

## U.R.S.I.

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ISSAC KOGA  
1899 - 1982

Professor Issac Koga, Honorary President of the Union, died on 2 September 1982 at the age of 82 years. He was born in Saga Prefecture, Japan, and he studied at the Tokyo Imperial University, where he received the degrees of Bachelor of Engineering and Doctor of Engineering, both in Electrical Engineering in 1923 and 1930 respectively. He joined the Electro-technical Research Institute of Tokyo Municipality in 1923. In 1929 he was made Assistant Professor, and later Professor at the Electrical Engineering Department of the Tokyo Institute of Technology. He moved to the Faculty of Engineering, Tokyo Imperial Tokyo University (later re-named the University of Tokyo) in 1946, and became Dean of Engineering from 1958 to 1960. In 1960, he retired with the rank of Professor Emeritus of the University of Tokyo and Tokyo Institute of Technology, and joined the Research Laboratories of Kokusai Denshin Denwa Co. (Japan's Overseas Radio and Cable System).

Prof. Koga's research covers a wide variety of topics relating to frequency standards, piezoelectric crystals and crystal oscillators, including frequency demultiplication by means of electronic circuits. In 1926, he made a vacuum tube frequency demultiplexer; his results were published in the *Proc. IRE* (Vol.15, No 8, August 1927) and were confirmed by Prof. Balth. van der Pol at the 5th General Assembly of URSI in 1934 in London.

The piezoelectric crystal unit has a stable resonant frequency, and the crystal oscillator using the piezoelectric crystal unit could produce stable constant frequency oscillations. However, the piezoelectric crystal units of the so-called "X-cut" thickness vibration type, used in the early 1930's, were difficult to maintain in continuous oscillation, and lacked reliability for practical use. In 1932, Prof. Koga found that the thickness vibration of a crystal was due to the standing wave produced by interference of plane waves incident on and reflected from the pair of plane boundary surfaces of the medium; he thus clarified the vibrating mechanism from the point of view of the elasticity, and established an explicit

theory of the resonant frequency and the oscillation modes of planar piezoelectric crystal units which takes account of the directions along which quartz crystals are sliced with respect to the electric axis. The result was published in *Physics* (Vol.3, No 2, Aug.1932). In view of the stringent requirements for piezoelectric crystal units with stable oscillating frequencies under various ambient temperatures, Prof. Koga proved that such oscillators could be realized by the piezoelectric quartz unit sliced along a specific axis. These results were published in *Phil. Mag.* (Vol.16, No 104, Aug.1933).

This invention of a piezoelectric crystal unit with zero frequency temperature coefficient has perpetuated the name of Prof. Issac Koga throughout the world, and today his piezoelectric crystal units are widely used for numerous purposes. This successful research provided a sound basis for the subsequent rapid progress in research on piezoelectric crystal units.

In his further research, Prof. Koga established a well-known theory of the operating mechanisms of vacuum tube circuits for the generation of radio frequencies, known as crystal oscillators. He succeeded in assembling a high-precision quartz-crystal clock using the piezoelectric crystal unit and a vacuum-tube frequency demultiplexer which he had also invented. He was still engaged in research work until just before his death. In 1980 he published a book "*Measurement of a UHF Crystal Unit Using an 'Fr-meter' and an 'Auxiliary Reference Resistor'*".

Prof. Koga was the author of over 200 papers, and he received many prizes, including the Asano Memorial Prize from the Institute of Electrical Engineers of Japan in 1934; the Academy Prize from the Japan Academy in 1948; the Distinguished Service Award from the Institute of Electrical Communication Engineers of Japan in 1950; the Medal of Honour with Purple Ribbon in 1956; the Broadcasting Cultural Prize from the Japan Broadcasting Corporation in 1960; the Order of Cultural Merit (regarded as top Japanese academic decoration) in 1963; the First Order of Merit in 1970 and the C.B. Sawyer Award (USA) in 1970. In 1977 he was elected a Member of the Academy.

Prof. Koga's many important inventions and researches have made a valuable contribution to radio science and were the result of his excellent imagination and his profound knowledge.

He also made remarkable contributions to engineering. As a

Professor in the University of Tokyo and the Tokyo Institute of Technology, he was responsible for the further education of many excellent researchers and engineers. Especially after World War II, he played a leading rôle in making many improvements in engineering education in Japan, such as in the establishment of the Association of University Professors for Engineering Education in Electrical Engineering, and of the Japanese Society for Engineering Education.

He also contributed to society as President of the Institute of Electrical Communication Engineers of Japan, later renamed the Institute of Electronics and Electrical Communication Engineers of Japan (1947-1948); President of the Institute of Electrical Engineers of Japan (1957-1958); Chairman of the IEEE Tokyo Section (1960- ); Member of the University Chartering Council in the Ministry of Education, Science and Culture (1958-1960); Member and Vice-President of the Council on National Language of Japan in the Ministry of Education, Science and Culture (1961-1981); Member of the Council on Training Teaching Staff in the Ministry of Education, Science and Culture (1968-1982); Member of the Central Council for Education in Japan in the Ministry of Education, Science and Culture (1966-1981); Member of the Radio Technical Council in the Ministry of Post and Telecommunications (1949-1950, 1957-1967); Member and Chairman of the Radio Regulatory Council in the Ministry of Post and Telecommunications (1963-1972). Prof. Koga was a member of URSI Commission I since 1934, and was a Vice-President of the Union from 1957 to 1963. He was elected President for the period 1963-1966, and remained a member of the Board as Past President until 1969. The title of Honorary President was conferred on him at the General Assembly in Washington, D.C. in 1981. When the 13th General Assembly of URSI was held in Tokyo in 1963, he was Chairman of the Organizing Committee, and it was thanks to his great efforts that this event is often regarded as one of the most successful General Assemblies in the history of URSI.

During his long career, Prof. Koga devoted himself fully to his research work and to education and other public duties, and he sacrificed his private life. He was a person who could not be satisfied with a result unless it was quite perfect. He was very strict with his students and his staff. At times, those who had the opportunity and the good fortune to work under him may have regarded him as somewhat authoritarian when their proposals were completely rejected by him, or when their work was severely criticized. However, they later learned to

appreciate the profound insight on which his rejection or criticism was based, and were very happy to have been able to benefit from such a wise advice.

Although he was very strict in his public life, he showed his warm-hearted personality in his private life. Prof. Koga's death is a great loss to both the scientific community and his friends.

S. Okamura

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### FRITZ EDWARD BORGNIS

Professor Dr. F.E. Borgnis, emer. professor of ETH Zurich Technical University, and member of the Swiss URSI Committee for many years, died on 27 August 1982.

Prof. Borgnis graduated with a Ph.D. in electron physics from Munich Technical University in 1933. After several years in private industry and research laboratories as a physicist, he became a professor at the Universities of Munich, Graz and Innsbruck, and the Wesleyan University of Middleton, Connecticut, Harvard University, the University of California at Berkeley, and finally, since 1960, at the Federal Institute of Technology, Zurich, Switzerland. Prof. Borgnis was recognized as one of the world's leading scientists in the field of high frequency electronics. He was the author of several scientific books and his name was listed in the World's Who's Who in Science. Professor Borgnis was a Director and Fellow of IEEE and other professional and scientific organizations.

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A.H. WAYNICK

We regret to announce the recent death of Professor A.H. Waynick who was well known in URSI circles.

An account of his activities will appear in the next issue of the *URSI Bulletin*.

## THE INTERNATIONAL POLAR AND GEOPHYSICAL YEARS: THE ROLE OF URSI

The year 1982 is being celebrated by the International Council of Scientific Unions for three reasons: it marks the 100th anniversary of the First Polar Year (1882-83), the 50th anniversary of the Second Polar Year (1932-33), and the 25th anniversary of the International Geophysical Year (1957-58). By common consent, each of these events is regarded as a turning point in the development of international cooperative projects for the collection and subsequent analysis of geophysical data.

Geophysics differs from other branches of physics in that it would be impossible for a geophysicist, working in isolation in his laboratory, to understand fully the implications of the observations he was making. For example, it is inconceivable that a meteorologist or a geomagnetician, making use only of their own local observations, could ever deduce the complex structure of the terrestrial atmosphere, or the global characteristics of the geomagnetic field. In contrast, it is quite conceivable that a spectroscopist, working completely alone, might eventually be able to interpret the spectral lines in which he was interested in terms of the energy levels of an atom or a molecule.

No geophysicist who was intent on making progress in his subject would disagree with the advice given by the Earl of Chesterfield to his son in 1746: "The knowledge of the world is only to be acquired in the world, and not in a closet". Half a century earlier, Edmond Halley had already concluded that he could only acquire a better understanding of the changes in magnetic declination by extending the measurements that he had made in England to other regions. In 1698 and 1700 he made two sea voyages, and during these he succeeded in making new observations which formed the basis for his map of the declination over the North and South Atlantic Oceans. Two years later, he was able to acquire additional measurements from ships sailing across the Indian and Pacific Oceans, and these enabled him to extend his charts to cover the whole world.

It seems fair to regard Halley's four-year programme of 280 years ago as a prototype of the large-scale international projects of the 19th and 20th centuries. The need for organising ambitious programmes based on the Halley model was cer-

tainly appreciated by C.F. Gauss and W. Weber when they organised the Göttingen Magnetic Union for the years 1836-41. This project demanded the regular acquisition of selected geomagnetic data in a world-wide network of 44 stations, and its ultimate success in bringing together the results obtained by many widely dispersed observers can be judged from the well-known comment made afterwards by Clerk Maxwell: "The scattered forces of science were converted into a regular army and jealousy and emulation became out of place, for the results of one man were of little value until combined with those of others".

Later in the 19th century, a young Austrian, Karl Weyprecht, became the main source of inspiration for the First Polar Year. Like Clerk Maxwell, he too recognised the need for carefully coordinated series of measurements covering a wide area, and the advice he gave during the early planning stages was often quoted, 50 years later, during the International Geophysical Year: "It will be necessary to organise a number of simultaneous expeditions, the objective of which will be to make comparable observations during one year, at a number of locations in the polar regions, using the same apparatus and following the same instructions". There can be little doubt that Weyprecht would have expressed his approval of the two sets of Instruction Manuals prepared for the International Geophysical Year and for its successor, the International Years of the Quiet Sun (1964-65), which have since been reproduced in the *Annals* of these two programmes (1, 2).

The question may well be asked why URSI, the Union concerned with the basic scientific aspects of radiocommunications, should be interested in joining in the celebration of several geophysical anniversaries. It must be admitted that the popular concept of a radiocommunication system is usually limited to a transmitter, probably with an impressive antenna and, far away, a receiver feeding a pair of headphones or a loudspeaker, a teleprinter or a television screen, or even nowadays a computer. It is certainly much more difficult to visualise what happens to the radio waves during their passage, through the mythical "ether", from the transmitter to the receiver. At the beginning of the century, after Marconi had succeeded in sending radio signals across the Atlantic from England to Canada, it was equally difficult for physicists and mathematicians to account for this feat, especially when it was shown that the diffraction field could not provide an acceptable explanation.

It is now known that the success or failure of a radio link depends as much on the characteristics of the lower

atmosphere or of the ionosphere, depending on the frequency used, as it does on the hardware at the two terminals. But when URSI's predecessor, the International Commission on Scientific Wireless Telegraphy, was formed in 1913, and even when the Union itself was created in 1919, nothing was known about the effect of the atmosphere on radio waves. Moreover, at that time, geophysicists had no means of exploring the upper atmosphere and of providing the radio scientist with the information he needed about its characteristics. Indeed it was not until the advent of high-altitude sounding rockets in the late 1940's, and of instrumented satellites a decade later, that geophysicists gained direct access to *in situ* measurements in the upper atmosphere. Thus it was inevitable that, during the first half of the 20th century, many of the physicists, electrical engineers and mathematicians who had an interest in radiocommunications were obliged to become 'do-it-yourself' geophysicists, and to use the radio waves themselves as long-distance probes for the investigation of the regions through which the radiation travelled.

Even at the time of the First General Assembly of URSI in 1922, it is obvious from the unpublished documents that Mesny, Abraham and others were concerned about the potential, but unknown, effects of atmospheric electricity on the propagation of radio waves, and Eccles reported that he had consulted Irving Langmuir and Balth. van der Pol about how the hypothetical ionised Kennelly-Heaviside layer might be expected to affect radio waves. Since 1913, Gustave Ferrié, URSI's first President, had been interested not only in radiocommunications, but also in the development of radio methods for the determination of longitude, and this involved finding out how and why the velocity of propagation of radio waves was modified during their passage through the atmosphere.

Convincing evidence for the existence of the ionosphere was not obtained until 1924, and then on both sides of the Atlantic by Breit and Tuve, and by Appleton and Barnett. By the time of the II General Assembly of URSI in 1927, Ferrié was able to say, in the course of his presidential address, that the study of wave propagation was certainly the most important at that time.

So far as ionospheric propagation was concerned, there was still an evident need for much more information about the geographical and temporal variations in the ionosphere. An opportunity to satisfy this need came during the IV Assembly of URSI in 1931, when the provisional plans for the Second

Polar Year were being discussed. These envisaged the repetition, using up-to-date instruments, of the types of measurement made 50 years earlier, but the Chairman of the URSI Commission on Wave Propagation, L.W. Austin, formed a Working Group to discuss the possibility of adding radio observations to the provisional programme. The Group was chaired by Appleton, and its members were La Cour (Chairman of the Polar Year Commission), Bureau, Dellinger, Watson Watt and van der Pol. Its recommendations were accepted by the Assembly and, as a result, plans for making coordinated ionospheric and other radio measurements were incorporated in the Polar Year Programme. Thus, thanks to the initiative taken by URSI, for the first time the acquisition of ionospheric data became one of the objectives of a major international programme of geophysical observations. The Polar Year and the results obtained during it gave a considerable impetus to ionospheric studies in many parts of the world. In Calcutta, for example, S.K. Mitra and his staff quickly applied their experience in high-frequency techniques to ionospheric research, and it is interesting to recall that this led to the publication of Mitra's *Report on the Present State of our Knowledge of the Ionosphere* which presented the first coherent account of the new and rapidly developing subject (3).

It should not be forgotten that, although radio scientists were the pioneers in ionospheric research, considerable attention was being given by geophysicists to the theory of ionospheric layers and to the effects on the geomagnetic field of electric currents flowing in them. The work of Alfvén, Bartels, Chapman, Ferraro and others is still well known. In 1938, Chapman suggested that it would be desirable to arrange for closer cooperation between radio scientists and geophysicists in the study of upper atmospheric ionisation. This collaboration was not realised until after World War II when, in 1948, the Mixed Commission on the Ionosphere was established. The membership was representative of the Astronomical, Geophysical, Physics and Radio Science Unions and included Appleton, then President of URSI, and two future Presidents, Berkner and Beynon.

The first suggestion concerning the organisation of a Third Polar Year was made in 1950 by Berkner, who had been active in ionospheric research before the War and who was elected President of URSI in 1957. At the Second Meeting of the Mixed Commission, held in Brussels in September 1950, Berkner's suggestion was examined and approved, and it was

agreed that it should be forwarded to the four Unions for consideration and possible action. The IX URSI Assembly was due to begin soon after the Brussels meeting, and this provided the Union with an opportunity to examine the views of the Commission, and the detailed supporting document, without delay. These were approved by the Assembly, and thus URSI became the first Union to submit to ICSU a formal proposal for the organisation, in 1957-58, of the Third Polar Year or, as it was later renamed, the International Geophysical Year.

Historically, URSI's concern with certain branches of geophysics began in the ionosphere, but it is important to remember that radio scientists have made contributions of value in other geophysical disciplines. In 1922, the First URSI Assembly established a Commission on Atmospheric, not because radio scientists were interested in thunderstorms as such, but because the radiation from lightning flashes was a serious source of interference to radiocommunications. In the 1920's and 1930's, studies of the world distribution of thunderstorms and of the physics of thunderclouds received a considerable impetus from radio scientists who also had experience and an interest in meteorology, such as Bureau in France, Lugeon in Switzerland and Watson Watt in the United Kingdom. Many years later, during detailed studies of atmospheric and their wave-forms, particular attention was given to the so-called "whistling atmospheric" which were not understood. The very unexpected explanation of their origin was brought to the URSI Assembly in Canberra in 1952 by J.A. Ratcliffe, who announced the conclusions reached by Storey, namely that "whistlers" were the result of the dispersion of pulses of radiation, produced by lightning flashes, which had travelled from the northern to the southern hemisphere, or vice versa, by way of residual ionisation far above the ionosphere as it was then known. Thus the discovery of the magnetosphere can be attributed to the use of radio waves as probes and, until satellites became available, the study of "whistlers" was the only source of information about the ionisation in the highest levels of the terrestrial environment.

Radio scientists have contributed also to detailed investigations of the structure of the lowest levels of the atmosphere, thanks to the sensitivity of radio waves in the vhf and higher-frequency bands to the refracting and absorbing properties of the air. As early as 1943, the unexpected behaviour of 100MHz radars in Malta led to the association of anomalous radio-wave propagation with the pronounced atmospheric tempera-

ture inversions found in the Mediterranean. After the end of World War II, with the development of vhf radiocommunications, the need for closer links between radio scientists and meteorologists became obvious, and this led to the formation in 1948 of the Mixed Commission on Radiometeorology which provided an important forum for the discussion of this relatively new branch of meteorology. Among those who participated in the early activities of this Commission, many were and some still are active in URSI: H.G. Booker, C.R. Burrows, W.E. Gordon, J. Lugeon, R.L. Smith-Rose.

The purpose of this review has been to draw attention to the contributions made by radio scientists and by URSI to advances in several branches of geophysical research, and especially in those on which attention was focused during the Polar Years and the IGY. The story would not be complete without a brief reference to the activities of radio scientists in astronomy, and to the involvement of radioastronomers, in their turn, in geophysics. Radioastronomy is now accepted as a new and important addition to the oldest branch of science. Although in 1934 the subject had not been born, Jansky's recent report on the recording of radio noise, which he suspected to be of extraterrestrial origin, was given serious attention at the URSI Assembly in 1934. The resulting Recommendation adopted by the Assembly can be regarded, with some justification, as the debut of radioastronomy on the international stage.

The observation of solar radio noise by Royal Air Force and Army radars in England in 1942 represents one of the first milestones along the route pioneered by Jansky, but it was not until the end of the War that radio scientists were free to convert surplus radars into radio telescopes, and to pave the way for the recognition of the new types of astronomical observation as complementary to, and not competitive with, those obtained using optical instruments. During the International Years of the Quiet Sun (1964-65), observations of the different types of solar noise were an important element in the programme for monitoring the changing activity of the Sun, and therefore in the analysis of the geophysical data then being acquired.

The contributions made by radio scientists to the study of the atmosphere, including the ionosphere and the magnetosphere, is now well known. What is probably less well known is that the very-long-base radio-interferometers, developed for making accurate stellar and other observations, can now be used for making geodetic measurements with a precision that would have

once been considered inconceivable. This link between one of the newest offshoots of radio science and one of the oldest branches of geophysics provides striking evidence of the potential value of cooperation between scientists working in completely unrelated disciplines.

The radio scientist's search for knowledge about how radio waves are propagated has, by force of circumstances, led to his apparent incursion into the field of the geophysicist. For a time, this led to arguments and to the expression of often sharply divided opinions about the boundaries between the different branches of science. However, these have now largely subsided, and indeed it seems true to say that the remark made by John Milton more than three centuries ago is still relevant: "Where there is a desire to learn, there of necessity will be much arguing, much writing, many opinions; for opinion in good men is but knowledge in the making".

3 September 1982

C.M. Minnis

#### References

- (1) *Annals of the IGY* (Pergamon Press, Oxford)
- (2) *Annals of the IQSY* (MIT Press, Cambridge, Mass.)
- (3) Mitra, S.K., *Proc. Natl Inst. Sciences, India*. 1. 131-215 (1935)

## MEETING OF URSI BOARD OF OFFICERS

### SUMMARY

On 18 and 19 September 1982, the Board of Officers met at the URSI Secretariat in Brussels. All the members were present.

#### 1. Composition of the Steering Group for the Coordination of the URSI Scientific Programme

The main task of this Group is to set up the scientific programme for the XXI General Assembly of URSI (Florence, Italy, August/September 1984) in consultation with the Chairmen and Vice-Chairmen of Commissions, and with the Chairmen of the Inter-Commission Working Groups.

Sir Granville Beynon, Honorary President of the Union, has kindly accepted to chair the Steering Group, the members of which are Prof. A.L. Cullen, Prof. W.E. Gordon and Prof. J. van Bladel.

The first meeting of the Steering Group was held on 19 September afternoon at the URSI Secretariat.

#### 2. Re-establishment of the Inter-Commission Working Group on the Influence of Man's Activities on Telecommunications

This Inter-Commission Working Group had been established at the General Assembly in Helsinki (1978). However there was not much activity during the triennium 1979-1981, and an *ad hoc* Discussion Group was convened during the General Assembly in Washington to examine the future rôle of this Working Group and to report to the Council. The Report was not available in time for consideration by the Council, which authorized the Board of Officers to make appropriate decisions.

The Board of Officers agreed unanimously that this Inter-Commission Working Group had an important task to fulfill, and it decided to re-establish it, with the following title and terms of reference:

Title: Effects of Human Activities on the Ionosphere and magnetosphere, and on Telecommunications.

Terms of Reference:

To study:

(1) the question of high-power HF heating of the ionosphere

and the consequences for radio propagation;

- (2) the effect of launch vehicles on the ionosphere, in particular the nature and extent of the ionospheric 'holes', and the consequent effects on telecommunication;
- (3) the effects of microwave beams from solar power satellites on the magnetosphere and the ionosphere;
- (4) the effects of changes in the ionosphere and the magnetosphere, resulting from human activities, on the quality of observations in other sciences such as radio astronomy.

Several names were mentioned for the chairmanship of this of this Inter-Commission Working Group, and it is hoped that a Chairman will be designated in the near future.

### 3. Finances

The audited accounts for the year 1981 (see *URSI Inf.Bull.* No 220, p.4) were approved.

At the General Assembly in Washington, the Council authorized the Board to make annual budget corrections, as appropriate. The units of contribution for 1982 and 1983 were left at their proposed level. For 1984, however, given the uncertainty of the future, as expressed e.g. by an increase in the rate of inflation, the Board decided to raise the unit slightly and to bring it to \$630 instead of \$610.

Since the last General Assembly, each of the following Member Committees has raised its membership Category:

India: from Cat.3 to 4; Japan: from Cat.5 to 5A; South Africa: from Cat. 2 to 3. The Board expressed its appreciation of the steps taken by these Committees.

### 4. URSI Committee on Developing Countries

Dr. A.P. Mitra, Chairman of the Committee, reported on the various actions taken since the Assembly in Washington.

Good progress has been made in the preparation of the *Handbook on HF Propagation* and of the *Directory of Radio Science Groups on Developing Countries*.

A Training Programme on 'Satellite Radio Beacon Measurements' will be held in association with the International Symposium on Satellite Radio Beacons to be held in February

in New Delhi, India. It is expected that, thanks to the support offered by the Indian organizers, by ICSU/UNESCO and by URSI, a number of young scientists from developing countries will be able to participate in these events.

Dr. Mitra reported further on the forthcoming Trieste Course on Geomagnetism, Ionosphere and Magnetosphere, and the Workshop on Radio Propagation in the Tropics which are both being organized by the International Centre for Theoretical Physics and co-sponsored by URSI (21 September - 12 November 1982). The workshop is of direct interest to developing countries.

#### 5. URSI Young Scientists Programme

A grant of \$10,000 has already been allocated by ICSU for the implementation of the Young Scientists Programme for the XXI General Assembly of URSI. It is hoped that the total funds made available will make it possible for about 50 young scientists to participate in the Assembly. Candidates will be invited not only from Member Committees of URSI, but also from other countries where there is no URSI Committee.

#### 6. Relations with ICSU

The President of the Union reported on the meetings of the ICSU General Committee and General Assembly which were held in Cambridge, UK, at the beginning of September.

He drew particular attention to the following decisions made by ICSU:

- Admission of the China Association for Science and Technology (see ICSU Res.2, p.16);
- Admission of two new Unions: the International Union of Microbiological Societies (IUMS), and the International Union of Psychological Sciences (IUPsyS), and one Associate Member: the Association for Physical and Engineering Science in Medicine;
- Recommendation to all members of the ICSU family to consider the possibility of waiving or reducing registration fees for young scientists attending conferences (see ICSU Res.5,p17 );
- Recommendation to ICSU bodies to facilitate the admission of Chinese scientists, thereby protecting the non-political tradition of ICSU (see ICSU Res.3, p.17);
- Appointment of a special committee to study the possible

consequences of the nuclear arms race (see ICSU Res.23, p.23).

#### 7. Appointment of new IUCAF Secretary

On the recommendation of the members of the Inter-Union Commission on Frequency Allocation for Radio Astronomy and Space Science (IUCAF), the Board approved the appointment of Dr. A.R. Thompson (NRAO, USA) as Secretary of the Commission.

#### 8. Dates for the XXI General Assembly of URSI

The Board discussed the dates proposed by the Italian Organizing Committee for the XXI General Assembly in Florence, Italy, but it decided not to take any decision before consulting the Chairmen of the URSI Commissions. Negotiations are still under way, but it is certain that the Assembly will be held within the period from 24 August to 6 September 1984.

## XIX GENERAL ASSEMBLY OF ICSU

The XIX General Assembly of the International Council of Scientific Unions was held in Cambridge, UK, from 13 to 17 September 1982. URSI was represented by its President, Prof. W.E. Gordon.

#### 1. Election of Officers

The following have been elected:

|                       |                                  |
|-----------------------|----------------------------------|
| President:            | Prof. D.A. Bekoe (Ghana)         |
| First Vice-President: | Sir John Kendrew (UK)            |
| Vice-President:       | Academician G.K. Skryabin (USSR) |
| Secretary General:    | Prof. L. Ernster (Sweden)        |
| Treasurer:            | Prof. T.F. Malone (USA)          |

#### 2. Resolutions and Decisions

The following Resolutions and Decisions adopted by the ICSU General Assembly are of interest to URSI:

##### 1. Membership

Accepts the application for International Scientific Union status from the International Union of Microbiological Societies (IUMS) and the International Union of Psychological

Science (IUPsyS).

*2. Admission of the China Association for Science and Technology as a National Member*

Reaffirming the principle of the universality of sciences as laid down by resolutions at successive General Assemblies and in particular at the 16th General Assembly; and

Recalling the resolutions of the 15th, 16th, 17th and 18th General Assemblies seeking to promote the representation in ICSU of all Chinese scientists; and

Acknowledging that there is only one China and that Taiwan is a part of China;

Accepts the application of the China Association for Science and Technology (CAST) as a National Member;

Requests the Ad hoc Committee on Structure and Statutes to study and report, after consultation with Members of ICSU including the China Association for Science and Technology and the Academy located in Taipei, China, on: a) the possibility of replacing the term "national member" by an appropriate term which would avoid the difficulties of the term national member; b) the appropriate form of membership for the Academy located in Taipei, China, if this should become necessary; and c) any other amendments to the Statutes that would tend to promote the universality of science; and

Affirms that the Academy located in Taipei, China, shall retain its present membership in ICSU, including its present voting rights, unless otherwise provided by a revision of the Statutes.

In adopting this Resolution, the General Assembly welcomes the agreement reached by the Executive Board regarding Chinese membership in ICSU and wishes to make the following clarification:

- 1) the statement "acknowledging that there is only one China and that Taiwan is a part of China" is not of a political nature and merely recognizes the fact that, in the case of China, several ICSU Unions have already provided for simultaneous adherence by two Chinese scientific bodies; and
- 2) references as to the appropriate form of membership for the Academy located in Taipei, China, and to the future status of the Academy as referenced in clause b) of the paragraph beginning "Requests...", mean that any revision of the Statutes

proposed should not exclude the Academy located in Taipei from membership or voting rights.

3. *Membership of China in the Scientific Unions and other ICSU Bodies*

Noting with satisfaction that with the admission to ICSU of the China Association for Science and Technology, scientists from all parts of China are now represented in ICSU, and in conformity with ICSU's dedication to the principle of the universality of science

Suggests that all ICSU constituent bodies where representation of Chinese scientists is incomplete, and where appropriate membership applications for admission are pending, or may be arranged, act to facilitate such admissions, and

Further suggests that all ICSU constituent bodies arrange such admissions through mechanisms that emphasize and protect the non-political tradition of the ICSU family.

5. *Registration Fees for Young Scientists*

Recognizing that many young scientists including those with accepted papers at international Conferences organized or sponsored by the scientific members of ICSU find difficulties in obtaining funds needed to enable them to attend such meetings; and

Further recognizing that even when specific programmes of support exist, such as COSTED Travel Fellowships, travel support given by the Unions concerned, etc., the registration fees for the meetings must often be paid by the participant;

Suggests that all Scientific Unions and other members of the ICSU family consider possibilities for waiving or reducing registration fees for young scientists invited to participate in scientific conferences.

6. *World Data Centres*

Aware that in 1982 the system of World Data Centres in geophysics and solar-terrestrial physics celebrates its 25th anniversary;

Noting that the data collected by the World Data Centres during the past 25 years contain the results of observations from a world network of stations in a wide range of scientific disciplines, from international and national expeditions to remote

regions of the globe including Antarctica, from ocean research vessels, and from space probes in the near-Earth environment; and that these data were the source of many important discoveries in the fields of planetary geophysics and solar-terrestrial physics;

Noting further that many countries have spent large sums to finance observations the results of which are now stored at the World Data Centres and made generally available to the world scientific community; and

Recognizing that the principles underlying the activities of the World Data Centres and the relations these activities have established among national scientific communities are a demonstration of the great progress achieved in international cooperation among scientists;

Congratulates all those involved in the World Data Centre system in geophysics and solar-terrestrial physics;

Thanks the ICSU National Members in the USA, USSR and other countries for arranging the facilities necessary for maintaining the operation of WDCs A, B and C; and

Recommends that scientists within the ICSU family who have not availed themselves of the services offered by the World Data Centre system establish contacts with the system and with the ICSU Panel of World Data Centres.

#### *7. Scientific Research Applied to World Needs*

Invites the Executive Board to establish an Ad hoc Group to examine in depth the proposal for a series of conferences, symposia or workshops devoted to Scientific Research Applied to World Needs, which should: a) take into account the experience already gained by the International Union of Pure and Applied Chemistry with its CHEMRAWN Conferences, the personnel and financial resources required to organize and carry out such meetings and the suggestions from members of the ICSU family concerning subjects to be discussed (for example, earthquake security, tropical forests, ocean resources); and b) report to the 17th meeting of the General Committee in 1983.

#### *8. ICSU-UNESCO International Biosciences Networks (IBN)*

Recognizing the needs of the developing countries to strengthen their research capability in many fields of biology so that they are better able to tackle for themselves investigations into problems of health, agriculture, food production, exploi-

tation of natural resources and biotechnology, and

Endorses the approach of setting up Regional Networks to organize training courses and joint research programmes in accordance with defined priorities,

Commends the progress made towards the establishment of an African Biosciences Network, continuation and extension of the work of the Latin American and Asian Networks, and the setting up of networks in the Arab countries and Caribbean region,

Invites the Union and National Members of ICSU to give all possible assistance in furthering the objectives of the IBN.

#### 10. COSTED

Gratefully acknowledges the offer of the Government of India to provide secretarial services and office space for the COSTED Headquarters in India,

Notes with appreciation the growth in scope and effectiveness of COSTED's activities including travel grants, meetings and workshops (in cooperation with intergovernmental and other non-governmental organizations), publications and scientific teaching aids, and

Expresses satisfaction at the expansion in the geographical coverage of COSTED's activities, in particular the opening of regional ICSU-COSTED offices in Asia, Africa, Latin America and the Caribbean, which should facilitate greater participation by the Scientific Unions and Committees in the approach of problems of science and technology in development,

Suggests that equally important functions of these offices will be to create an awareness in the regions they serve of the importance of science and technology, and to arrange for outstanding scientists to work with younger scientists in these regions,

Recommends that COSTED enhance its cooperative activities with the Scientific Unions and Associates as well as with the International Biosciences Networks, the CTS, and CASAF, and that it cooperate with the International Foundation for Science in organizing workshops and symposia for younger scientists working in specific research areas.

### 11. *ICSU Press*

Accepts the report of the Committee on Publications and Communications,

Invites the Committee: a) to examine further the economic and administrative feasibility of creating an ICSU Publishing House and the advantages and disadvantages to the international scientific community that the creation of such a Press would bring; b) to report by June 1983 to the Executive Board and to the General Committee on: i) the existing and projected publications of the ICSU family; ii) the willingness of the members of the ICSU family to use the facilities and advice of the ICSU Publishing House, if one is created; iii) the feasibility of creating an ICSU Publishing House in cooperation with either a not-for-profit publisher or group of publishers, or one or more commercial publishers; iv) the feasibility of launching new scientific journals in fields not adequately covered; v) the possibility of publishing a series of volumes which would bring to wider audiences a greater consciousness of the work of the scientific community. In undertaking these studies the Committee should take into account the needs for: 1) providing scientific information to the scientific community at a reasonable price; 2) maintenance of high quality; 3) the special requirements of scientists in developing countries; and 4) the avoidance of the proliferation of journals.

### 12. *Safeguard of the Pursuit of Science*

Notes the Report of the Committee,

Recommends that the Committee establish liaison with the several committees on human rights of the National Members of ICSU,

Thanks the Royal Society for maintaining an archive of cases in which the human rights of scientists have been violated or their work has been seriously hampered, and

Expresses the hope that the Committee will draw greater attention to the poor condition and status of scientists, which are among the main causes of the problems of the brain drain of scientists from developing countries,

Repeats the suggestion made at the 18th General Assembly that the Committee develop a set of principles concerning the necessary safeguards for the pursuit of science. These should include: avoidance of restriction on scientific communication

resulting from the supposed commercial applicability of new scientific discoveries or from the desire to avoid strengthening the technical capabilities of other countries; avoidance of refusal of exit visas to scientists who are unable to work in their own countries; avoidance of revocation of legitimately earned academic degrees.

*13. Refusal of Exit Visas*

Expresses its grave concern about the cases of scientists who, while being dismissed from their Institutes and denied the possibility of pursuing research in their country of residence, are refused exit visas to other countries where their skills are sought and where they can continue to contribute to the advancement of science,

Notes the serious obstacles to fruitful and friendly international cooperation caused by such action,

Urges the Committee on the Safeguard of the Pursuit of Science and all National Committees to do their utmost to persuade the responsible authorities to resolve these cases as speedily as possible and to report thereon to the next meeting of the General Committee.

*14. Revocation of Academic Degrees*

Expresses dismay that legitimately earned academic degrees have been revoked as punishment for political activities,

Declares that it consider such revocation as null and void; and

Urges the scientific community and all institutions of science to treat the individuals concerned as possessing those degrees.

*15. Free Circulation of Scientists*

Commends the Standing Committee on the Free Circulation of Scientists for its report and for the Committee's vigorous and timely activities,

Thanks the Royal Swedish Academy for assisting in the maintenance of archives and providing administrative assistance to the Committee,

Reaffirms its abiding commitment to the principles of free circulation of scientists contained in the resolutions adopted by the 10th, 14th, 15th and 16th General Assemblies,

Requests that National Members monitor at appropriate intervals government policies that may pose difficulties in issuance of visas to bona fide scientists, and report promptly to the Standing Committee on Free Circulation of Scientists and to meeting organizers,

Urges organizers of international scientific meetings to adopt and publicize in meeting circulars the timetable for visa application and issuance, as recommended in the 1974 Resolution on the Free Circulation of Scientists,

Draws the attention of Unions, Committees and National Members to the possible consequences of refusal of visas to bona fide scientists, including: withdrawal of international sponsorship; cancellation or removal of the meeting to another site; and a recommendation to all ICSU bodies not to hold meetings in the country until the situation is remedied.

#### *19. Scope and Structure*

Commending the initiative taken by the President of ICSU to stimulate discussion about the present rôle of the Council and the direction in which it should evolve in the next decade,

Keeping in mind the discussions that occurred during consideration of the Reports of the President, the Ad hoc Committee on Structure and Statutes, and the Admissions Committee,

Suggests that the Executive Board direct the Ad hoc Committee to undertake a broad examination of the overall structure and responsibilities of ICSU - which will necessarily include some expansion of the membership of the Ad hoc Committee to assure appropriate disciplinary and geographic representation,

Further suggests that a careful general review and analysis of the ICSU Statutes and Rules of Procedure are required, and

Requests the Committee to report to the 20th General Assembly.

#### *22. Oceanic Aspects of the World Climate Programmes*

Noting that during the discussion of the World Climate Research Programme special attention was paid to the difficulties of research directed toward determining the ocean's rôle in climate variability and change, because of the high costs and long time periods involved, the multiplicity of required instruments, and the present inadequacy of coupled models of the ocean-atmosphere system,

Noting further the long-term problems of climate change related to increases in atmospheric carbon dioxide, the possible rise in sea level resulting from changes in the West Antarctic ice cap; the rôle of the oceans in absorbing carbon dioxide, and thereby mitigating the increased atmospheric concentrations; and the rôle of variations in the extent and thickness of sea ice,

Understanding that the causes of climatic variability and change are global in character (although there are differences in their impact) and most disruptive to human lives in the developing countries,

Recognizes the importance of involving the developing countries in collecting the data needed for understanding the ocean's rôle in climatic variability and change, especially because of the establishment of the 200 mile wide exclusive economic zones off the coasts of these countries, in which they must consent to any kind of marine research,

Urges these countries to install and operate simple but adequate gauges for the measurement of changes in mean sea level, and to report the results in timely fashion through the international data collecting and disseminating agencies and

Further urges all coastal states to cooperate in the work of the IOC/SCOR Committee on Climate Change and the Oceans and to support these activities by voluntary contributions to SCOR or the IUC,

Recommends close cooperation between COSPAR, SCAR and SCOR in planning the operation of ocean and ice-scanning satellites and in studies of the dynamics of sea ice and the West Antarctic Ice Cap.

### *23. Effects of a Nuclear War*

Recognizing the need for public understanding of the possible consequences of the nuclear arms race and the scientific competence that can be mobilized by ICSU to make an assessment of the biological, medical and physical effects of the large-scale use of nuclear weapons,

Urges the Executive Board to appoint a special committee to study these effects and to prepare a report for wide dissemination that would be an unemotional, non-political, authoritative and readily understandable statement of the effects of nuclear war, even a limited one, on human beings and other parts of the biosphere.

### 3. Next General Assembly of ICSU

At the invitation of the National Research Council of Canada, the 20th General Assembly of ICSU will be held in 1984 in Canada.

## HEINRICH BARKHAUSEN: CENTENARY COMMEMORATION

The 100th Anniversary of the birth of Heinrich Barkhausen was celebrated in Berlin on 1 December 1981, under the auspices of the Academy of Sciences of the DDR, and the Technical University of Dresden. On this occasion the Barkhausen Medal of the Academy was awarded to Prof. Dr. Adam Smolinski, President of the Polish URSI Committee and a Vice-President of URSI. We take this opportunity of congratulating Prof. Smolinski.

The event was followed, on 2-4 December, by a Colloquium in Dresden devoted to selected aspects of Information Techniques.

## 1982 INTERNATIONAL SYMPOSIUM ON INFORMATION THEORY

This Symposium was held in Les Arcs, France, from 21 to 25 June 1982, under the sponsorship of the IEEE Information Theory Group, the International Union of Radio Science (URSI) and the French Society for Information Theory.

On the first day, Prof. B. Picinbono, Chairman of the Symposium (co-Chairman: Prof. Helstrom) welcomed the participants on the top floor of the Golf Hotel, that gave an excellent view of the Mont Blanc panorama. Prof. Kailath gave his keynote address on "Classical Information Theory, VLSI, and Modern Signal Processing".

Other plenary sessions: An information theoretic view of jamming problems, by Prof. R.Mc. Eliece (Illinois University), an excellent speaker, and faster than anyone I know. Recent results in vector quantization (Dr. N. Sloane, Bell Labs). Combinatorial methods in classical and multi-user information theory (Prof. I. Csiszar, Budapest). Telematic services (Prof. B. Marti, CCETT Rennes); a demonstration of the French work in this direction was given separately during the two final days of the Symposium. Distributed algorithms and information (Prof. R. Gallager, MIT, Cambridge, Mass.).

The seventh Shannon lecture was presented by Prof. I.S. Reed (University of Southern California) on the "Applications of transforms to coding and interrelated topics". Prof. Reed drew also attention to the work of the Jet Propulsion Laboratory on coding for deep-space flights.

Apart from the plenary sessions, there were usually six sessions in parallel, with sixteen contributions per day. Some of the subjects were: Questionnaire theory; Convolutional codes; Noiseless source coding; Adaptive systems; Sampling; Multi-user theory; Information measures; Block codes; Spread spectrum techniques; Pattern recognition; ARQ systems; Speech and image processing; Sonar and radar; Cryptography; Estimation; Multiple and random access techniques; Optical communication.

Prof. J.M. Goethals (MBLE and Louvain Univ.) chaired the Programme Committee, and Prof. A. Viterbi chaired an International Advisory Committee. All 420 participants and about 130 other guests resided at the Golf Hotel at 1800 meters in the Haute Savoie. A cocktail party on Sunday, a piano and violin concert on Monday, a film about the French Alps on Tuesday and

a banquet on Thursday provided entertainment. On Wednesday there were several trips to Chamonix and the Mont Blanc Massif, but a trip to the nearby National Park had to be cancelled because of weather conditions.

Among the session Chairmen were Prof. van der Meulen (Louvain Univ.), Mrs Bouchon (Paris 6), Johannesson (Lund Univ.), Macchi (ESE, Gif-sur-Yvette), Wolf (Amherst), Savage (Providence), Schalkwijk (Eindhoven), Jellinek (IBM), Viterbi (San Diego), Massey (ETH, Zurich), Zetterberg (Stockholm), Turin (Berkeley). I chaired the session on Multiple access techniques. Apart from those already mentioned, we met many old friends like Blachman, Slepian, Proakis, some of whom are already coming to Symposia on Information Theory since 20-30 years.

The Abstracts are collected in a book that is available from IEEE under Catalog Nr.82 CH 1767-3 IT.

7 July 1982

F.L.H.M. Stumpers

## 6TH SUMMER SYMPOSIUM ON CIRCUIT THEORY

The Institute of Radio Engineering and Electronics of the Czechoslovak Academy of Sciences organised the 6th Summer Symposium on Circuit Theory in Prague from 12 to 16 July 1982. On 12 July, Prof. V. Zima, Director of the Institute, welcomed over 200 participants in the spacious rooms of the Palace of Culture. He drew attention to the special relation of this Symposium with URSI, manifested by URSI sponsorship and the presence of Dr. Géher and Prof. Stumpers.

The main subjects of the Symposium were: Discrete Signal Processing, with invited lectures by Boite (Noise performance), Del Re (Transmultiplexers), Jaroslavski (Image processing), Kroupa (Frequency stability), Lüder (Digital filters), Nussbaumer (Fast polynomial transforms), and Stursa (Filter simulation); Active and Nonconventional Analog Filters, with special lectures by Gensel (Electromechanical resonators), Moss (Switched capacitor technology), Spiegel (Active filter building blocks); Communication circuits and systems, with invited lectures by Benedetto (Digital satellite systems), Frigyes (Digital microwave systems), Kuchar (Optical fibre systems),

and Simsa (Carrier recovery in MPSK signals).

A special and interesting workshop had Prof. Emiliani as its main speaker. The subject of the workshop was: Medical Applications, and Prof. Emiliani treated Speech processing in aid of sight and hearing impaired persons.

The sixteen main lectures were collected in a book of 267 pages. Another book collected 115 short contributions, that treated the above mentioned subjects in greater detail (also a nice book of 619 pages).

On Friday a special workshop covered the work of the Institute of Radio Engineering and Electronics on phase-locked loops, with demonstration of several of their own newly developed apparatus.

This Symposium now becomes a member of a series; the next one is foreseen for Stuttgart, and in 1985 it will return to Prague.

12 August 1982

F.L.H.M. Stumpers

## RADIO PROBING OF THE HIGH-LATITUDE IONOSPHERE AND ATMOSPHERE: NEW TECHNIQUES AND NEW RESULTS

The International Symposium on Radio Probing of the High-latitude Ionosphere and Atmosphere was held from 9 to 13 August 1982 at the Geophysical Institute of the University of Alaska, Fairbanks, USA. It was sponsored by URSI Commissions G and H, the URSI Committee in the United States, and the US Air Force Geophysics Research Laboratory.

The Steering Committee was chaired by Dr. R.D. Hunsucker of the Geophysical Institute of the University of Alaska.

The Programme included sessions on the following topics:

- Modification experiments (Chairman: J.G. Roederer)
- Methods of high latitude radiowave research (Chairman: J.R. Dudeney)
- Solar cycle variations of the high latitude ionosphere (Chairman: J.R. Dudeney)

- Radiowave probing of boundaries in the magnetosphere-ionosphere system (Chairman: J.A. Gledhill)
- Radiowave studies of the disturbed polar ionosphere (Chairman: T. Hagfors)
- Neutral atmosphere (Chairman: P. Bauer)
- Irregularities large and small (Chairmen: G.C. Reid and V.B. Wickwar)
- Future directions (Chairman: R.A. Greenwald).

The programme included about 70 lectures of which 14 were invited.

## 7TH COLLOQUIUM ON MICROWAVE COMMUNICATION

The 7th Colloquium on Microwave Communication was held in Budapest, Hungary, from 6 to 10 September 1982. Professor Bogner welcomed the participants during a cocktail party on 6 September and he officially opened the Colloquium on the next morning in the auditorium of the Academy of Sciences. The Colloquium was organized by the Scientific Society for Telecommunication and the Research Institute for Telecommunication, Hungary, and sponsored by the International Union of Radio Science (URSI) and the Hungarian Academy of Sciences.

I had the pleasure of giving the keynote address on 'Microelectronics in Telecommunications'. It compared digital and analog approaches (e.g. the Bell System Digital Signal Processor, and the switched capacitor codes), and also discussed progress in speech handling (vocoders) and subscriber line interfaces.

The main themes of the Colloquium were: I. Trends in Communication; II. Communication System Theory; III. Circuit Theory and Computer Aided Design; IV. Electromagnetic Theory, Antennas and Propagation; V. Microwave Circuits; VI. Materials and Devices for Microwave Applications. In 33 sessions, 132 papers could be placed, and another 51 were presented in three poster sessions. Unfortunately several authors did not appear without having informed the organizers of their absence. Economic difficulties may well make impossible planned travel, but one should try to find a substitute, and certainly inform the organizers.

Many distinguished scientists, well known in URSI circles,

were among those present: e.g. Almassy, Benda, Boithias, Carassa, Czibi, Felsen, Gardiol, Géher, Gordos, Horvat, Jellinek, Oliner, Piefke, Severin, Smolinski, Spasov, Tsybakov, Unger, too many to mention them all.

We were privileged to have a nice summer weather all the time, especially during a boat trip on the Danube on Thursday evening, of about three and a half hours. At noon on Friday, Professor Bognar closed officially the Colloquium, and I had the opportunity to thank him and his collaborators for a well organized Colloquium, also on behalf of URSI. Friday afternoon all participants could choose between visits to the Research Institutes of TKI (the Hungarian telecommunication industry), the Technical University of Budapest, and the Academy of Sciences.

The full papers of the Colloquium are published in two volumes of 514 and 368 pages, plus 24 pages of contents and introduction. OMIKK TECHNOINFORM, Budapest 1982 is the publisher.

September 1982

F.L.H.M. Stumpers

## 24TH PLENARY MEETING OF COSPAR

At the invitation of the National Research Council of Canada, COSPAR held its 24th Plenary Meeting, and Associated Activities, including ten symposia, seven workshops, and several topical sessions, in Ottawa, from 17 May through 2 June 1982. In addition to COSPAR proper, many related meetings were held in the two and a half weeks mentioned. For the fifth time, SCOSTEP organized the International Symposium on Solar-Terrestrial Physics in conjunction with the meeting of COSPAR.

### 1. Election of COSPAR Officers

The following were elected for the term 1982-1986:

President: Prof. C. de Jager (Netherlands)  
Vice-Presidents: Prof. N.S. Kardashev (USSR)  
Prof. L.E. Peterson (USA)  
Bureau Members: Dr. R.E. Barrington (Canada)  
Prof. J.F. Denisse (France)

Prof. K.B. Serafimov (Bulgaria)  
Prof. A.J. Somogyi (Hungary)

## 2. URSI Participation

URSI was represented on the Executive Council of COSPAR by Professor K. Rawer.

The following specialized symposia and workshop were co-sponsored by URSI:

- *Symposium on Remote Sensing and Mineral Exploration* (COSPAR/IUGS/AGID/URSI).
- *Symposium on Giant Planets and Their Satellites* (COSPAR/IAU/IAMAP/IUTAM/URSI).
- *Workshop on Advances in Instrumentation and Data Display Related to Space Plasmas* (COSPAR/URSI).

## 3. Decisions of Interest to URSI

Decision No 4/82, proposed by COSPAR ISC C

COSPAR,

*noting* the recommendation of the Middle Atmosphere Programme (MAP) Steering Committee for an extended period of observation and analysis, Middle Atmosphere Cooperation (MAC), for the period of 1 January 1986 through 31 December 1988;

*noting* that this will encourage cooperative investigation of the middle atmosphere using new instruments coming into use only at the end of MAP;

*supports* MAC in principle, and

*encourages* countries membering in COSPAR to participate in the planning of cooperative projects for MAC.

Decision No 5/82, proposed by COSPAR ISC D.1

COSPAR,

*recognizing* that in the period 1986-1990

1. there will exist an extensive network of spacecraft distributed throughout the interplanetary medium, and
2. proposals have been made for additional interplanetary spacecraft,

*suggests* that steps be taken first to coordinate the various plans and later to ensure the efficient exchange and comparison of data, and

*recommends* that the period January 1988 to December 1990 be designated the period of the International Heliospheric Study, and

*further recommends* that this study be conducted under the auspices of COSPAR, with assistance from the other appropriate ICSU bodies.

## ANNOUNCEMENTS OF MEETINGS AND SYMPOSIA

### Waves in Magnetospheric Plasmas

A Chapman Conference on 'Waves in Magnetospheric Plasmas' will be held on the Kona coast, Hawaii (Big Island), 7-11 February 1983. The aim of the Conference will be to bring together investigators of magnetospheric plasma waves from VLF whistlers and emissions down through ELF and ULF to Pc5 pulsations. The Conference will be convened by AGU and is sponsored by Commission H of the International Union of Radio Science (URSI).

The emphasis of the Conference will be on the physics and techniques underlying the whole frequency range. Topics include non-linear electron and ion cyclotron wave growth; the rôle of heavy ions in generation and propagation; artificial generation such as Siple transmission, electrojet modulation, PLR, and BART-type effects; wave-wave interactions, such as Pc1-VLF, VLF-VLF, and various ULF-VLF; wave-particle interactions; free energy sources for waves; harmonic generation; multi-spacecraft and ground reception; and wave and spectrum analysis techniques.

### Format and Abstracts

The Conference will last 5 days (Monday-Friday) and will consist of both invited and contributed papers. There will be morning and evening sessions, with the afternoons available for discussion and recreation. The site is a tropical paradise on the west coast of Big Island sheltered from the trade winds by the massive bulk of Mauna Loa and Mauna Kea. The time is mid-winter in the rest of the northern hemisphere.

There will be no parallel sessions. All papers presented should interest all attendees. Substantial sections of the field will be presented entirely by poster, but there will be a review and discussion of all material so presented. Oral presentations will have a minimum of 30 minutes each. At this stage, intending contributors should be willing to present in either form. For travel planning, intending contributors can reasonably expect acceptance of their papers. Formal acceptance and notification of the form (poster or oral) will be about 1 month after the abstract deadline given below. Presented papers will be published in a special issue of *Geophysical Research Letters*.

All interested in attending and in receiving later information circulars should write to Hawaii Meeting, AGU, 2000 Florida Avenue, N.W., Washington, D.C. 20009, USA. To submit a paper, write an abstract of any length and form that enables assessment and classification of your paper. A sample format was published in *EOS* on 29 June 1982. Such abstracts will be used only by the Programme Committee and not for distribution or publication. All abstracts should be sent to both convenors:

R.L. Dowden,  
Department of Physics,  
University of Otago,  
P.O. Box 56,  
Dunedin, New Zealand.

and

B.J. Fraser,  
Department of Physics,  
University of Newcastle,  
Newcastle 2308, N.S.W.  
Australia.

*Deadline for abstracts is 29 October 1982.*

#### Programme Committee

The Programme Committee includes: G.G. Fälthammar (Sweden), A. Gul'elmi (USSR), R.A. Helliwell (USA), J. Hughes (USA), T. Kaiser (UK), J.Kangas (Finland), V.I. Karpman (USSR), S. Kobun (Japan), H. Matsumoto (Japan), C.T. Russell (USA), D. Southwood (UK), A.D.M. Walker (South Africa).

#### Student Travel

A Chapman grant covering partial travel expenses will be available to one or two students who will be attending the Conference. To apply, write to AGU, giving your educational background, your reasons for wanting to attend the Conference, and your current interests. The awardees will be selected by AGU in conjunction with the Programme Committee. Deadline for travel application is 1 October 1982.

### 1984 International Symposium on Electromagnetic Compatibility

The 1984 International Symposium and Technical Exhibitions on Electromagnetic Compatibility will be held from 16-18 October 1984 at Hotel Pacific, Tokyo, Japan. It will be sponsored by IECE and IEE of Japan and IEEE EMC-S.

The Steering Committee will be chaired by Prof. R. Sato.

The Call for Papers will appear in September 1982.

For further information, apply to:

EMC' 84/Tokyo,  
c/o Prof. T. Takagi,  
Tohoku University, Dept. of Comm.,  
Aramaki, Aoba, Sendai,  
Japan.

### BOOKS PUBLISHED BY URSI PERSONALITIES

D.T. GJESSING (Chairman, URSI Commission F):

*Adaptive Radar in Remote Sensing*, 150 pages, Ann Arbor  
Science Publishers, Ann Arbor, Michigan, 1982.

E.V. JULL (President, Canadian URSI Committee):

*Aperture Antennas and Diffraction Theory*, IEE Electro-  
magnetic Waves Series 10, Peter Peregrinus, 1981.

## INTERNATIONAL GEOPHYSICAL CALENDAR 1983

The Operational Edition of the Calendar (see following pages) has been issued by the International Ursigram and World Days Service (IUWDS) and copies are available from

Dr. P. Simon,  
Chairman, IUWDS,  
Ursigrammes Observatoire,  
F-92190 Meudon,  
France

or

Miss H.E. Coffey,  
IUWDS Secretary for World Days,  
WDC-A for Solar-Terrestrial Physics,  
NOAA,  
325 Broadway,  
Boulder, Colorado 80303,  
USA.

On the back of the Calendar, there is a summary (not reproduced here) of the recommended observational programmes in various branches of atmospheric physics and in studies of certain interplanetary phenomena.

# International Geophysical Calendar for 1983

(See other side for information on use of this Calendar)

|          | S    | M  | T                 | W                 | T                 | F  | S  |  | S    | M  | T                 | W                 | T              | F  | S  |           |
|----------|------|----|-------------------|-------------------|-------------------|----|----|--|------|----|-------------------|-------------------|----------------|----|----|-----------|
|          |      |    |                   |                   |                   |    | 1  |  | 26   | 27 | 28                | 29                | 30             | 1  | 2  |           |
|          | 2    | 3  | 4                 | 5                 | 6                 | 7  | 8  |  | 3    | 4  | 5                 | 6                 | 7              | 8  | 9  |           |
| JANUARY  | 9    | 10 | (11)              | (12) <sup>+</sup> | (13) <sup>*</sup> | 14 | 15 |  | 10   | 11 | (12) <sup>+</sup> | (13) <sup>+</sup> | (14)           | 15 | 16 | JULY      |
|          | 16   | 17 | 18                | 19                | 20                | 21 | 22 |  | 17   | 18 | 19                | 20                | 21             | 22 | 23 |           |
|          | 23   | 24 | 25                | 26                | 27                | 28 | 29 |  | 24   | 25 | 26                | 27                | 28             | 29 | 30 |           |
|          | 30   | 31 | 1                 | 2                 | 3                 | 4  | 5  |  | 31   | 1  | 2                 | 3                 | 4              | 5  | 6  |           |
|          | 6    | 7  | 8                 | 9                 | 10                | 11 | 12 |  | 7    | 8  | 9                 | 10                | 11             | 12 | 13 |           |
| FEBRUARY | 13   | 14 | (15) <sup>*</sup> | (16) <sup>+</sup> | (17)              | 18 | 19 |  | 14   | 15 | (16) <sup>*</sup> | (17) <sup>+</sup> | (18)           | 19 | 20 | AUGUST    |
|          | 20   | 21 | 22                | 23                | 24                | 25 | 26 |  | 21   | 22 | 23                | 24                | 25             | 26 | 27 |           |
|          | 27   | 28 | 1                 | 2                 | 3                 | 4  | 5  |  | 28   | 29 | 30                | 31                | 1              | 2  | 3  |           |
|          | 6    | 7  | 8                 | 9                 | 10                | 11 | 12 |  | 4    | 5  | 6                 | 7                 | 8              | 9  | 10 |           |
| MARCH    | (13) | 14 | (15) <sup>*</sup> | (16) <sup>+</sup> | (17)              | 18 | 19 |  | (11) | 12 | (13)              | (14) <sup>+</sup> | (15)           | 16 | 17 | SEPTEMBER |
|          | 20   | 21 | 22                | 23                | 24                | 25 | 26 |  | 18   | 19 | 20                | 21                | 22             | 23 | 24 |           |
|          | 27   | 28 | 29                | 30                | 31                | 1  | 2  |  | 25   | 26 | 27                | 28                | 29             | 30 | 1  |           |
|          | 3    | 4  | 5                 | 6                 | 7                 | 8  | 9  |  | 2    | 3  | 4                 | 5 <sup>+</sup>    | 6 <sup>*</sup> | 7  | 8  |           |
| APRIL    | 10   | 11 | (12)              | (13) <sup>+</sup> | (14) <sup>*</sup> | 15 | 16 |  | 9    | 10 | 11                | 12                | 13             | 14 | 15 | OCTOBER   |
|          | 17   | 18 | 19                | 20                | 21                | 22 | 23 |  | 16   | 17 | (18)              | (19)              | (20)           | 21 | 22 |           |
|          | 24   | 25 | 26                | 27                | 28                | 29 | 30 |  | 23   | 24 | 25                | 26                | 27             | 28 | 29 |           |
|          | 1    | 2  | 3                 | 4                 | 5                 | 6  | 7  |  | 30   | 31 | 1                 | 2 <sup>+</sup>    | 3 <sup>*</sup> | 4  | 5  |           |
|          | 8    | 9  | 10                | 11                | 12                | 13 | 14 |  | 6    | 7  | 8                 | 9                 | 10             | 11 | 12 |           |

|             |    |    |      |     |    |    |    |
|-------------|----|----|------|-----|----|----|----|
| <b>MAY</b>  | 15 | 16 | 17*  | 18* | 19 | 20 | 21 |
|             | 22 | 23 | 24   | 25  | 26 | 27 | 28 |
|             | 29 | 30 | 31   | 1   | 2  | 3  | 4  |
|             | 5  | 6  | 7    | 8   | 9  | 10 | 11 |
| <b>JUNE</b> | 12 | 13 | 14** | 15* | 16 | 17 | 18 |
|             | 19 | 20 | 21   | 22  | 23 | 24 | 25 |
|             | 26 | 27 | 28   | 29  | 30 | 1  | 2  |
|             | S  | M  | T    | W   | T  | F  | S  |

|    |    |     |     |    |    |    |                 |
|----|----|-----|-----|----|----|----|-----------------|
| 13 | 14 | 15  | 16  | 17 | 18 | 19 | <b>NOVEMBER</b> |
| 20 | 21 | 22  | 23  | 24 | 25 | 26 |                 |
| 27 | 28 | 29  | 30  | 1  | 2  | 3  |                 |
| 4  | 5  | 6   | 7   | 8  | 9  | 10 |                 |
| 11 | 12 | 13* | 14* | 15 | 16 | 17 | <b>DECEMBER</b> |
| 18 | 19 | 20  | 21  | 22 | 23 | 24 |                 |
| 25 | 26 | 27  | 28  | 29 | 30 | 31 |                 |
| 1  | 2  | 3   | 4   | 5  | 6  | 7  |                 |
| 8  | 9  | 10* | 11* | 12 | 13 | 14 |                 |
| 15 | 16 | 17  | 18  | 19 | 20 | 21 | <b>1984</b>     |
| 22 | 23 | 24  | 25  | 26 | 27 | 28 | <b>JANUARY</b>  |
| 29 | 30 | 31  |     |    |    |    |                 |
| S  | M  | T   | W   | T  | F  | S  |                 |

13 Regular World Day (RWD)

12 Priority Regular World Day (PRWD)

16 Quarterly World Day (QWD)  
also a PRWD and RWD

5 Regular Geophysical Day (RGD)

7 8 World Geophysical Interval (WGI)

12\* Incoherent Scatter Coordinated  
Observation Day and Coordinated  
Tidal Observation Day

11 Day of Solar Eclipse

13 14 Airglow and Aurora Period

13\* Dark Moon Geophysical Day (DMGD)

**NOTES:**

1. Days with unusual meteor shower activity are: Northern Hemisphere Jan 3, 4; Apr 22, 23; May 3-6; Jun 8-12, 23, 24; Jul 27-30; Aug 11-14; Oct 20-23; Nov 2, 3, 17; Dec 13-15, 22, 23, 1983. Southern Hemisphere May 3-6; Jun 8-12, 23, 24; Jul 26-31; Oct 20-23; Nov 2, 3, 17; Dec 5, 6, 13-15, 1983.

2. Middle Atmosphere Program (MAP) began 1 Jan 1982 and runs through 1985.

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