Bulletin No 239 Décembre 1986

U.R.S.I.

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XXII General Assembly of URSI

CORRECTION TO INFORMATION PUBLISHED IN THE FIRST ANNOUNCEMENT

Attention is drawn to the following error on page 50 of the First Announcement of the XXII General Assembly, which has been circulated in July 1986 by the Israeli Organizing Committee.

The text appearing under the title "Deadlines" should read as follows:

"...

15 February 1987

...

- Invited speakers have provided their abstracts to the Conveners with copy to the URSI Secretariat in Brussels.

..."

Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere

The International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere was held at the Palazzo dei Congressi in Florence, Italy, from 27-30 May 1986.It was organized by the Department of Physics of the University of Florence and the Oregon Graduate Centre, and held under the auspices of the Radiation Commission of IAMAP, URSI, and some other organizations.

The objective of the Conference was to bring together active researchers in the field from around the world and provide a forum for the presentation of the most recent results and discoveries.

The meeting brought together 110 specialists from 13 countries. A total of 82 papers, 31 of which were invited and 51 contributed, were presented in 12 sessions. Twenty-four contributed papers were presented orally and the remaining 27 papers were presented in a long-lasting poster session.

Topics were: the scintillation of visible, microwave and infrared radiation; imaging; remote sensing including lidar; surface scattering; multiple scattering by particles; atmospheric transmission and refraction, and non-linear interaction of radiation with matter.

A Digest has been published made up of four-page summaries of all the 92 scheduled papers (excluding 3 post-deadline ones)

In this Conference, for the first time, scientists working in different areas of atmospheric propagation and scattering met together. Ample participation and discussion were achieved in all sessions.

The social programme included a welcome by the Mayor of Florence in Palazzo Vecchio (the Town City Hall), followed by a welcome cocktail and a guided visit to the Quartieri Monumentali (the old aparments of the Medici family) and a Social Dinner in a Florentine villa on a hill. A programme for the accompanying persons was also organized.

The Digest is available at the price of US$20 from OMPSA Conference Secretariat, c/o OIC Via Gustavo Modena, 19, I-50121 Firenze, Italy.

A. Consortini

ELECTROMAGNETIC COMPATIBILITY WROCŁAW 1986

The 8th International Wrocław Symposium on Electromagnetic Compatibility was held in Poland from 24-26 June 1986. The Symposium was co-sponsored by URSI, CCIR, CCITT, and 4 other international organizations as well as by national associations of electrical engineers from 14 countries. About 220 participants from 20 countries attended the Symposium (20 from non-European countries). A total of 98 papers were presented in English or Russian with simultaneous translation (oral presentation 79, posters 19). The 3-volume 1192-page Proceedings containing 129 papers accepted for presentation were available at the Symposium.

Professor A. Smoliński, President of the Polish URSI Committee, chaired the Symposium Council, and Professor F.L. Stumpers, Chairman of URSI Commission E on Electromagnetic Noise and Interference, chaired the Scientific Programme Committee. Prof. D.J. Bem, Polish Official Member in URSI Commission B, served as Symposium Chairman and was supported by Mr. J. Rutkowski, Co-Chairman and Mr. W. Moron, Organizing Chairman.

17 sessions covered the majority of EMC fields. The core of the Symposium were invited sessions organized by Prof.Yoshino (Japan) on EM emissions related to earthquakes; Dr. H. Lorke (GDR/CCITT) on EMC in wire communications; Prof. H. Mikołajczyk (Poland) on EMC and biological risk ; Prof. K. Bullough (UK) on Terrestrial EM environment; Prof. L.E. Varakin (USSR) on Cellular systems; Prof. H. Kikuchi (Japan) on Lightning EMP; and Prof. N.B. Chimitdorziev (USSR) on Propagation. The other sessions concerned Spectrum management and utilization; EM fields and antennas; Interference control; EMP threat;

EMI/EMC in devices and systems; Measurement and monitoring.

For the first time the Young Scientists Participation Programme was organized with substantial financial support from URSI. Four young scientists (from China, Malaysia, Spain and UK) were invited to present their work in the fields connected with EMC. Great interest was attracted by the round-table discussion on "General background and experience in automation of national spectrum management", co-organized by Prof. R. Strużak, Vice-Chairman of URSI Commission E, and Mr. R. Mayher, Chairman of the CCIR IWP 1/2. The discussion was followed by the demonstration of the microcomputer application in spectrum management by members of the IWP 1/2.

The Symposium took place in the historical premises of the Wrocław Technical University. The get-together cocktail party on Tuesday and the picnic in the countryside on Wednesday gave good opportunities for informal contacts. On the last day there was a common meeting of the Symposium Council, the Scientific Programme Committee and the Organizing Committee with all the Chairmen of the sessions. The results and organization of the Symposium were evaluated, and possible future improvements were discussed. The general opinion was that the 8th International Wrocław Symposium on Electromagnetic Compatibility provided a good forum for the presentation of work, and gave an opportunity to review the activity in the field of electromagnetic compatibility on an international scale.

Copies of the Proceedings of the Symposium (papers in English or Russian as submitted by authors, with a summary in the second language) are still available from:

EMC Symposium
Box 2141
51-645 Wrocław 12
Poland.

The 9th International Wrocław Symposium on Electromagnetic Compatibility is planned for 28-30 June 1988. Papers are invited.

W. Waszkis
Secretary General of
the Symposium.

SCIENTIFIC COMMITTEE ON SOLAR-TERRESTRIAL PHYSICS (SCOSTEP)

Meetings of the Bureau and Council of SCOSTEP were held in Toulouse, France, on 26-28 June 1986. URSI is represented on the Bureau of SCOSTEP by Dr. R. Woodman.

Prof. J. Roederer and Prof. W.I. Axford were elected as President and Vice-President of SCOSTEP respectively.

The Council of SCOSTEP considered the reports submitted by the Planning Committees for the following programmes:

- Polar Auroral Dynamics (PAD)
- Solar Interplanetary Variability (SIV)
- World Ionosphere/Thermosphere Study (WITS)
- Solar-Terrestrial Energy Programme (STEP).

These four new projects have been approved, as well as the establishment of Steering Committees, one for each of the above programmes. The following scientists were designated as Chairmen of these Committees:

Drs Showhan and Troitskaya for STEP
Drs Cole and Liu for WITS
Dr. Oga for PAD
Dr. Schmit for SIV.

The SCOSTEP Awards went to:

Dr. E.R. Dyer "for 15 years of outstanding work and enduring dedication to IUCSTP/SCOSTEP as Scientific Secretary", and

Dr. A.H. Shapley "for his outstanding support of SCOSTEP scientific programmes by the establishment and operation of data services fundamental to Solar-Terrestrial Physics".

The next meeting of the SCOSTEP Coundil will be held in Helsinki, Finland, during the COSPAR Plenary Meeting in 1988.

URSI International Symposium on Electromagnetic Theory

The traditional triennial Commission B Symposium on Electromagnetic Theory took place in Budapest, Hungary, 25-29 August 1986 simultaneously with the 8th Colloquium on Microwave Communication. The opening and closing sessions, and social events were joint events, otherwise the two meetings had separate but coordinated programmes. Since many participants had interest in both meetings there were up to seven parallel activities, divided in space between the beautiful old Palace of the Hungarian Academy of Sciences and the House of Techniques, a 10 min. walk away.

The total number of participants was about 500, including 150 from Hungary. The URSI part took about 60% of the papers and the participants, which came from 38 different countries. A large part of the participants were from the Eastern countries, including the Soviet Union, so it was a good occasion to make new acquaintances, or meet old ones, from that part of the world.

At the URSI Symposium there were 284 accepted presentations, which were divided between the following sections:

1. Field analysis and numerical methods
2. Scattering and diffraction
3. Antennas
4. Guided waves
5. Transient phenomena
6. Random media
7. Inverse scattering
8. Fields in biological media.

An unusually large proportion (37%) of the papers were presented as posters, which was judged as a success by the participants. Two-volume Proceedings were available at the meeting and may be obtained from Elsevier Science Publishers as Vol. 28A in the series 'Studies in Electrical Engineering'. As has been the case in some of the previous meetings, a special issue of 'Radio Science' will be devoted to the Symposium with Prof. A. Ishimaru as guest editor.

Apart from the scientific content, the participants will remember a fine welcome reception and a beautiful boat trip along the Danube to the small town of Szentendre.

The next URSI Symposium on Electromagnetic Theory will be held in Stockholm, Sweden, in August 1989.

J. Bach Andersen

URSI Workshop on Ionospheric Modelling

The Workshop on Practical Aspects of Ionospheric Modelling was held at the National Center for Atmospheric Research in Boulder, Colorado on 12-14 Aug. 1986. It was attended by 33 scientists from 5 countries. The purpose of the Workshop was to bring together ionospheric model builders and ionospheric model users to exchange ideas, review current work and develop recommendations for further activity. To this end, the Workshop has to be considered a success. Scientists and practitioners whose experience and expertise spanned the range from theoretical ionospheric modelling to development of ionospheric propagation prediction programmes met for 3 days and discussed the various aspects of ionospheric modelling in an atmosphere that can be accurately described as open and constructive.

The topics discussed were as follows: Neutral Atmospheric Modelling; Theoretical Ionospheric Modelling; Empirical Ionospheric Modelling; Propagation System Prediction Requirements; Data Needed to Verify/Quantity Models.

The major points that emerged from the discussions are listed below.

1. There was a general feeling that both global and localized neutral atmospheric models were needed for ionospheric modelling applications. The global models are needed to better understand the overall physics and dynamics of the upper atmosphere. The localized models are needed to interpret specific ionospheric features and observations.

2. An improved ionospheric model is needed in the Thermospheric General Circulation Model. In particular, a direct coupling between the ionospheric model and the thermospheric model is required in the computer simulations.

3. Values of the global distributions of thermospheric winds have been developed for specific time periods and expressed in terms of vector spherical harmonics (VSH). There was a general feeling that VSH coefficients for standard periods, i.e. equinox, solstice, solar minimum and solar maximum are required for incorporation into theoretical ionospheric models.

4. Theoretical ionospheric models were felt to be extremely useful in interpolating observations into regions where measurements are sparse or non-existent.

5. Theoretical ionospheric models should be used to test the sensitivity of calculated output parameters (electron density, electron temperature, etc.) to changes in input parameters (production rates, loss rates, etc.). These results are extremely important for deciding where to make investments for measurements of required parameters that can lead to better ionospheric predictions.

6. There was general agreement that there is a need for semi-empirical models of the high latitude ionosphere that are based on the output of theoretical ionospheric models.

7. The International Reference Ionosphere (IRI) has been extensively studied and outstanding developments have been made. There is further work, however, that needs to be addressed in order to bring the results of the IRI closer to reality. In particular, the high latitude part of the model needs to be improved.

8. The IRI is particularly geared for aeronomy applications; for telecommunications purposes it may be overly specific. Further work addressing the applications of the IRI for telecommunication system performance predictions is needed.

9. Further improvements to the existing global maps of ionospheric parameters, particularly foF2, need to be accomplished in order to lead to better predictions of the performance of ionospheric-dependent telecommunications systems.

10. Observations of the mean behavior of the ionosphere and the variability about the mean continue to be needed. Furthermore, both the mean and the variability must be quantified for inclusion into performance prediction methods in order that the prediction methods yield results that are of value to the telecommunication system user.

11. There is a need to have a standardized set of data that can be used to verify ionospheric models. These data should be independent of the models that are being verified. The data need to be representative of the entire range of season, solar, and geomagnetic activity variations that is observed in practice.

12. It must be appreciated by both ionospheric model builder and ionospheric model user, that the usefulness of a model or a prediction method is dependent upon how long into the future

the prediction or the model can be applied with accuracy.

There were a number of recommendations that were made at the Workshop that addressed the points enumerated above. These recommendations, along with descriptions of specific issues related to ionospheric model development and use are provided in the full Workshop report that will be available shortly.

Charles M. Rush

AURORAL DYNAMICS: RESULTS FROM EISCAT AND VIKING

A symposium co-sponsored by URSI with the above title was held during the XI General Assembly of the European Geophysical Society held at Kiel, Germany, over the period 25-30 August 1986. The conveners were S. Perraut (CNET/CRPE, Issy-les-Moulineaux, France) and G. Gustafsson (Ionospheric Observatory Uppsala, Sweden). A total of 23 papers (12 invited, 11 contributed) were presented during three half-day sessions, and some 30-35 scientists attended.

In the first part of the symposium, a large part of the time was devoted to the Swedish VIKING satellite which has been specially designed to study the auroral acceleration region. Results were presented on VIKING experiments on imaging, magnetic and electric fields, waves and particles. For some major events, in particular in the areas of wave-particle interactions and of the source of particles, preliminary interpretations were given. Progress in plans for the future analysis of the data was also discussed.

In the second part of the symposium, emphasis was placed on ground experiments which can provide complementary information for a better understanding of VIKING data, in particular EISCAT and networks of magnetometers and all-sky cameras. Methods for deriving the location, motion, and intensity of the field-aligned currents from ground-based measurements were presented.

A further symposium on the topics covered, with emphasis on insight into the physical processes involved, is planned for the next General Assembly of the EGS in Strasbourg, France, in April 1987.

G.M. Brown

INTERNATIONAL GEOSCIENCE AND REMOTE SENSING SYMPOSIUM

The International Geoscience and Remote Sensing Symposium (IGARSS'86) was held at the University of Zürich-Irchel, Switzerland, from 8 to 11 September 1986. It was sponsored by IEEE and several other organizations, including URSI. It was attended by 480 participants.

With the general theme "Remote Sensing - today's solutions for tomorrow's information needs", IGARSS'86 intended to highlight the possibilities and potentials of remote sensing systems and techniques to expand our knowledge of the earth and man's impact on its habitability. These aspects of setting up truly operational systems which provide pertinent information to solve the urgent needs of mankind today and in the near future were evaluated in a special Panel Discussion.

The scientific progress was presented in approximately 350 papers, structured in 47 sessions. The topics reached from hardware aspects, such as "Innovations in radar instrumentation", to software problems such as "Image analysis systems/ artificial intelligence" or "Processing methods and algorithms", and applications, such as "Stress detection in forestry and vegetation or the "Archimedes-Project", etc. Sensors considered included "Active and passive microwaves, laser fluorescence, geophysical techniques", as well as "Optical and infrared systems".

Regarding satellite systems, a review was presented of all important international and national programmes with special reference to ERS-1 and other 'Future Imaging Radar Missions'.

The results are published in a Digest of three volumes totalling 1,700 pages. The Proceedings are available from ESA-ESTEC Publishing Division in Nordwijk, Netherlands.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

21ST GENERAL ASSEMBLY

The 21st General Assembly of ICSU was held from 14 to 19 September 1986 in Berne, Switzerland. The following report was prepared by the ICSU Secretariat.

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At lunch time today the ICSU General Assembly adjourned after five days of intense activity at the University of Berne. The Assembly brought together about 250 scientists from more than 50 countries. About 20 of those from developing countries had part or all of their expenses paid by a special fund created by the Swiss authorities and ICSU.

The Assembly elected M.G.K. Menon, a distinguished Indian physicist, as its President-elect. Lars Ernster, biochemist from Stockholm, and Klaus Thurau, physiologist from Munich, were re-elected as Secretary General and Treasurer respectively. The six newly elected members of ICSU's General Committee are: J.P. Schaer, R. Caldeyro Barcia, E.U. Emovon, M. Ito, I. Land and B.I. Sendov.

The General Assembly decided to launch an International Geosphere-Biosphere Programme: a Study of Global Change. This will probably continue through the end of this Century and will include a wide range of studies of the environment of our planet and the changes, both natural and man-made, that are taking place. The Programme will provide the information we need to assess the future of the Earth over the next 100 years. It will be a programme of basic research with almost immediate practical applications in the management of resources at both national and international levels and as a means of improving the reliability of forecasts about global changes that might lead to the kind of deterioration in the Earth's environment that would make it less suitable for human and other life. This programme will interact closely with other major international programmes, such as the joint ICSU-World Meteorological Organization's World Climate Research Programme and the Man and the Biosphere Programme of UNESCO. It should be noted that ICSU, created in 1931, celebrates this year its 40th anniversary of close cooperation with UNESCO.

The General Assembly also decided to create a Scientific Committee on Biotechnology, one task of which will be to coordinate ICSU's diverse activities in this field and to take up contacts with industrial groups that are active in this area. Even before it was created the Committee had received requests for advice from Scientific Academies in Latin America.

The Assembly received a report on toxic waste disposal which drew attention to the importance of the study of old dump sites so as to provide information that will help us to improve our techniques for isolating toxic wastes from the environment.

During the Assembly, an open Symposium on the Environmental Consequences of Nuclear War (ENUWAR) was held to present the findings of a study carried out by ICSU's Scientific Committee on Problems of the Environment. The Assembly decided to disseminate the findings of the study to a wide audience, including decision-makers, the general public and scientists, to increase awareness of the catastrophic effects on humanity of a nuclear war. It drew particular attention to the following conclusions of the ENUWAR Study:

"i. Multiple nuclear detonations would result in considerable direct physical effects from blast, thermal radiation, and local fallout. The latter would be particularly important if substantial numbers of surface bursts were to occur since the lethal levels of radiation from local fallout would extend hundreds of kilometres downwind of detonations.

ii. There is substantial reason to believe that a nuclear war could lead to large-scale climatic perturbations involving drastic reductions in light levels and temperatures over large regions within days and changes in percipitation patterns for periods of days, weeks, months or longer. Episodes of short term, sharply depressed temperatures could also produce serious impacts - particularly if they occur during critical periods within the growing season. There is no reason to assert confidently that there would be no effects of this character and, despite uncertainties in our understanding, it would be a grave error to ignore these potential environmental effects. Any consideration of a post-nuclear war world would have to consider the conse-

quences of the totality of physical effects. The biological effects then follow.

iii. The systems that currently support the vast majority of humans on Earth (specifically agricultural production and distribution systems) are exceedingly vulnerable to the types of perturbation associated with climatic effects and societal disruptions. Should these systems be disrupted on regional or global scale, large numbers of human fatalities associated with insufficient food supplies would be inevitable. Damage to the food distribution and agricultural infrastructure alone (i.e. without any climatic perturbations) would put a large portion of the Earth's population in jeopardy of a drastic reduction in food availability.

iv. Other indirect effects from nuclear war could individually and in combination be serious. These include disruptions of communications, power distribution, and societal systems on an unprecedented scale. In addition, potential physical effects include reduction in stratospheric ozone and, after any smoke had cleared, associated enhancement of ultraviolet radiation; significant global-scale radioactive fallout; and localized areas of toxic levels of air and water pollution.

v. Therefore, the indirect effects on populations of a large-scale nuclear war, particularly the climatic effects caused by smoke, could be potentially more consequential globally than the direct effects, and the risks of unprecedented consequences are great for combatant and noncombatant countries alike.

In arriving at these conclusions, we have been moderate in several respects. We have tried to state and examine all challenges to theories about environmental effects of nuclear war, to minimize speculative positions and to factor valid criticisms into discussions and conclusions. Uncertainties in the projections could either reduce or enhance the estimated effects in specific cases. Nevertheless, as representatives of the world scientific community drawn together in this study, we conclude that many of the serious global environmental effects are sufficiently probable to require widespread concern. Because of the possibility of a tragedy of an

unprecedented dimension, any disposition to minimize or ignore the widespread environmental effects of a nuclear war would be a fundamental disservice to the future of global civilization".

The Assembly also noted with approbation the work of the Committee on the Free Circulation of Scientists that helps scientists from all countries who have problems in obtaining visas. It was also decided to study the application and interpretation of ICSU's policy of non-discrimination which affirms the rights of scientists throughout the world to adhere to, or to associate with, international scientific activity without regard to race, religion, political philosophy, ethnic origin, citizenship, language or sex.

The Assembly adopted the following

RESOLUTIONS

The 21st General Assembly of ICSU:

1. *Accepts* the application from the Academia Colombiana de Ciencias Exactas, Fisicas y Naturales to become a National Member.

2. *Taking into consideration* the proposal by the 20th Meeting of the General Committee to dissolve the Standing Committee on the Pursuit of Science (SCSPS) *decides* to dissolve the SCSPS;

   acknowledges that ICSU must continue to be concerned with the issues for which the SCSPS was created;

   notes with approbation that the Standing Committee on the Free Circulation of Scientists (SCFCS) has undertaken some of the tasks of the Safeguard Committee within its own terms of reference and *encourages* it to continue so to do;

   encourages the study of the interpretation and practical application of ICSU's principle of non-discrimination in a contemporary setting;

   requests the President's Working Group on this subject to clarify further how the activities of ICSU bodies could be made still more effective in this field.

3. *Recommends* that the attention of adhering Scientific Academies, Research Councils, Scientific Institutions or associations of such institutions be drawn to the value of establishing ICSU Committees, so as to strengthen and to extend the participation in ICSU activities of all appropriate scientific bodies in the territory concerned.

4. *Noting* the recommendation of the 21st Meeting of the General Committee to create a Scientific Committee on Biotechnology (COBIOTECH);

   resolves to create a Scientific Committee on Biotechnology and *decides* to review this decision at the 22nd General Assembly, and the activities of all ICSU bodies that relate to those proposed for COBIOTECH, thus to ensure that there is no unnecessary duplication of activities.

5. *Noting* the acceptance by the 20th Meeting of the General Committee of the proposal from the Presidents of IUGG and IUGS that the mandate of the Inter-Union Commission on the Litosphere (ICL) be extended;

   resolves to extend the mandate of the Commission subject to acceptance by IUGG, IUGS and ICSU of five-yearly reviews of the Commission.

6. *Recalling* the resolution of the 1982 ICSU General Assembly urging an assessment of the biological, medical and physical effects of the large scale use of nuclear weapons and an unemotional, non-political, authoritative and readily understandable statement of these effects on the biosphere and on human beings;

   noting with satisfaction the response of the Scientific Committee on Problems of the Environment (SCOPE) in the form of two volumes addressing physical, ecological and agricultural effects;

   having received an oral presentation of these findings and having discussed them during the ICSU 21st General Assembly, commends SCOPE for the thoroughness of its assessment of the Environmental Consequences of Nuclear War (ENUWAR);

   associates itself with the summary statement of the ENUWAR Steering Committee (see text of statement on page 12);

   welcomes the efforts to maintain an ICSU/SCOPE Unit to

serve ICSU and its Unions and Committees for the next two years as a clearing house for updated and evaluated scientific information on the consequences of nuclear war, to be used for dissemination and dialogue purposes;

decides to disseminate the findings of the SCOPE ENUWAR study to ICSU members with the request to share them widely in the scientific community and beyond to decision-makers and the public in general;

urges the international scientific unions and the relevant scientific committees to undertake research projects and programmes both to reduce the uncertainties in our present understanding, and to provide a more comprehensive assessment of the direct and indirect effects of multiple nuclear detonations;

urges the Executive Board to enlist the cooperation of the International Social Science Council in order to gain greater understanding of the societal consequences;

invites the Executive Board to explore the establishment of an appropriate mechanism for a continuing dialogue on this matter with the United Nations and the Specialized Agencies.

7. *Thanking* the Special Committee on Toxic Waste Disposal (TOWD) for its excellent and timely report on the Disposal of Toxic Wastes discussed by the 21st Meeting of the General Committee;

notes the conclusions of the report;

accepts the recommendation of the Chairman of TOWD that the Special Committee should be disbanded and that the Executive Board should consider the establishment of a working party, perhaps in conjunction with SCOPE, to look into practical ways in which ICSU bodies can contribute to the welfare of mankind in respect of this most vitally important and pressing problem.

8. *Noting* the successful symposia on Global Change held at Ottawa in 1984 and at Berne in 1986;

acknowledging with appreciation the planning activities carried out by the ad hoc Planning Group on Global Change, the four Working Groups and the COSPAR Working Group on Remote Sensing;

taking into consideration the recommendation of the 21st Meeting of the General Committee;

accepts with enthusiasm the recommendations given in the final report of the ad hoc Planning Group;

resolves to establish an International Geosphere-Biosphere Programme: A Study of Global Change to describe and understand the interactive physical, chemical and biological processes that regulate the total Earth system, the unique environment that it provides for life, the changes that are occurring in this system, and the manner in which they are influenced by human actions;

authorizes the establishment of a Special Committee for the Geosphere-Biosphere Programme (SCGB) to provide for the development and correlation of the scientific programme;

acknowledges the expressions of interest and support by Unions, scientific and special committees and other members of the ICSU family;

urges that provision be made to ensure effective liaison between the SCGB and the relevant scientific Unions and other members of the ICSU family, and appropriate international scientific organizations;

accepts with thanks the offer of the Government of Sweden to provide an international secretariat for the Programme;

endorses the decision to establish a nominating group charged with recommending the Chairman and Members of the SCGB by January 1987, for appointment by the Executive Board;

encourages the development of an appropriate financial plan for the programme including regularly scheduled contributions by participating national members;

urges that every effort be made to take full advantage of the strong impetus that now exists to begin the preliminary phases of the programme and to allow the commencement of the operational phases in the early 1990s.

9. *Welcomes* the proposal made at the Rindberg Conference for the establishment of an ICSU Lectureship Programme;

resolves that a scheme for the appointment of ICSU Lecturers should be put into effect in partnership with the

Third World Academy of Sciences (TWAS);

requests the Executive Board, in consultation with TWAS, to set up appropriate machinery for coordinating the nominations of suitable lecturers with the wishes of would-be hosts.

10. *Endorses* the conclusion of the Rindberg Conference that participation of young scientists and women scientists in ICSU activities should be increased;

encourages Members of ICSU to include young scientists and women scientists as nominees for the posts of Officers and National Representatives to the General Committee;

invites the Executive Board to appoint more young scientists and women scientists to ICSU Committees and Commissions.

11. *Taking into consideration* the activities of the ICSU family in developing countries, and especially those of the Unions, COSTED, IBN, CASAFA and CTS, as expressed in the report of the Study Group on ICSU Activities Related to Developing Countries, and the important role played by the Third World Academy of Sciences (TWAS) and the regional academies in promoting science in the Third World;

expresses its strong support for the recommendations reached by the Study Group and *urges* the Executive Board to implement them;

invites the ICSU scientific bodies to strengthen their collaboration with TWAS and the regional academies, and

invites the organizations working in and for the developing countries to coordinate better their activities.

12. *Noting* the concern of the scientific community over the use of laboratory animals in biomedical and other scientific experiments;

refers this concern to the ICSU Ethics Committee so that the position of the scientific community can be clarified; and

urges the Ethics Committee to report to the 22nd General Assembly in order to present ICSU's views to the public in due course.

13. *Recognizing* the importance to the development of science of the free association of scientists as a means of communicating the results of scientific investigations;

recognizing further that this is the primary purpose of conferences of ICSU and of the International Scientific Unions and that it is a responsibility of the organizers of such conferences and of participants to ensure that there is free communication and information;

reaffirming the ICSU principle of non-discrimination and the resolution on the non-political nature of ICSU-sponsored meetings of the Executive Board at its meeting in 1966 in Monaco;

urges the organizers of ICSU conferences, if they are unable to ensure the attendance of all *bona fide* scientists, to report the problems encountered simultaneously to the adhering body, to ICSU and to their parent Union or Committee in sufficient time (a minimum of 3 months before the meeting is recommended) to allow these bodies to take corrective measures; and

resolves that all applications for membership and associate status of ICSU shall include a signed statement that the applicant supports ICSU's Statutes, especially Statute 5, which outlines ICSU's policy of non-discrimination.

14. *Adopts* the report of the Assembly Finance Committee and the recommendations contained therein.

15. *Expresses* its deep gratitude to the Swiss Academy of Science and to the Swiss National Science Foundation and to Dr. B. Sitter, Dr. Christina Scherer-von Waldkirch and their staff for the generous and excellent arrangements made for the ICSU meetings; and

also expresses its grateful thanks to the Secretariat for the excellent way in which it has ensured the efficient functioning of the meetings.

12TH EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION

This Conference was held in Barcelona, Spain, from 22 to 25 September 1986. It was organized by the Compania Telefonica Nacional de Espana, and sponsored by the Convention of National Societies of Electrical Engineers of Western Europe. URSI was one of the co-sponsors. The Conference was attended by 851 participants coming from 32 countries.

Both invited and contributed original papers were presented on the subject of optical fibre and integrated optics research. Topics considered included: Materials; Fibres and cables; Passive components; Active devices; Integrated optics; and Systems and applications.

Copies of the Proceedings (3 volumes) are available at the price of Pesetas 5,000 from:

TELEFONICA
ECOC
Beatriz de Bobadilla 3
28040 Madrid
Spain.

4TH INTERNATIONAL CONFERENCE ON OPTICAL FIBER SENSORS (OFS'86)

The 4th International Conference on Optical Fiber Sensors was held in Tokyo, Japan, from 7-9 October 1986. It was organized by the Institute of Electronics and Communication Engineers of Japan (IECEJ), and sponsored or co-sponsored by OITDA, JSAP, IEEJ, FAIS, URSI, AEI, IEEE, NTG, OSA, SEE, SFO, SPIE and IEE. The Conference was attended by 308 participants (including 100 young scientists) coming from 22 countries.

The optical fiber has attracted the interest of sensor-engineers because of its excellent electromagnetic compatibility (i.e., no electromagnetic interference between fibers as well as between an electric wire and a fiber), essential safety (no fear of fire or explosion even when used in a flammable gas), high sensitivity, light weight, small cross-

section, mechanical flexibility and strength. The low loss and wide frequency-band capability of the optical fiber, which are the most important features in optical fiber communications, are advantageous also in its application to sensors, but much less significant than in communications.

During the 1970s various novel types of sensors taking advantage of the above features of the optical fiber appeared. The First International Conference on Optical Fiber Sensors was held in London in April 1983. Since then this series of conferences has been held almost annually (since 1984 with 18-month intervals) to provide international forums for discussion and information exchange on the development and application of optical fiber sensors. The OFS'86 Tokyo was the first of the OFS series in Asia. It is the fourth in the world, following the first held in London in 1983, the second in Stuttgart in 1984, and the third in San Diego in 1985. The fifth OFS will be held in the United States in early 1988.

The scope of OFS'86 was essentially identical to those of the previous conferences, but a little widened. Both sensors using the fiber itself as the sensing element and those using it as a light guide between the sensing element and the observer were included in the discussions. At technical sessions, 8 invited papers, 56 regular papers, 22 poster papers and 4 post-deadline papers were presented.

To offer those attending from abroad the opportunity to make their trip to Japan more worthwhile, the organizers of the Conference tried to gather as many relevant meetings and events as possible, in the former half of October of this year, particularly during 6-11 October, which was named the "OPTO-WEEK". Prior to the conference, a technical tour of a robot factory was held on 6 October. Also, prior and concurrently with the conference, there were large-scale technical exhibitions in Tokyo on electronics (Japan Electronics Show '86), and optoelectronics (InterOpto '86). During the week-end following the Conference, the Informal Workshop on Optical Fiber Sensors for Industrial Applications was held at Tsukuba Science City. The Conference was a success, as well as these relevant events.

T. Okoshi

ANNOUNCEMENTS OF MEETINGS AND SYMPOSIA

7th INTERNATIONAL ZURICH SYMPOSIUM AND TECHNICAL EXHIBITION ON ELECTROMAGNETIC COMPATIBILITY

This International Symposium on Electromagnetic Compatibility will be held in Zurich, Switzerland, on 3-5 March 1987. It is being organized by the Institute for Communication Technology of the Swiss Federal Institute of Technology Zurich, and sponsored by the Swiss Electrotechnical Association. Co-operating bodies are URSI, CCIR, EUREL, and others.

The President of the Symposium is Prof. P. Leuthold, with Dr. E. Dünner and Prof. F.L. Stumpers as Vice-Presidents. The Technical Programme Committee is chaired by Prof. R.M. Showers.

The Preliminary Programme for the Symposium has now been published. It includes sessions on the following topics:

- Nonlinear effects in EMC/EMP
- Antennas and EMC
- Systems compatibility
- Lightning EMP
- Testing and measurements
- EMC analysis
- HEMP: Field system impact
- Standards and sources
- Power and data line transients
- EMP effects on power system
- Correlating open-area EMI data
- Suppression
- EMC in power transmission
- ESD test methods
- Spectrum use
- Shielding
- Grounding and inter-unit wiring
- Statistical theory of EMC.

The Programme includes also three Tutorial Lectures on "Crosstalk", "Shielding of interconnect systems" and "Digital design for electromagnetic compatibility", as well as three Workshops on the following subjects: Theoretical and practical

NEMP problems of protective constructions; Lasting effects of transients on communication equipment performance; Application of computers to EMC education.

For further information, contact

Prof. T. Dvorak
ETH Zentrum-IKT
8092 Zurich, Switzerland.

XII GENERAL ASSEMBLY: EUROPEAN GEOPHYSICAL SOCIETY

The XII General Assembly of the EGS will be held in Strasbourg, France, from 9 to 14 April 1987.

The scientific programme of Section III (External Geophysics) of EGS will include three Open Sessions, three Symposia, and one Workshop. The subjects are as follows:

- Sun, cosmic rays and interplanetary physics
- Magnetosphere and ionosphere of the Earth
- Dynamics and chemistry of the middle and upper atmosphere
- Progress in magnetospheric physics: Contributions from VIKING and PROMIS
- Progress in the Solar Terrestrial Physics Programme
- Active experiments in space plasmas
- Atmospheric gravity waves and tides.

For further information concerning the meeting, contact

M.M. Cara
Institut de Physique du Globe
5 rue R. Descartes
F - 67084 Strasbourg Cedex
France.

XLII ALL-UNION SCIENTIFIC SESSION
DEVOTED TO RADIO DAY

The Central Administration of the A.S. Popov Scientific Technical Society for Radio Engineering, Electronics and Telecommunication is planning to organize the XLII All-Union Scientific Session devoted to Radio Day in the second half of May 1987 in Moscow, USSR. The Session will last for 3 days.

It is suggested to discuss papers delivered by scientists and engineers on the main branches of radio techniques, electronics and telecommunication, and to consider ways of introducing advanced scientific research and engineering experience and their effective use in the national economy.

The following subjects will be discussed at the Conference Production mechanization and automation; Antennae devices; Waveguides; Measurements in radio techniques and electronics; Microelectronics; Reliability and production quality control; Radio technique; Radioelectronics in biology and medicine; Transmitters and radio-signal generation technique; Receivers and amplifiers; Quantum radio optics; Fiber-optic systems and devices; Wave propagation; Information theory; Radio devices production technology; Synchronizers; Economic problems in radio industry and electronics and communication branches; Electronic microscopy; Electronics.

Call for Papers

15 December 1987: final date for submission of papers.

Time for presentation: 20 minutes.

Conference language: Russian.

All persons interested in participating in the Session are kindly requested to make arrangements through one of the Intourist accredited agencies.

For further information, contact:

Central Administration, A.S. Popov Society
Kuznetskij Most 20
103897 Moscow Centre GSP-3
USSR.

XV ANNUAL MEETING ON ATMOSPHERIC STUDIES BY OPTICAL METHODS

The XV Annual Meeting on Atmospheric Studies by Optical Methods will be held in Granada, Spain, from 6 to 11 September 1987.

The following topics are included in the scientific programme:

- Ground-based and space-borne instrumentation
- Coordinated observational campaigns
- Airglow and aurora: excitation processes
- Dynamics of the atmosphere as studied by optical methods
- Radiation in the atmosphere
- Theoretical considerations and interpretation of data in terms of atmospheric science.

A Workshop on Calibration will be held during the meeting.

The deadline for the submission of abstracts of papers is 1 June 1987.

For further details, contact:

XV AMASOM
Local Organizing Committee
Instituto de Astrofisica de Andalucia
P.O.Box 2144
18080 Granada, Spain.

13th EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION

The 13th ECOC will be held at Finlandia Hall in Helsinki, Finland, from 13 to 17 September 1987. In conjunction with the Conference, a Nordic exhibition in the field of optical fiber technologies will take place at the same location.

In line with its predecessors, the 13th ECOC is intended to provide a major international forum for the dissemination of significant new results on all aspects of optical fiber communications, both scientific and technological. The main emphasis will be on the oral and poster presentation of original unpublished contributions. A limited number of invited papers

by recognized experts will provide an overview of topics of current interest. The very latest ideas and results will be presented in a post-deadline session.

Contributions should cover topics related to the theory, fabrication, and characterization of the following: Materials; Passive components; Active devices; Fibers and cables; Optical and optoelectronic integration, and systems and applications.

The deadline for the submission of papers is 9 March 1987. These should be addressed to

Dr. A.B. Sharma
Technical Programme Committee Chairman
ECOC 87
Sähköinsinööriliitto
Merikasarminkatu 7 J 53
SF-00160 Helsinki, Finland.

INTERNATIONAL CONFERENCE ON WAVE-PARTICLE INTERACTIONS AND WAVE-INDUCED PARTICLE PRECIPITATION (ICWIPP88)

This Conference will be held at the University of Otago, New Zealand, from 1 to 5 February 1988. The Convener is Prof. R.L. Dowden, Chairman of URSI Commission H, and the Co-Conveners are Dr. H. Matsumoto and Dr. U.S. Inan.

The aim of this URSI conference is to bring together investigators interested in magnetospheric wave-particle interactions and wave-induced particle precipitation effects, including interactions between electrons and whistler-mode waves, electrostatic and electromagnetic ion-cyclotron waves and ions, nonlinear electron and ion cyclotron wave growth, wave-particle-wave interactions such as ULF/VLF and VLF/VLF, the role of such interactions in the acceleration and loss of the radiation belt particles, ionospheric phenomena associated with wave-induced particle precipitation, and new techniques for measuring wave spectra and particle precipitation effects.

There will be no parallel sessions. The proposed deadline for abstracts is 1 August 1987.

Further details are available from

Professor R.L. DOWDEN
Physics Department
University of Otago
Dunedin, New Zealand.

4th INTERNATIONAL CONFERENCE ON HF RADIO SYSTEMS AND TECHNIQUES

The 4th International Conference on HF Radio Systems and Techniques will be held at the Institution of Electrical Engineers (IEE), London, UK, from 11-13 April 1988. The Conference is being organized by the IEE in association with the Institute of Mathematics and its Applications.

The aim of the Conference is to review recent advances in the theory, design, performance and operation of HF communications systems and networks. It will also provide a discussion forum for researchers, designers, manufacturers, users and others in the field, including workers in HF radar.

For further information, contact

Conference Services
IEE
Savoy Place
London WC2R OBL
United Kingdom.

THE CCIR STUDY GROUPS

At its XVIth Plenary Assembly held in Dubrovnik, Yugoslavia, in May 1986 the International Radio Consultative Committee (CCIR) re-elected Mr. R.C. Kirby as Director of the Committee. It reviewed the terms of reference and structure of its Study Groups. The terms of reference and the names of the Chairmen and Vice-Chairmen of the Study Groups for the period 1986-1990 are given below.

Study Group 1 - Spectrum Utilization and Monitoring

Terms of reference:

1. To study principles and general applications relating to the efficient use of the radio frequency spectrum.

2. To study principles and to develop techniques for spectrum management, including electromagnetic compatibility (EMC) prediction models and computer aided techniques for frequency assignment, and to develop, in cooperation with the Study Groups concerned, general methods for solving sharing and interference problems.

3. To study principles for classifying emissions.

4. To develop means of specifying and measuring the characteristics of emissions and other forms of radiation, including man-made radio noise from individual sources likely to give rise to harmful interference.

5. To study techniques for spectrum monitoring and for measuring at a distance the parameters of emissions and spectrum occupancy; to devise means for identifying emissions and for locating sources of harmful interference; and to improve, in collaboration with the IFRB, procedures for presenting the corresponding reports.

Chairman: M.J. Hunt (Canada)

Vice-Chairmen: R.N. Agarwal (India), T. Bøe (Norway), R. Mayher (USA).

Study Group 2 - Space Research and Radioastronomy Services

Terms of reference:

To study questions relating to:

1. systems for space research service, the Earth exploration satellite service, including the meteorological satellite service and their associated technologies, as well as general principles of systems for the operation of spacecraft;

2. systems for radioastronomy service and for radar astronomy, with particular reference to associated interference problems.

Chairman: F. Horner (UK)

Vice-Chairman: H.G. Kimball (USA).

Study Group 3 - Fixed Service at Frequencies below about 30 MHz

Terms of reference:

To study questions relating to complete systems for the fixed service operating at frequencies below about 30 MHz and terminal equipment associated therewith.

Chairman: H. Kaji (Japan)
Vice-Chairman: J.E. Adams (USA).

Study Group 4 - Fixed-satellite Service

Terms of reference:

To study questions relating to systems for the fixed-satellite service and intersatellite links in the Fixed-satellite service (including the associated tracking, telemetry and telecommand functions).

Chairman: E. Hauck (Switzerland)

Vice-Chairmen: F.S. Leite (Brazil), T. Muratani (Japan), P. Remedi (Indonesia).

Study Group 5 - Propagation in Non-ionized Media

Terms of reference:

To study with the object of improving radiocommunication the propagation of radio waves (and the study of associated radio noise):

- at the surface of the Earth,
- through the non-ionized regions of the Earth's atmosphere,
- and in space where the effect of ionization is negligible.

Chairman: A. Kalinin (USSR)

Vice-Chairmen: F. Fedi (Italy), Y. Hosoya (Japan).

Study Group 6 - Propagation in Ionized Media

Terms of reference:

To study with the object of improving radiocommunication:

1. the propagation of radio waves through the ionosphere, and through ionized regions beyond the ionosphere;

2. the characteristics of related radio noise.

Chairman: L.W. Barclay (UK)

Vice-Chairmen: G.L. Mutti (Zambia)
G. Pillet (France).

Study Group 7 - Standard Frequencies and Time Signals

Terms of reference:

1. To coordinate services of standard frequency and time-signal dissemination on a world-wide basis.

2. To study the technical aspects of emission and reception, including the use of satellite techniques in these services, and means to improve the accuracy of measurement.

Chairman: J. McA. Steele (UK)

Vice-Chairman: S. Leschiutta (Italy).

Study Group 8 - Mobile, Radiodetermination and Amateur Services

Terms of reference:

To study the technical and operating aspects of systems in:

1. all mobile services and all mobile-satellite services;

2. the radiodetermination services and the radiodetermination-satellite services; and

3. the amateur service and amateur-satellite service.

Chairman: E. George (FRG)

Vice-Chairmen: Y. Hirata (Japan), J. Karjalainen (Finland), R.C. McIntyre (USA), O. Villanyi (Hungary).

Study Group 9 - Fixed Service Using Radio-relay Systems

Terms of reference:

To study questions relating to line-of-sight and trans-horizon radio-relay systems operating via terrestrial stations at frequencies above 30 MHz.

Chairman: J. Verrée (France)

Vice-Chairmen: M. Murotani (Japan), H. Willenberg (FRG).

Study Group 10 - Broadcasting Service (Sound)

Terms of reference:

To study:

1. technical aspects of the broadcasting service and the broadcasting-satellite service when these services are used for sound;

2. the special problems of broadcasting in the Tropical Zone, taking into account the standards required for good quality service; interference in the shared bands; power required for an acceptable service; design of suitable transmitting antennas; receiving equipment; optimum conditions for utilization of the frequency bands and other associated questions;

3. standards for audio-frequency equipment, including recording, to facilitate the international exchange of programmes.

Chairman: C. Terzani (Italy)

Vice-Chairmen: A. Keller (France), O.P. Khushu (India), H. Kussmann (FRG).

Study Group 11 - Broadcasting Service (Television)

Terms of reference:

To study:

1. technical aspects of the broadcasting service and the broadcasting-satellite service when these services are used for television;

2. standards for video-frequency equipment, for motion picture films intended for television and for all forms of television recording, to facilitate the international exchange of programmes.

Chairman: M. Krivocheev (USSR)

Vice-Chairmen: E. Aguèrrevere (Venezuela), A. Todorović (Yugoslavia), Wu Xianlun (People's Republic of China), R. Zeitoun (Canada).

Books Published by URSI Personalities

D.S. JONES

Acoustic and Electromagnetic Waves

Oxford Science Publications, published by Clarendon Press, Oxford, 1986, xix + 745 pages.
ISBN 0-19-853365-9.

R. SKANG and J.F. HJELMSTAD

Spread Spectrum in Communications

IEE Telecommunications Series 12, published by Peter Peregrinus, 1985, 201 pages.

INTERNATIONAL GEOPHYSICAL CALENDAR 1987

The International Ursigram and World Days Service (IUWDS) is a permanent scientific service of the International Union of Radio Science (URSI), with the participation of the International Astronomical Union and the International Union of Geodesy and Geophysics. It adheres to the Federation of Astronomical and Geophysical Services (FAGS) of the International Council of Scientific Unions (ICSU). The IUWDS coordinates the international aspects of the world days programme and rapid data interchange. One of its tasks is the annual publication of the *International Geophysical Calendar*.

The Calendar reproduced on pp. 40-41, continues the series begun for the IGY years 1957-58, and is issued annually to recommend dates for solar and geophysical observations which cannot be carried out continuously. Thus, the amount of observational data in existence tends to be larger on Calendar days. The recommendations on data reduction and especially the flow of data to *World Data Centers (WDCs)* in many instances emphasize Calendar days. The Calendar is prepared by the *International Ursigram and World Days Sservice (IUWDS)* with the advice of spokesmen for the various scientific disciplines. For some programmes, greater detail concerning recommendations appears from time to time published in *IAGA NEWS, IUGG Chronicle, URSI Information Bulletin* or other scientific journals or newsletters.

The definitions of the designated days remain as described on previous Calendars. *Universal Time (UT)* is the standard time for all world days. *Regular Geophysical Days (RGD)* are each Wednesday. *Regular World Days (RWD)* are three consecutive days each month (always Tuesday, Wednesday and Thursday near the middle of the month). *Priority Regular World Days (PRWD)* are the *RWD* which fall on Wednesdays. *Quarterly World Days (QWD)* are one day each quarter and are the PRWD which fall in the *World Geophysical Intervals (WGI)*. The *WGI* are fourteen consecutive days in each season, beginning on Monday of the selected month, and normally shift from year to year. In 1987 the *WGI* will be February, May, August, and November.

The *Solar Eclipses* are:

a) March 29 (annular-total) beginning in the southern part of

South America and part of Antarctica, moving across the S. Atlantic Ocean, across Africa except the northwest part, across the extreme southeast section of Europe and the southwest of Asia -- totality lasts only 8 seconds in a path 5 km wide over the S. Atlantic, off the coast of West Africa.

B) September 23 (annular-partial) beginning in Asia (except the northeast and southwest sections) crossing China, moving across Japan, across the Pacific Ocean, the Philippine Islands, Indonesia (except the southwest section), New Guinea, Northeast Australia and New Zealand (except the extreme south), and ends near Samoa.

Meteor Showers (selected by P.M. Millman, Ottawa) include important visual showers and also unusual showers observable mainly by radio and radar techniques. The dates for Northern Hemisphere meteor showers are: Jan 3, 4; Apr 21-23; May 4-5; Jun 8-12; Jul 28-29; Aug 11-14; Oct 20-23; Nov 2-4, 17-18; and Dec 13-16, 22-23, 1987; and Jan 3, 4, 1988. The dates for Southern Hemisphere meteor showers are: May 4-5; Jun 8-12; Jul 27-30; Oct 20-23; Nov 2-4, 17-18; and Dec 5-7, 13-16, 1987. Note that the meteor showers that come in the first week of May and the third week in October are of particular interest (fragments of Halley's comet).

The occurrence of unusual solar or geophysical conditions is announced or forecast by the IUWDS through various types of geophysical ALERTS (which are widely distributed by telegram and radio broadcast on a current schedule). Stratospheric warmings (STRATWARM) are also designated. The meteorological telecommunications network coordinated by WMO carries these worldwide Alerts once daily soon after 0400 UT. For definitions of Alerts see IUWDS *Synoptic Codes for Solar and Geophysical Data, Third Revised Edition 1973* and its amendments. *Retrospective World Intervals* are selected and announced by MONSEE and elsewhere to provide additional analyzed data for particular events studied in the ICSU Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) programmes.

RECOMMENDED SCIENTIFIC PROGRAMMES PLANNING EDITION

(The following material was reviewed in 1986 by spokesmen of IAGA, WMO and URSI as suitable for coordinated geophysical programmes in 1987).

Airglow and Aurora Phenomena. Airglow and auroral observatories operate with their full capacity around the New Moon periods. However, for progress in understanding the mechanism of inter alia, low latitude aurora, the coordinated use of all available techniques, optical and radio, from the ground and in space is required. Thus, for the airglow and aurora 7-day periods on the Calendar, ionosonde, incoherent scatter, special satellite or balloon observations, etc., are especially encouraged. Periods of approximately one week's duration centered on the New Moon are proposed for high resolution of ionospheric, auroral and magnetospheric observations at high latitudes during northern winter.

Atmospheric Electricity. Non-continuous measurements and data reduction for continuous measurements of atmospheric electric current density, field, conductivities, space charges, ion number densities, ionosphere potentials, condensation nuclei, etc.; both at ground as well as with radiosondes, aircraft, rockets; should be done with first priority on the *RGD* each Wednesday, beginning on 7 January 1987 at 0000 UT, 14 January at 0600 UT, 21 January at 1200 UT, 28 January at 1800 UT, etc. (beginning hour shifts six hours each week, but is always on Wednesday). Minimum programme is at the same time on *PRWD* beginning with 21 January at 1200 UT. Data reduction for continuous measurements should be extended, if possible, to cover at least the full *RGD* including, in addition, at least 6 hours prior to indicated beginning time. Measurements prohibited by bad weather should be done 24 hours later.Results on sferics and ELF are wanted with first priority for the same hours, short-period measurements centered around the minutes 35-50 of the hours indicated. *Priority Weeks* are the weeks which contain a *PRWD*; minimum priority weeks are the one with a *QWD*. The World Data Centre for Atmospheric Electricity, 7 Karbysheva, Leningrad 194018, USSR, is the collection point for data and information on measurements.

Geomagnetic Phenomena. It has always been a leading principle for geomagnetic observatories that operations should be as continuous as possible and the great majority of stations undertake the same programme without regard to the Calendar.

Stations equipped for making magnetic observations, but which cannot carry out such observations and reductions on a continuous schedule are encouraged to carry out such work at least on *RWD* (and during times of MAGSTROM Alert).

Ionospheric Phenomena. Special attention is continuing on particular events which cannot be forecast in advance with reasonable certainty. These will be identified by *Retrospective World Intervals*. The importance of obtaining full observational coverage is therefore stressed even if it is possible to analyze the detailed data only for the chosen events. In the case of vertical incidence sounding, the need to obtain quarter-hourly ionograms at as many stations as possible is particularly stressed and takes priority over recommendation (a) below when both are not practical.

For the vertical incidence (VI) sounding programme, the summary recommendations are: (a) All stations should make soundings on the hour and every quarter hour; (b) on *RWDs*, ionogram soundings should be made at least every quarter hour and preferably every five minutes or more frequently, particularly at high latitudes; (c) All stations are encouraged to make f-plots on *RWDs*; f-plots should be made for high latitude stations, and for so-called "representative" stations at lower latitudes for all days (i.e., including *RWDs* and *WGIs* (Continuous records of ionospheric parameters are acceptable in place of f-plots at temperate and low latitude stations); (d) Copies of hourly ionograms with appropriate scales for *QWDs* are to be sent to WDCs; (e) Stations in the eclipse zone and its conjugate area should take continuous observations on solar eclipse days and special observations on adjacent days. See also recommendations under *Airglow and Aurora Phenomena*.

For the incoherent scatter observation programme, every effort should be made to obtain measurements at least on the *Incoherent Scatter Coordinated Observation Days*, and intensive series should be attempted whenever possible in *WGIs* or the *Airglow and Aurora Periods*. The need for collateral VI observations with not more than quarter-hourly spacing at least during all observation periods is stressed. Dr. V. Wickwar, SRI International, 333 Ravenswood Ave., Menlo Park, CA 94025 (USA), URSI Working Group G/H.1, is coordinating special programmes.

For the ionospheric drift or wind measurement by the various radio techniques, observations are recommended to be concentrated on the weeks including *RWDs*.

For travelling ionosphere disturbances, propose special periods for coordinated measurements of gravity waves induced by magnetospheric activity, probably on selected *PRWD* and *RWD*.

For the ionospheric absorption programme half-hourly observations are made at least on all *RWDs* and half-hourly tabulations sent to *WDCs*. Observations should be continuous on *solar eclipse* days for stations in eclipse zone and in its conjugate area. Special efforts should be made to obtain daily absorption measurements at temperate latitude stations during the period of *Absorption Winter Anomaly*, particularly on days of abnormally high or abnormally low absorption (approximately October-March, Northern Hemisphere; April-September , Southern Hemisphere).

For back-scatter and forward scatter programmes, observations should be made and analyzed on all *RWDs* at least.

For synoptic observations of mesospheric (D region) electron densities, several groups have agreed on using *RGD* for the hours around noon.

For ELF noise measurements involving the earth-ionosphere cavity resonances any special effort should be concentrated during the *WGIs*.

It is recommended that more intensive observations in all programmes be considered on days of *unusual meteor activity*.

Meteorology. Particular efforts should be made to carry out an intensified programme on *RGD* -- each Wednesday, UT. A desirable goal would be the scheduling of meteorological rocketsondes, ozone sondes and radiometer sondes on these days, together with maximum-altitude rawinsonde ascents at both 000 and 1200 UT.

During *WGI* and STRATWARM Alert Intervals, intensified programmes are also desirable, preferably by the implementation of *RGD*-type programmes (see above) on Mondays and Fridays, as well as on Wednesdays.

Middle Atmosphere Cooperation (MAC). MAC runs from 1 Jan. 1986 through 1988. Techniques for observing the middle atmosphere should concentrate or center their observations on the *RGDs*, *PRWDs*, and *QWDs*. It is recommended that observing runs for studies of planetary waves and tides be at least 10 days centered on the *PRWDs* and *QWDs*. Non-continuous studies of stratospheric warmings and the effects of geomagnetic activity on the middle atmosphere must be initiated by STRATWARM and MAGSTROM alers, respectively. For more details see the "Recommended Scientific Programmes" on the reverse of the *Middle Atmosphere Dynamics Calendar for 1987*, which is

published as a special edition of the *IGC for 1987*. Contact Dr. T. VanZandt, NOAA R/E/AL3, 325 Broadway, Boulder, Colorado 80303, USA.

Solar Phenomena. Observatories making specialized studies of solar phenomena, particularly using new or complex techniques, such that continuous observation or reporting is impractical, are requested to make special efforts to provide to WDCs data for *solar eclipse* days, *RWDs* and during *Proton/Flare Alerts*. The attention of those recording solar noise spectra, solar magnetic fields and doing specialized optical studies is particularly drawn to this recommendation.

Study of Travelling Interplanetary Phenomena (STIP).. STIP Interval XIX is March 1986 to coincide with the International Halley Watch. Coordination of solar, interplanetary, and cometary activity is particularly desired. Revised STIP Intervals: STIP XV 12-21 Feb 1984 solar GLE; STIP XVI 20 Apr - 4 May 1984 Forbush decrease; STIP XVII 24 Apr - 30 Jun 1985 alignment of Venus magnetotail with satellites VEGA 1, VEGA 2, MS-T5, PVO, and ICE; STIP XVIII Sep 1985 Giacobini-Zinner Comet fly-by by ICE.

Space Research, Interplanetary Phenomena, Cosmic Rays, Aeronomy. Experimenters should take into account that observational effort in other disciplines tends to be intensified on the days marked on the Calendar, and schedule balloon and rocket experiments accordingly if there are no other geophysical reasons for choice. In particular it is desirable to make rocket measurements of ionospheric characteristics on the same day at as many locations as possible; where feasible, experimenters should endeavour to launch rockets to monitor at least normal conditions on the *Quarterly World Days (QWD)* or on *RWDs*, since these are also days when there will be maximum support from ground observations. Also, special efforts should be made to assure recording of telemetry on *QWD* and *Airglow and Aurora Periods* of experiments on satellites and of experiments on spacecraft in orbit around the Sun.

For URSI/IAGA Coordinated Tidal Observations Programme (CTOP) contact Dr. R.G. Roper (School of Geophysical Sci., Georgia Inst. of Tech. , Atlanta, GA 30332, USA) for the 1987 Calendar.

This Calendar for 1987 has been drawn up by H.E. Coffey, of the IUWDS Steering Committee, in association with spokesmen for the various scientific disciplines in URSI, IAGA and SCOSTEP. Similar Calendars are issued annually beginning with the IGY, 1957-58, and are published in various widely available scientific publications. They are published for the ICSU, and with the financial assistance of UNESCO.

ADDITIONAL COPIES are available upon request to:

IUWDS Chairman

Dr. R. Thompson
IPS Radio and Space Services
Department of Science
162-166 Goulburn Street
Darlinghurst, NSW 2010
Australia,

or

IUWDS Secretary for World Days

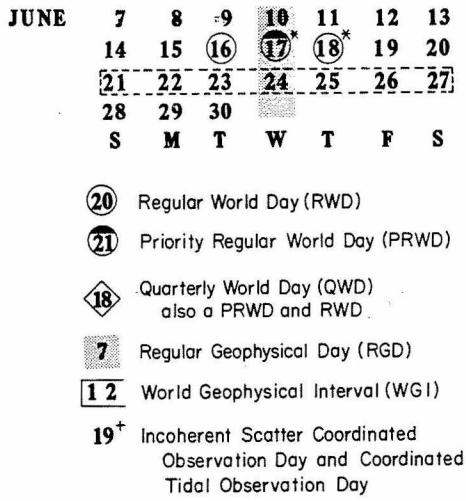
Miss H.E. Coffey
WDC-A for Solar-Terrestrial Physics
NOAA E/GC2
325 Broadway
Boulder, Colorado 80303
USA.

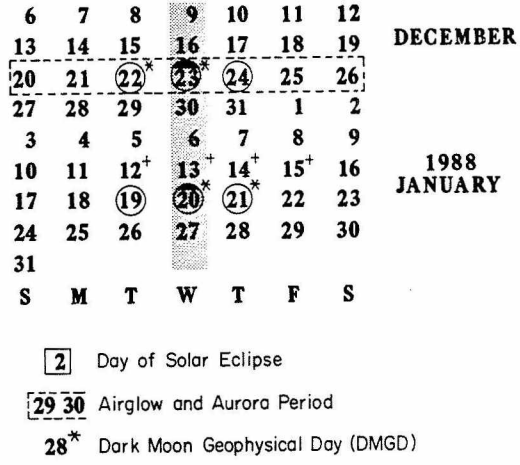
International Geophysical Calendar
1987

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

	S	M	T	W	T	F	S
					1	2	3
	4	5	6	7	8	9	10
JANUARY	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27+	28*+	29*+	30+	31
	1	2	3	4	5	6	7
FEBRUARY	8	9	10	11	12	13	14
	15	16	17	18*	19*	20	21
	22	23	24	25	26	27	28
	1	2	3	4	5	6	7
MARCH	8	9	10	11	12	13	14
	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
APRIL	12	13	14	15	16	17	18
	19	20	21	22*	23*	24	25
	26	27	28+	29+	30	1	2
	3	4	5	6	7	8	9
MAY	10	11	12	13	14	15	16
	17	18	19	20*	21*	22	23
	24	25	26	27	28	29	30

	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
JULY	12	13	14	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
AUGUST	9	10	11	12	13	14	15
	16	17	18	19*	20*	21	22
	23	24	25	26+	27+	28	29
	30	31	1	2	3	4	5
SEPTEMBER	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21+	22+	23*+	24*+	25+	26+
	27	28	29	30	1	2	3
	4	5	6	7	8	9	10
OCTOBER	11	12	13	14	15	16	17
	18	19	20*	21*	22	23	24
	25	26	27	28	29	30	31
	1	2	3	4	5	6	7
NOVEMBER	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24*+	25*+	26	27	28





NOTES:

1. Days with unusual meteor shower activity are: Northern Hemisphere Jan 3,4; Apr 21-23; May 4-5; Jun 8-12; Jul 28-29; Aug 11-14; Oct 20-23; Nov 2-4, 17-18; Dec 13-16, 22-23, 1987; Jan 3,4, 1988. Southern Hemisphere May 4-5; Jun 8-12; Jul 27-30; Oct 20-23; Nov 2-4, 17-18; Dec 5-7, 13-16, 1987.
2. Middle Atmosphere Cooperation (MAC) began 1 Jan 1986 and runs through 1988.
3. Day intervals that IMP 8 satellite is in the solar wind (begin and end days are generally partial days): 1986 Dec 31-1987 Jan 5; Jan 12-18; Jan 24-30; Feb 6-12; Feb 18-25; Mar 3-10; Mar 16-22; Mar 28-Apr 4; Apr 10-17; Apr 23-30; May 5-12; May 17-25; May 29-Jun 6; Jun 10-19; Jun 23-Jul 2; Jul 6-14; Jul 19-27; Jul 31-Aug 9; Aug 13-21, Aug 25-Sep 2; Sep 6-14; Sep 19-27; Oct 2-9; Oct 15-22; Oct 27-Nov 4; Nov 9-16; Nov 22-29; Dec 4-11; Dec 17-24; Dec 30-1988 Jan 6. There will not be total IMP 8 data monitoring coverage during these intervals. (Information kindly provided by the WDC-A for Rockets and Satellites, NASA/GSFC, Greenbelt, MD 20771 U.S.A.).
4. + Incoherent Scatter programs start at 1600 UT on the first day of the intervals indicated, and end at 1600 UT on the last day of the intervals.

List of Future Symposia and Meetings

Note: Events marked by an asterisk are sponsored or co-sponsored by URSI.

1987 National Radio Science Meeting
Boulder, Colorado, USA, 12-15 January 1987.

Contact address: Prof. S.W. Maley
Chairman, Steering Committee
National Radio Science Meeting
Department of Electrical Engineering
University of Colorado
Boulder, Colorado 80309
USA.

URSI International Symposium on Microwave Signatures in Remote Sensing*
Göteborg, Sweden, 19-22 January 1987.

Contact address: MSRS 87
Prof. J. Askne
Chalmers University of Technology
Department of Radio and Space Science
S-412 96 Göteborg, Sweden.

Phone: +46-31-810100
Telex: 2369 Chalbib S.

12th Annual Conference on Infrared and mm-Waves
Walt Disney, Florida, USA, 13-18 February 1987.

Contact address: Prof. K.J. Button
Massachusetts Institute of Technology
Box 72
Cambridge, Mass. 02139-0901
USA.

7th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility[x]
Zurich, Switzerland, 3-5 March 1987.

Contact address: Prof. T. Dvorak
ETH Zentrum-IKT
CH-8092 Zurich
Switzerland.

Phone: +41-1-256 2790
Telex: 53178 ethbi ch.

International Conference on Antennas and Propagation (ICAP '87)[x]
York, United Kingdom, 30 March-2 April 1987.

Contact address: ICAP '87 Secretariat
Conference Services, IEE
Savoy Place
London WC2R OBL
United Kingdom.

Biregional Latin American/African Workshop on Radio Propagation Research and Applications[x]
Buenos Aires, Argentina, 30 March-2 April 1987.

Contact address: Prof. Sandro M. Radicella
Executive Secretary, PRONARP
1987 Biregional Workshop
Julian Alvarez 1218
1414 Buenos Aires, Argentina.

XII General Assembly of the European Geophysical Society
Strasbourg, France, 9-14 April 1987.

Contact address: M.M. Cara
Institut de Physique du Globe
5 rue R. Descartes
F-67084 Strasbourg Cedex
France.

Phone: +33-88-604110
Telex: 890826 csem f.

The Impact of VLBI on Astrophysics and Geophysics[x]
Cambridge, Mass., USA, 10-15 May 1987.

Contact address: Dr. J. Moran
CfA
Mail Stop 42
60 Garden Street
Cambridge, Mass. 02138
USA.

Remote Sensing: Understanding the Earth as a System (IGARSS '87)[x]
Ann Arbor, USA, 18-21 May 1987.

Contact address: Ms Joan Eadie, Secretariat
The University of Michigan Extension Service
Department of Conferences and Institutes
200 Hill Street
Ann Arbor, Michigan 48104-3297
USA.

42th All-Union Scientific Session of the A.S. Popov Society
Moscow, USSR, 19-21 May 1987.

Contact address: Central Administration
The A.S. Popov Society
Kuznetskij Most 20
103897 Moscow Centre GSP-3
USSR.

Phone: 221 7108 or 924 8084.

International Workshop on Ionospheric Informatics[x]
Novgorod, USSR, 26-28 May 1987.

Contact address: Dr. T.L. Gulyaeva
IZMIRAN
USSR Academy of Sciences
142092 Troitsk
Moscow Region
USSR.

Phone: 232 1921
Telex: 412623 SCSTP SU.

Symposium on Picture Coding 1987
Stockholm, Sweden, 9-11 June 1987.

Contact address: Dr. Harald Brusewitz
PCS 87 Local Arrangements Secretariat
Swedish Telecommunication Administration Ptf
Varuvagen 9
S-123 86 Farsta
Sweden.

Phone: +46-8-713 1204
Telex: 14970 GENTEL S.

1987 IEEE AP-S International Symposium and URSI Radio Science Meeting
Blacksburg, Virginia, USA, 15-19 June 1987.

Contact address: 1987 IEEE AP-S International Symposium and URSI Radio Science Meeting
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061
USA.

3rd School on Space Simulation (ISSS-3)[x]
La Londe-les-Maures and Beaulieu, France, 15-27 June 1987.

Contact address: Dr. R. Gendrin
CRPE/CNET
38 rue du Général Leclerc
F-92131 Issy-les-Moulineaux
France.

Phone: +33-1-4529 5025
Telex: CNETION 200570 F.

18th International Conference on Phenomena in Ionized Gases (ICPIG XVIII)
Swansea, United Kingdom, 13-17 July 1987.

Contact address: Dr. W.T. Williams
Department of Physics
University College of Swasea
Singleton Park, Swansea SA2 8PP
Wales
United Kingdom.

1987 International Microwave Symposium/Brazil
Rio de Janeiro, Brazil, 27-30 July 1987.

Contact address: Prof. Alvaro Augusto de Salles
CETUC-PUC/RJ
rua Marques de Sao Vicente 225
Gavea, CEP 22453
Rio de Janeiro
Brazil.

XIX General Assembly of the International Union of Geodesy and Geophysics (IUGG)
Vancouver, Canada, 10-22 August 1987.

Contact address: Conference Secretariat
c/o Venue West
801-750 Jervis Street
Vancouver, B.C.
Canada V6E 2A9.

Phone: (604) 681 5226
Telex: 04-352848 VcR.

XXII General Assembly of the International Union of Radio Science (URSI)[x]
Tel Aviv, Israel, 25 August-2 September 1987.

Contact address: The Secretariat
XXII General Assembly of URSI
P.O.B. 50006
Tel Aviv 61500
Israel.

Phone: (03) 654571
Telex: 341171 KENS IL.

8th European Conference on Circuit Theory and Design (ECCTD '87)[x]
Paris, France, 1-4 September 1987.

Contact address: Mme J. Hénaff
CNET/DIT
38 rue du Général Leclerc
F-92131 Issy-les-Moulineaux
France.

Workshop on Beam Methods for High-Frequency Radiation, Propagation and Diffraction - Theory and Applications[x]
Kiryat Anavim, Israel, 3-4 September 1987.

Contact address: Beam Workshop Secretariat
P.O.B. 50006
Tel Aviv 61500, Israel.

17th European Microwave Conference[x]
Rome, Italy, 7-11 September 1987.

Contact address: Dr. F. Fedi
Fondazione Ugo Bordoni
Viale Trastevere 108
I-00153 Roma
Italy.

Conference on Digital Signal Processing[x]
Florence, Italy, 7-10 September 1987.

Contact address: ENIC
Via S. Caterina d'Alessandria 12
I-50129 Florence
Italy.

Phone: +39-55-496177-8
Telex: 580412 Enic 1.

15th Annual Meeting on Atmospheric Studies by Optical Methods
Granada, Spain, 6-11 September 1987.

Contact address: XV AMASOM
Local Organizing Committee
Instituto de Astrofisica de Andalucia
P.O. Box 2144
18080 Granada
Spain

Phone: +34-58-121300
Telex: 78573 IAAG E.

13th European Conference on Optical Communication (ECOC '87)[x]
Helsinki, Finland, 13-17 September 1987.

Contact address: ECOC '87
c/o Sähköinsinööriliitto
Merikasarminkatu 7 J 53
SF- 00160 Helsinki, Finland.

5e Forum Mondial des Télécommunications - Partie 2:
Symposium technique
Genève, Suisse, 22-27 octobre 1987.

Contact address: Secrétariat du Forum 87
Union Internationale des Télécommunications
CH-1211 Genève 20
Suisse.

Phone: +41-22-99 51 90

International Symposium on Electronic Devices, Circuits and Systems (ISELDECS-87)
Kharagpur, India, 16-18 December 1987.

Contact address: Prof. N.B. Chakrabarti
Department of Electronics and Electrical Communication Engineering
Indian Institute of Technology
Kharagpur 721302 WB
India.

URSI International Conference on Wave-Particle Interactions and Wave-Induced Particle Precipitation (ICWIPP '88)
University of Otago, New Zealand, 1-5 February 1988.

Contact address: Prof. R.L. Dowden
Department of Physics
University of Otago
Dunedin
New Zealand.

International Symposium on Radio Propagation (ISRP '88)
Beijing, China, 28-31 March 1988.

Contact address: Dr. Zheng Wenhao
Chief of the Academic Division
Headquarters of CIE
P.O.B. 139
Beijing
China.

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Note: An alphabetical index of names, with addresses and page references, is given at the back of this Bulletin.

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