RSRS NEWSLETTER

No. 123 August 1971

THE INTERNATIONAL SCHOOL OF ATMOSPHERIC PHYSICS, 13-27 JUNE 1971

Poor little Sicily
Kicked by Italy
Right in the middle of the Mediterranean Sea

Sicily has been kicked around quite a bit all through its history. Greeks, Carthaginians, Normans and others have all left their mark on the island. The last military invasion was that of the Allies in 1943. Now the invaders come mostly as tourists; they tend to congregate in the east, around Etna, and not too many penetrate to Erice in the far west of the island, some fifty miles beyond Palermo. Latterly, however, groups of scientists have come to Erice, perhaps with motives rather different from those of numerous sailors that are said to have visited the Temple of Venus that adorned the mountain of Erice in classical times.

Just how a summer school on atmospheric physics came to be held on a mountain in western Sicily is still a bit of a mystery to me. It seems that the Church, having built a modern conference centre in Erice, leases it out each summer to the University of Bologna for a series of schools on a wide range of topics - mathematics, physics, chemistry, biology, economics and social sciences. Some of these are purely Italian affairs; others are international. Ours was organized by Professor Verniani of Bologna and was conducted entirely in English. But since the wives did not conduct themselves entirely in English, Erice took on the character of a language school as far as my wife was concerned.

During the fortnight of the school 45 hours were occupied by the nine series of lectures. The lectures, intended for graduate students or other people starting specialized work, provided a fairly thorough going-over of the properties of the earth's atmosphere from 50 to 500 km altitude. The lecturers came from the U.S.A., U.K., Germany, France and Norway. In addition there were eleven seminars, mostly on current Italian work. The thirty students came from several Western European countries, Poland, Turkey, Israel, India, Hong Kong, Argentina and the U.S.A., while R.S.R.S. was represented by John Dudeney as a student and myself as a lecturer.

After a long and complex journey (we had to turn back from Boulogne because of a sudden rail strike in France) my wife and I eventually reached Trapani, a big, dull seaport town which is the railhead for Erice. We met up with the Argentinian and Polish contingents who, incredibly, managed to 'phone Erice for transport. At length a Kombi arrived and took us up the winding road to Erice, 2500 feet up. We entered the town through the impressive walls (the buses cannot even get through the gate, so when going on excursions we always had to walk down to the outside of the walls). An enjoyable alternative way of reaching Erice from Trapani is by the funicular, which we used on occasion.

Erice is a small town, only about half a mile across, surrounded on most sides by its walls. It contains a maze of narrow paved streets and alleys, several squares and many churches, some now used for secular purposes. It has a lovely Norman cathedral with a hideous modern interior. It commands a magnificent view (of the sort you'd disbelieve if you saw it on a travel poster) of the surrounding plains and distant mountains; on clear days in winter supposedly one can see North Africa. We took our main meals at restaurants in Erice which supplied quite a variety of generally Italianish food, though breakfasts and coffees and teas were served at the conference centre.

The conference centre was typical of much modern Mediterranean building - very smart and slightly unfinished. Doors banged and the magnificent corridors echoed and re-echoed. Fittings came adrift from walls. Our bedside table collapsed and the cistern of our loo, when activated, emitted a horizontal jet of water across the bathroom. But we were comfortable and we enjoyed the view. From the hillside below there floated up a variety of sounds from tinkling sheepbells, the melodious horns of buses, Italian motorbikes and, on some excruciating nights, a racing car practising hill climbs.

As most of the school's work was done in the morning sessions, and the remainder in the evenings, the afternoons were free for excursions to Greek temples, for swimming or just for siesta. One Sunday there was a trip from Trapani to an offshore island in a hydrofoil, an uncomfortable beast in a rough sea.

We finally departed from Trapani airport in a small turboprop. It flew round the coast to Palermo at a height of 1000 feet; we had to look upwards to see Erice as we flew past. At Palermo we found a crowded bustling airport, seemingly thrown into chaos by each of its few daily planes. Then Rome airport, with many more planes, even more chaotic. Erice seemed thousands of miles away.

Henry Rishbeth

W.A.R.C.

The Station was represented at the World Administrative Radio Conference by the Director and Deputy Director. The following article for 'Nature' was prepared by Dr. Horner from information gathered during his attendance throughout the Conference.

Frequencies for Space Telecommunications and Radioastronomy

The second World Administrative Radio Conference for Space Telecommunications, organized by the International Telecommunications Union, was held in Geneva from 7th June to 17th July 1971 and was attended by some 650 delegates from 100 nations. It is generally agreed that the decisions taken at the first such conference, in 1963, have stood the test of time, but subsequent developments in space technology and radio astronomy have been such that new international agreements have become necessary to cater for the needs of the next decade.

The main theme of the conference was that since the demands for radio frequencies show no signs of abating, and since there is a limit to the extent of the radio spectrum which can be exploited, the same frequencies should be used by more than one service whenever this is technically feasible. Much of the discussion, and most of the difficulties in reaching agreements, were concerned with sharing problems. Some of the increased demands can also be met, as technology advances, by using frequencies higher than 40 GHz, the previous upper limit of the allocated bands, and allocations have now been made up to 275 GHz.

The remarkable expansions in satellite communications and in space research since 1963 are common knowledge. Meteorological satellites have also established an essential role in weather forecasting, and the next decade is expected to see

the operational implementation of satellite services for aeronautical and maritime navigation and communication, for direct broadcasting to the public, (at least on a communal basis), for the study of the earth's resources, and for monitoring the environment. It is also becoming clear that recent discoveries by radioastronomers are providing new insight into the fundamental physics of matter, and that greater protection from interference in a number of frequency bands is necessary for this important branch of science to develop. All services call for increasingly wide bands in an already overcrowded spectrum.

The work of the conference was organised mainly in three committees. The first was concerned with the administrative procedures by which international negotiations may take place as services are introduced or expanded. It has been found necessary to revise the procedures laid down in 1963, particularly as the greater emphasis on frequency sharing calls for clear and more comprehensive procedures by which different countries may co-ordinate their activities. An interesting departure from custom is that there is now provision for the adoption of new technical criteria on frequency sharing when these are recommended by the International Radio Consultative Committee (CCIR, an advisory committee of the ITU) without waiting for another Administrative Conference. Countries will have the option of retaining the existing criteria or adopting the revised criteria when these become available.

The second committee was concerned with establishing the technical criteria such as limits of radiated power and power flux densities which are considered to be necessary to enable services to share frequencies without mutual interference. This committee also provided the technical data needed first for calculating the co-ordination distances within which consultation with other countries needs to take place, and then for calculating the likelihood of interference, and the necessary separation distances, taking into account the actual radio links in operation or planned. Agreement on comprehensive technical standards, in the available time, was made possible only by the thorough preparatory work carried out in February 1971 by a Special Joint Meeting of relevant Study Groups of the CCIR, in Geneva, and before that, by a CCIR working party in Nice, in December 1970, to assemble the latest data on radio propagation, necessary to enable the more general studies to proceed.

Since 1963 it has become abundantly clear that the future development of space communications is vitally dependent on the exploitation of geostationary satellites, which remain fixed in relation to the surface of the earth. The

technical committee therefore gave considerable attention to the need for the efficient use of the geostationary satellite orbit, and the criteria which must be adopted to avoid interference between links using different satellites in this orbit, and between these links and terrestrial services.

Although the work of preparing the administrative procedures and technical criteria is fundamental to the development of communications, it is perhaps the frequency allocations themselves which will excite the widest interest. The revision of the frequency allocation tables was the task of the third committee, and some difficult problems were encountered. These stemmed largely from the fact that although space services can be operated over a wide range of frequencies, certain parts of the spectrum, have marked advantages and are in heavy demand. One such range, for example, is in the region of 2-3 GHz; wide bandwidths are not available at much lower frequencies, and propagation at much higher frequencies can be seriously affected by adverse meteorological conditions. This desirable part of the spectrum which is already used extensively for terrestrial services, is in demand also for earth exploration satellites, for broadcasting satellites, and for increased bandwidths in the space research service. An acceptable compromise was finally achieved, by which it should be possible for these services to share certain bands, provided that there are only a few earth stations for space research and earth exploration, that the power flux density from broadcasting satellites is kept below an agreed limit, and that full consultation takes place before any new system is established. Similar problems in other parts of the spectrum were treated in similar ways.

The final agreements on frequency allocations are inevitably the result of much compromise, and operators of most services will be disappointed that not all their hopes were realised. It has not been possible to make new primary allocations for space research, except in the newly-allocated part of the spectrum above 40 GHz, but a number of special provisions have been made which will, it is hoped, enable the necessary arrangements for specific operations to be made by negotiation. The basis of this philosophy is that successful operation of a few earth stations in the space research service, even though a high degree of protection is required, need not inhibit the use of the same frequencies for other services in other parts of the world.

Radioastronomy has received improved status in several bands, and has obtained a new exclusive high-frequency band near 22 MHz and new bands above 40 GHz. There is increased recognition of the importance of bands needed for observing natural line emissions. On the other hand, the expected increase in transmissions from satellites, for all purposes, constitutes a threat to radio-astronomy which cannot be avoided by locating observatories in remote areas. As an example, there is now an allocation for Broadcasting satellites in a band adjacent to the exclusive radioastronomy band at 2690-2700 MHz. Careful planning and much goodwill is needed if radioastronomers are to be able to use this band without danger of serious interference.

The new regulations will come into force, formally, on 1st January 1973. However, since they reflect the established policies of the majority of countries, many of the provisions will already have been adopted for practical purposes, and others will no doubt be followed well in advance of the formal date of implementation.

F. Horner

Jabberwocky, 1971

Readers of George Orwell's "1984" will remember that English was being converted into the much-abbreviated language "Newspeak", with the aim of making political heresies not merely prohibited, but actually incapable of being formulated or communicated. However rapid advances in jargon technology are now making Newspeak unnecessary. We will soon reach the state where none of us understand each other anyway. Everyone can think of examples, but RSRS experts in the field of information scrambling consider the following to be a significant breakthrough:-

> The system-state model (SSM) is both an abstract and a computational construct for representing, in the discrete time domain, at arbitrary and varying levels of specificity, the activity inherent in the processes of many classes of systems. Representable process activity may be simultaneous, asynchronous and hierarchically-related. As a formal model, the SSM represents quantitative temporal and spatial relationships among the components of the process or system being modelled. Also, as a simulation model, the SSM may accommodate representation of supplemental aspects of component activity to the extent such activity influences the formal temporal and spatial specifications.

- Abstract from "System State Model Theory and Implementation", J.J. Lenahan, Computer Science Dept., Houstan University.

M. J. S. Quigley

Staff News

Congratulations to:-

John and Ann Smith on the birth of their daughter Nicola Louise at Stanley F.I. on July 30th.

Jim and Dorothy Burge on the birth of their twin sons, James Sinclair and Daniel McKay, on August 6th.

John and Kathy Reed, on the birth of a second daughter, Dianna Tracy on August 7th.

Annette Bailey and Richard Street, on their wedding at the Congregational Church Slough on July 31st.

Welcome to:

D. Maskell	Sandwich Course Student
P. H. Kamau	Vacation Worker
J. Rasmussen	Vacation Worker
J. Woolf	Sandwich Course Student
R. Bolgiano	Principal Research Fellow
A. Fordham	Sandwich Course Student
J. E. Byles	Vacation Worker
F. W. Salter	Craftsman I. Chargehand

Resignations

F. J. Dickenson	Radio Tech. F.Is. Secondment ends. Returned to Dept. of Trade & Industry
Miss L. Taylor	Sandwich Course Student
K. Ahlstedt	Vacation Worker
J. J. Rousseau	" "
P. T. Manning	A.E.O
P. J. Cuthbert	Sandwich Course Student
Mrs. J. M. Murphy	Tech. Officer Singapore

Other Changes

Mrs. J. M. Cobb	C.A. Changed from P/T to full-time duties
J. A. Gourlay	E.O. Became permanent w.e.f. 13.7.71

ESRO

D. W. Hardy	A.E.O. Arrived Falkland Islands

Sports and Social Club News

Cricket

Scores:

Vs Phoenix 1971 (H): Phoenix 99-7 (Moosajee 3-21) RSRS 90-9

Vs Wilkinson Sword (A): Wilkinson Sword 102 (Kitt 5-14) RSRS 98-5 (Martin 39, Kitt 38)

Vs Admiralty Engineering Lab. (H): A.E.L. 76 RSRS 79-9

Vs Wilkinson Sword (A): Wilkinson Sword 186-5 RSRS 77

Vs Castrol 21 (Kitt 5-11, Davies 3-2) RSRS 22-3

Our first victory for some years against A.C.O. was mainly due to some sterling batting by Martin and Kitt, the innings closing with two resounding straight sixes by Martin off the last two balls. Phoenix, with several ex-D.S.I.R. stalwarts in their team beat us by nine runs and then Wilkinson Sword revenged an earlier defeat with a four run victory. The feature of this match was the way Kitt polished off the Wilkinson innings and then together with Martin put on 78 for the first wicket. This was a close match and we were unfortunate to lose, but the tables were turned in the next when our last pair Hardie and Gondhalekar put on the 15 runs needed to beat A.E.L. A third weekend match against Wilkinson Sword proved a disaster for us but by way of compensation we annihilated Castrol in the following match with Kitt again taking five wickets and several good catches being taken.

E. Dunford

Details of reduced prices for Windsor Theatre tickets are now regularly posted on the notice board.

P. Scammell

Plus ça change

(which being interpreted signifieth 'You can't win')

Radio Research

Pure versus Applied

At a recent meeting of the Wireless Section of the I.E.E. one or two or those taking part in the subsequent discussion suggested that some of the investigations conducted under the auspices of the Radio Research Board were of too practical a nature. A strong plea, backed by telling arguments, was entered in favour of the Board devoting more of its energies to pure research.

Few commercial organisations can afford to carry out pure research into matters that do not promise any immediate financial return; such work seems to be essentially a matter for bodies financed by the State, or by university foundations.....

The Wireless World March 9th 1939

Sports and Social Evening with A.C.O.

On Wednesday, July 28th, the Sports Club entertained teams from the Admiralty Compass Observatory to a Sports and Social Evening at home. The games participated in were Cricket, Tennis, Badminton, Bowls and Table Tennis.

The result was a conclusive victory for R.S.R.S. with wins in every department except the Ladies' Bowls, (Which omission everyone assures me will be rectified in our return match at ACO on Wednesday 25th August).

Some of the individual results were as follows:-

Cricket

R.S.R.S. won

R.S.R.S. 104-3 (Kitt 41, Martin 47, not out) A.C.O. 93-3.

Tennis

R.S.R.S. won by eight matches to nil with one match abandoned due to bad light. The R.S.R.S. pairs were A. C. (Gus) Gordon-Smith and Pat Martin; Roger Raphael and Marie Bramley; Jack Moore and Marie Huggins.

/Table Tennis

Table Tennis

Our team of 3 players were Piers Eggett, Alan Chipperfield and Roger Raphael and as A.C.O. supplied a team of six, each of our people played twice. R.S.R.S. won 11-7.

Badminton

The three pairs playing for us were Tim Bevan and Mrs. Gordon-Smith, Derek Wright and Marilyn Harrison, Rick and Annette Street. We won all our matches, the score being 9-0.

Bowls

Ladies Team: Betty Carroll, Sarah McCaig, Queenie Sams, Carol Spears, Lena Thomas, Daphne Robertson, Gwen Clarke, Hanne Lennon, Ellen Scammell, Mary Parissien and Elaine Wright.
Lost 11-9

Mens Team : Messrs. Bence, Price, Meadows, and Carroll.
Won 25-8.

The evening continued with a very excellent chicken and ham salad supper organised by the bar-members and ladies of the committee, followed by games of snooker and darts still being fought on an R.S.R.S. v. A.C.O. basis. There was also dancing to tape-recorded music provided by the committee.

The evening, with our near neighbours from the other half of Ditton Park, proved to be extremely successful both on the field, or courts, of sport and socially. We look forward to the return evening, when we are the guests of A.C.O., on Wednesday 25th August.

John Cathrew

"DAYTON" MOTOR SCOOTER - REG. NO. 190-MPL

The above vehicle has been standing derelict for a number of years in the cycle shed adjacent to the boiler house. Any member of the staff having information regarding ownership is requested to contact Office Services.

If no information is forthcoming before the end of September the vehicle will be removed as scrap.

L.R. MITCHELL

LITTER TO THE OUTSTATIONS

Dear Colleagues,

Blame not the print for this month's title. Ever mindful of the Trade Descriptions Act, it seemed just as well to give a brief nod in its direction and that of the reader, name and address supplied, who was good enough to provide a much wanted theme.

This season of Staff leave and summer's drowsy airs offered even less to write about than usual, when up comes this bit of grist in the form of critical comment : 'The Letter to the Outstations is rubbish'.

Here's a dilemma; do I say 'Too right, mate, but it fills a space as well as better stuff' and thereby risk alienating the rest, if any, of my uncomplaining public? Do I deny the charge - and get lumbered with an attempt to make heavy stuff of unconsidered trifles? Perhaps escape lies in pointing out the position of the offering.

After the Lord Mayor ..... let us examine the O.S. Letter's place in the informative edifice of the Newsletter. Fitly enough it is at the foot, the end, the zone at once of detritus and of foundation. Such purpose as it has at all is as a miniscript, a sort of written small-talk. In this it serves, that weightier articles may rest secure and well drained upon a base of rococo rubble compounded unrepentant by

Yours sincerely

The Editor

AUGUST 1971

List of Reprints

P. G. Davies	Radiometer studies of atmospheric attenuation of solar emission at 19 GHz. IEE 1971, 118, 1485-1487
J. A. Saxton	Radio and weather Proc IEE 1970, 117 No. 1 9-15
P. G. Davies	Comparison of attenuation statistics at 19 and 37 GHz for Sun Earth Paths. Report from Electronics Letters Vol. 7, 1, No. 2
D. I. Llewellyn Jones and A. M. Zavody	Rainfall attenuation at 110 and 890 GHz. Electronics Letters Vol. 7, 1-2, No. 12

Internal Memoranda

In order to simplify reference, Memoranda will be listed in numerical order rather than in order of circulation. This may mean that not all are immediately available at the time of this list's publication.

341	Report on a visit to the National Research Council of Canada, Ottawa and the NRC. 46-M Radiotelescope in Algonguin Park. February 24th-March 4th 1971.	M. J. S. Quigley
342	Radiosondes for radio meteorological research.	M. P. M. Hall
343	Report on NATO Advanced Study Institute on statistical methods and instrumentation in Radio Meteorology.	T. Golton M. P. M. Hall M. J. S. Quigley and Z. Warhaft
344	The U.K. 4 Data Checking Programs	B. R. Martin
345	A control and data-handling system for a large steerable aerial. Paper presented at N.A.T.O. Advanced Study Institute on "Statistical Methods and Instrumentation in Radio Meteorology", held at Skeikampen, Tretten, Norway from 15-22 April 1971	M. J. S. Quigley
346	Report on R.S.R.S. Aerial III Electron density and Temperature data handling system	M. D. Lawden and M. L. Kendall