of the Sky in Leningrad.[22] I was particularly pleased to be able to go as it was attended by many of the persons from other countries with whom I had worked during my career. I had prepared a review paper on reference systems for astronomy and geodesy that I had expected to give in the opening session, but I found that I was expected to give a general review at the end of the conference, and so I had to make many last minute revisions to take account of the discussions during the meeting.

Many of the western astronomers were accommodated in a new hotel where the conference took place and found that on our first evening the hotel restaurant was being used for a wedding reception. We were even more surprised to find that we were treated to a free cabaret that was performed by a group from East Germany. We were also able to get cheap tickets for the ballet – we paid Russian prices rather than western tourist prices. We had some time for sightseeing and I was disappointed to see how much Leningrad had deteriorated since my first visit – many of the city streets were in an appalling state of repair, with large potholes.

Some of us were invited to an evening meal at the home of Victor Abalakin, who had been made the Director of the Pulkovo Observatory. I was also invited to supper at the home of a lady from the Observatory to whom I had chatted to on the boat trip down the River Dnieper at Kiev. Her daughter's room had all the characteristics of that of a western teenager.

After the conference in Leningrad I travelled by train to Moscow – in this case I failed in my attempt to buy the ticket at the Russian rate – I paid the tourist rate and travelled in complete isolation in the carriage for tourists. I did manage to get a drink at the buffet.

My main aim in Moscow was to hand over responsibility for an IAU Task Group on the revision of UDC 52, the class for astronomy in the Universal Decimal Classification system which is used in some libraries and abstracting journals.[23] I also took the opportunity to visit the HQ of the Astronomical Council of the USSR, to learn about their data centre as at the time I was President of the IAU Commission 5 on Documentation and Astronomical Data. I was very surprised to be presented with a commemorative medal by the Head of the Centre, Olga Dluzhnevskaya, who later became the President of Commission 5. According to the Diploma, the medal was for my 'significant contribution to international cooperation'. I would like to feel that my contributions matched the satisfaction and enjoyment that I gained from my participation in international activities.

Fig.7. Yaroslav Yatskiv speaking at the opening of the conference on Geodesy and Geophysics at Potsdam in August 1988.
Photograph by author.

Acknowledgement

This paper is based on a talk entitled 'Glimpses of the USSR, 1971-1989' that I gave to the Torquay Natural History Society at the Torquay Museum on 1998 February 10 as the result of a request by the programme secretary to give a talk to the Society about a personal aspect of my career. My notes for that slide-talk contain more details of people and places than are given here. The official correspondence and notes about these visits are in the files of the NAO in the RGO archives in the Cambridge University Library.

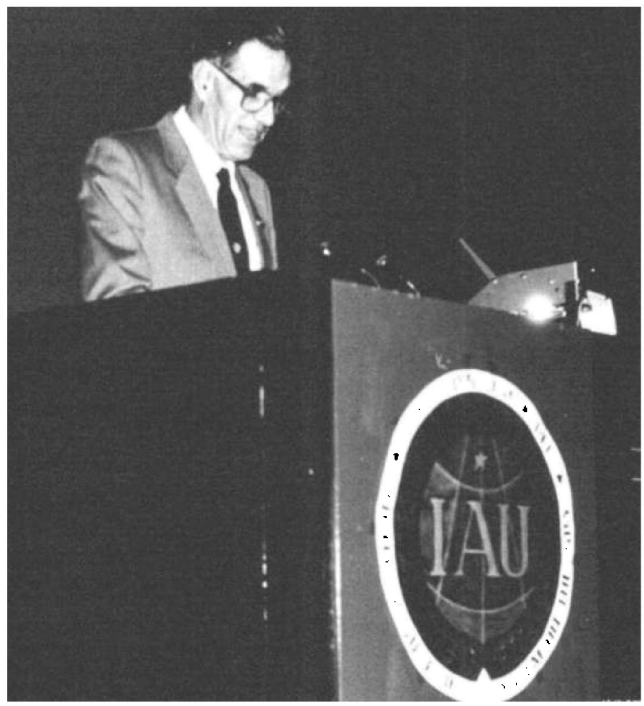

Fig. 8. George Wilkins speaking during IAU Symposium 141 on the Inertial Coordinate System on the Sky at Leningrad in October 1989.
Photograph by Wolfgang Dick.

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Notes and References

1. Wilkins, G.A., 'A personal review of the history of the Royal Greenwich Observatory at Herstmonceux Castle, 1948-1990', *Antiquarian Astronomer*, 4 (2008), 69-80.

2. Wilkins, G.A., 'The expanding role of H. M. Nautical Almanac Office', *Vistas in Astronomy*, 20 (1976), 239-43.

3. The IAU has played a dominant role in my career – I have been to 14 of its General Assemblies and to many conferences and meetings of working groups. The structure and activities of the IAU up to 1969 are described by Adriaan Blaauw in *History of the IAU* (Kluwer Academic Publishers, 1994).

4. D.H. Sadler was the Superintendent of H.M. Nautical Almanac Office from 1936 to 1971. See the obituary Wilkins, G.A., 'Donald Harry Sadler, O.B.E. (1908-1987)', *Quarterly Journal of the Royal Astronomical Society*, 32 (1991), 59-65. Much interesting information about activities and persons is given in *A personal history of H.M. Nautical Almanac Office, 1931-1972*, written by Sadler and edited by Wilkins on the NAO website at *http://www.hmnao.com/nao/history/*.

5. F.M. McBain was on the staff of the NAO from 1937 to 1973. See the obituary, Wilkins, G.A., 'Flora Munro McBain 1912-2000', A*stronomy and Geophysics*, 42 (2001), page 4.34.

6. H.S. Jones was Astronomer Royal from 1933 to 1971. See the obituary by Sadler, D.H., 'Harold Spencer Jones', *Quarterly Journal of the Royal Astronomical Society*, 4 (1963), 113-25.

7. *Explanatory Supplement to the Astronomical Ephemeris and the American Ephemeris and Nautical Almanac* (London, H.M.S.O., 1961). Chapter 1 gives a brief account of the history of International cooperation as well as details of the publications of the two offices; Seidelmann, P. K. (editor), *Explanatory supplement to the Astronomical Almanac* (California, University Science Books, 1992)

8. Wilkins, G.A., 'The analysis of the observations of the satellites of Mars', in: Colombo, G. (ed.), *Modern Questions of Celestial Mechanics* (Rome, Centro Internationale Matematoco Estivo, 1968), 223-40. Wilkins, G.A., 'The motion of Phobos', *Nature*, 224 (1969), page 789.

9. I was the IAU delegate to CODATA from 1970-1979. I reported on what we were doing in astronomy, and I also learnt about what was happening in other fields of science so that I saw new developments before they had been widely publicised.

10. I was the IAU representative on the Council of FAGS from 1970-1975 and its Secretary from 1975-1979. Most of the annual meetings involved one-day journeys to Paris.

11. Wilkins, G.A., 'The genesis of the IAU Working Group on Astronomical Data' in: Heck, A., (ed.), *Organisations and strategies in astronomy* (Springer 2006), vol. 7, 355-66.

12. I was mainly concerned with the International Association of Geodesy and had the honour to be the chief UK delegate to its GA in Hamburg in 1983, when I was the chairman of the Royal Society's subcommittee on geodesy.

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14. Wilkins, G.A., 'The IAU Style Manual (1989): the preparation of astronomical papers and reports', *Transactions IAU* (1989), vol. 20B, chapter 8.

15. Wilkins, G.A., 'The specification of Nutation in the IAU system of astronomical constants', in: Federov, E.P., et al. (eds.), 'Nutation and Earth's Rotation', *Proceedings of IAU Symposium No.78* (Dordrecht, Holland: Reidel, 1980), 17; Wilkins, G.A., 'Report of general discussions at IAU Symposium No.78 on Nutation and the Earth's Rotation', *Ibid.*, 247-55.

16. McCarthy, D.D. & Pilkington, J.H. (Editors), 'Time and the Earth's Rotation', *Proceedings of IAU Symposium No.82, Cadiz*, 1978 (Dordrecht, Holland: Reidel, 1979)

17. The project was one of the most satisfying of my international activities. It spawned many papers and the results and recommendations of the Working Group are summarised in the following paper that was also printed in geodetic publications: Wilkins, G.A. and Mueller I.I., 'Joint Summary Report of the IAU/IUGG Working Groups on the Rotation of the Earth and the Terrestrial Reference System', in: Swings, J-P. (ed.), *Highlights of Astronomy* (IAU, 1986), vol. 6, 771-88. The report was adopted by the IAU at its GA in Delhi in November 1985 and subsequently by the IUGG.

18. IERS was set up on the basis of the recommendations of the MERIT group. I chaired the first meeting of the new Directing Board in 1988, but then I handed over to Y. Yatskiv as I was to retire from the RGO the following year. I reviewed the 10-year programme at a conference in 1999; Wilkins, G.A., 'Project MERIT and the formation of the International Earth Rotation Service', in Dick, S., McCarthy, D. and Luzum, B. (eds), 'Polar motion: historical and scientific problems', *Proceedings of IAU Colloquium 178, Cagliari, Sardinia, Italy, 27-30 September 1999* (ASP Conference Series, 2000), vol. 208, 187-200, pages 187-198.

19. Wilkins, G.A., 'A note on the origin, objectives and programme of Project MERIT', in: Gaposchkin, E. M., and Kolaczek, B. (eds.), *Reference Coordinate Systems for Earth Dynamics* (Dordrecht, Holland: Reidel, 1981), 275-76.

20. Wilkins, G.A., 'Report on recent developments in international collaboration in monitoring the rotation of the Earth and in establishing new terrestrial and celestial reference systems', Invited paper; abstract only in: *Proceedings of International Symposium on the Figures and dynamics of the Earth, Moon and planets (Prague, 1986 Sept. 15-20,* (1987), part 3, 713-14.

21. The *Electronic Newsletter for the History of Astronomy* contains information about current meetings etc and is at www.astrohist.org; Bruggenthies, Wilhelm, and Dick, Wolfgang R., *Biographischer Index der Astronomie* (Frankfurt: Verlag Harri Deutsch, 2005).

22. Wilkins, G.A., 'The past, present and future of reference systems for astronomy and geodesy', in: Lieske, J.H., & Abalakin, V.K. (eds.), 'Inertial coordinate system on the sky', *Proceedings of IAU Symposium No. 141 (Leningrad, 1989)* (Kluwer Academic Publishers, 2000), 39-46.

23. UDC 52 – I continued to work on the much-needed revision after my retirement but, far as I am aware, my proposals were not implemented. It is a multi-lingual system and its uses are described on the website of the UDC Consortium at www.udc.org.

The Author

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