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JEAN LUGEON
1897-1976

The death of Professor Jean Lugeon on 21 February 1976 will be regretted by many members of the URSI community and particularly by those who attended URSI General Assemblies before World War II.

Jean Lugeon graduated from the University of Lausanne and later continued his studies at the Eidgenössische Technische Hochschule in Zürich where he received his doctorate. In 1924 he entered the Swiss Meteorological Institute of which he was Director from 1945 until he retired in 1963.

Lugeon was one of the pioneers, nearly half a century ago, in the application of radio techniques to the needs of meteorologists. At the URSI Assemblies in 1931, 1934 and 1938 he took part in lively discussions on the detection and location of thunderstorms using narrow-sector recorders, cathode-ray direction-finders and other new devices. In the Commission on Atmosphericics, together with Bureau, Norinder, Watson Watt and others who had similar interests, he helped to lay the foundations of the first European network of stations capable of locating thunderstorms.

Professor Lugeon continued to be actively associated with the Swiss URSI Committee and was a member of the Swiss delegation until the General Assembly in 1960.

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URSI-CCIR-CCITT LIAISON COMMITTEE

Although URSI was created to encourage studies of the basic scientific aspects of telecommunications, many of the scientists associated with the Union over the past half century have, nevertheless, recognised the importance of keeping in close touch with the national and international organisations responsible for the practical operation of telecommunications networks and, in particular, of radiocommunications systems.

Among the members of the delegations at the International Radiotelegraphy Conference held in Washington in 1927, the first to be convened since 1912, it is not surprising to find the names of prominent URSI personalities. These include three Presidents of URSI (Ferrié,

Austin and Kennelly), the first Secretary General (Goldschmidt), and several Chairmen and others connected with URSI Commissions (Bureau, Le Corbeiller, Dellinger, Mesny, van der Pol, and Vanni). Ferrié, Goldschmidt and Vanni had earlier been members of the pioneering International Commission on Scientific Radiotelegraphy (1913-14) from which URSI sprang in 1919.

Since the creation of the International Telecommunications Union, URSI has had particularly close links with the Comité Consultatif International des Radiocommunications and the cooperation between URSI and CCIR was especially fruitful during the period when Balth. van der Pol was Director of CCIR while still Chairman of an URSI Commission. Many past and present Chairmen and Vice-Chairmen of CCIR Study Groups have been, or still are, equally well known in the URSI Commissions; for example, Bailey, Becker, Decaux, Dellinger, Hagen, Klein, Mlle Pillet, Ranzi, Saxton, Smith-Rose, Steele and others. Finally it is worth noting that the present Director of CCIR (R.C. Kirby) and his predecessor (J.W. Herbstreich) were both active in URSI Commissions and have always encouraged closer cooperation between URSI and CCIR.

In view of the decision of the URSI General Assembly in 1975 to give an additional stimulus to studies of telecommunication science in URSI, some thought was given to the formation of an URSI Commission designed to deal with problems of interest to ITU and especially to its technical Committees CCIR and CCITT. However, instead of such a Commission, it was considered preferable to recommend the formation of a joint URSI-ITU Committee whose task would be to ensure the maximum degree of cooperation between the two organisations.

In order to discuss this possibility further, the President of URSI, together with Dr. J.A. Saxton (a former Chairman of URSI Commission II and now Chairman of CCIR Study Group 5) met the Director of CCIR in Geneva in June 1976. It was agreed to create the URSI-CCIR-CCITT Liaison Committee, on an informal basis for the present, consisting of the following members:

- Dr. J.A. Saxton (Chairman of the Committee)
- Prof. W.E. Gordon (URSI)
- Dr. J.P. Hagen (URSI and CCIR)
- Mr. R.C. Kirby (CCIR)
- Monsieur M. Mili (Secretary General, ITU)
- Prof. F.L.H.M. Stumpers (URSI)

Monsieur J. Verrée (CCIR)
A representative of CCITT
Dr. C.M. Minnis (Secretary General of URSI and
Secretary of the Committee).

It was considered desirable to keep the membership fairly small, but it is intended to co-opt appropriate specialists, as and when the need arises, to help in dealing with particular problems.

At the Geneva meeting just mentioned, the suggestion was made that URSI and CCIR should jointly organise a few symposia to be held in connection with the Final CCIR Study Group Meetings in Geneva in the autumn of 1977. These Symposia would be designed to bring together those who are interested in the scientific or the operational aspects of radiocommunications, or in both aspects. The topics tentatively suggested are:

- A. Electromagnetic interference and the utilization of the radio spectrum;
- B. Space research and radioastronomy (aspects relating to ITU);
- C. Radio links and digital communication;
- D. Acquisition of data relating to radio wave propagation from regions where such data are at present sparse.

In order to provide a bridge between research scientists concerned with fundamental problems of telecommunications and the engineers and others responsible for the operational aspect of the various networks, it has been suggested that URSI should commission several articles suitable for publication in the Telecommunication Journal of the ITU. These articles would be oriented towards possible future applications of current research in telecommunication science and would be designed to interest the readers of the Journal which is widely circulated in all the countries which adhere to the ITU.

As in the past, it is expected that URSI will find it possible to make contributions towards the discussion of the Study Programmes, Reports and Questions which are being dealt with by the various CCIR Study Groups, particularly in such fields as radio wave propagation, standard frequencies and time signals, the optimum utilization of the radio spectrum, radioastronomy and space research, the application of information theory, studies of radio noise and its effects on communications, and so

on.

Although URSI has not previously had many contacts with CCITT, it is believed that there will be advantages to both organisations in the future development of their relations with each other.

The URSI-CCIR-CCITT Liaison Committee has not yet held its first meeting and, in consequence, has not yet made specific recommendations. Later, however, it will obviously be necessary to establish contact with individuals in URSI who are interested in contributing towards closer cooperation between research workers and their counterparts in the field of telecommunications. Many of those who are engaged in scientific research relevant to telecommunications already have indirect contacts with ITU through the medium of the appropriate national administration in their respective countries. In the past, URSI has been fortunate in finding research workers who do not have such contacts and who have made valuable contributions to URSI documents submitted to CCIR. It will probably be desirable to expand the number of such contacts as well as to make the maximum possible use of those individuals who are already active in both URSI and CCIR.

The purpose of this article has been to announce the formation of the URSI-CCIR-CCITT Liaison Committee and to place this event in its historical perspective. In a later article more precise information will be given concerning the actions proposed by the new Committee. In the meantime the Secretary would be glad to establish contact with individuals who are particularly interested in the application of the results of scientific research to the improvement and to the future development of the telecommunications systems on which modern societies depend so heavily.

C.M. Minnis

Brussels, 11 August 1976

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IONOSPHERIC ABSORPTION

High-frequency radiocommunications systems can not be operated effectively in the absence of adequate information about the critical frequencies of the reflecting E and F layers of the ionosphere. The need for such information led ultimately to the establishment of the

world network of ionospheric sounders and, in 1961, to the publication of the URSI Handbook of Ionogram Interpretation and Reduction which appeared in a revised second edition in 1972 (1).

Critical frequencies are not the only factors which determine the effectiveness of a communications system, since high-frequency waves are often severely attenuated when they pass through the D region on their way to and from the reflecting layers. In view of this, it is important to acquire quantitative information concerning the absorption of the energy of radio waves in this region. Several methods for making measurements of ionospheric absorption have been available for many years, but the experimental techniques and the interpretation of the results obtained are much more difficult than those used in observing critical frequencies.

Absorption measurements formed part of the programmes of both the IGY (1957-58) and the IQSY (1964-65) and the instructions given to the observing stations have since been published (2, 3). At the General Assembly of URSI in 1966, it was recommended that these earlier instructions should be edited and expanded, and issued in a form suitable for use by those responsible for making absorption measurements. The responsibility for collecting and editing the material to be provided by the specialists in the various methods fell on Prof. K. Rawer who had been elected Vice-Chairman of URSI Commission III for the period 1966-69.

The new 200-page Manual on Ionospheric Absorption Measurements (4) was published a few months ago and will certainly take its place alongside the earlier Handbook as an authoritative companion work of reference in the field of ionospheric studies.

Prof. Rawer has himself written the three introductory chapters which are concerned respectively with the basic concepts of radio wave propagation, with the theory of ionospheric absorption (including the rôle of deviative absorption in the E layer) and with the problems involved in making observations in the presence of a fading signal.

The following six chapters deal with the various ways of measuring absorption. Since each of the methods presents particular problems, it is appropriate that these chapters should have been written by different research workers chosen for their specialised knowledge

and experience:

Chap. 4 Pulse Reflections: K. Rawer (F.R. Germany);

Chap. 5 Cosmic Noise Absorption: J. Taubenheim (German D.R.) on the basis of contributions mainly from G.C. Reid (USA), A.P. Mitra (India) and K.R. Ramanathan (India).

Oblique Incidence Field Strength

Chap. 6 above 2MHz: H. Schwentek (F.R. Germany)

Chap. 7 at LF and MF: E.A. Lauter with assistance from J. Bremer, G. Entzian and K. Sprenger (German D.R.)

Chap. 8 Partial Reflections: W. Dieminger and K. Schlegel (F.R. Germany).

Chap. 9 Satellite Observations: J. Mass (Israel).

Readers who wish to refer to original published papers will welcome the concluding chapter which includes over 200 references covering, with a few earlier and later exceptions, the years 1930-72.

If progress in the measurement of ionospheric absorption continues to be made, consideration will probably be given to the preparation of a Supplement to the Manual in a few years time. The views of research workers on the contents of such a Supplement would be welcome and should be addressed either to the URSI Secretariat or to Prof. Rawer whose address is

Fraunhofer Gesellschaft Institut für Physikalische
Weltraumforschung,
Heidenhofstrasse 8,
D - 78 Freiburg/Breisgau, F.R. Germany.

Copies of both the new Manual (4) and the earlier Handbook (1) can be obtained from:

National Climatic Center (attn Publications),
Federal Building,
Asheville, NC 28801, USA.

Cheques for the Manual (\$4.27) or the Handbook (\$1.75) should be made payable to "Dept. of Commerce, NOAA". Special rates are available to subscribers to the UAG Series of Reports which includes both these volumes.

References.

- (1) URSI Handbook of Ionogram Interpretation and Reduction: 2nd edition, ed. W.R. Piggott and K. Rawer (US Dept. of Commerce, Rep. UAG-23, 1972).

- (2) The Measurement of Ionospheric Absorption: ed.W.R. Piggott et al. Ann. IGY Vol.III, pp.171-226 (Pergamon Press, 1957).
- (3) Ionosphere: Absorption Measurements: K.H. Geisweid et al. Ann. IQSY Vol.1, pp.74-116 (MIT Press, 1968).
- (4) Manual on Ionospheric Absorption Measurements: ed. K. Rawer (US Dept. of Commerce, Rep. UAG-57, 1976).

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INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
(CISPR)

The International Special Committee on Radio Interference (CISPR) was founded in 1934. Some of its interests coincide with those of URSI Commission E. Certain subjects are also under consideration in CCIR Study Group 1 whose Vice-Chairman, Dr. Struzak (Poland), suggested to the President of CISPR, M. Meyer de Stadelhofen (Switzerland), that the scientific background to CISPR studies might be improved by establishing closer links with URSI. It was considered possible that CISPR might find it advantageous to refer certain Study Programmes, Questions and Reports to URSI in much the same way as CCIR does.

Prof. Stumpers (Vice-President, URSI) attended a meeting of the CISPR Steering Group in Nice on 26 May and reviewed the possibilities for cooperation between the two organisations. In his opinion, it would be possible for the Chairmen of the six CISPR Sub-Committees to submit questions relating to scientific matters to the Secretary General of URSI who would then refer them to the relevant URSI Commissions.

Following some discussion, Mr. Akerlind, the Vice-Chairman concerned with limits in CISPR, proposed that CISPR should accept the opportunity of obtaining more scientific information through URSI and this was accepted unanimously by the Steering Committee.

For practical purposes, it may be worth encouraging closer collaboration between URSI Commission E and CISPR in the planning of International Symposia on Electromagnetic Compatibility of which URSI is a cosponsor. Several scientists associated with URSI Commission E already have an interest in these Symposia: Egidi and Nano in Italy, Dvorak in Switzerland, Joachim in Czechoslovakia, etc.

F. L. H. M. Stumpers

19TH COSPAR MEETING: JUNE 1976

The following brief summary is based on the Report submitted by Prof. K. Rawer, who represented URSI at the COSPAR Meeting, including meetings of the Executive Council, and on the Report submitted by the Executive Secretary of COSPAR.

1. The 19th annual Meeting of COSPAR was held in Philadelphia, USA from 10 to 19 June 1976. The Meeting was attended by 634 participants from 33 countries.

In addition to the open meetings of COSPAR Working Groups 1 - 7, symposia were arranged on the following topics:

- A. Infra-red and submillimetre astronomy
- B. Minor constituents and excited species in the upper atmosphere
- C. Meteorological observations from space
- D. Materials science in space
- E. The future of science in space.

The total number of papers presented during the COSPAR Meeting was nearly 500.

2. Future COSPAR Meetings will be held in:

- Tel Aviv, Israel; 7-18 June 1977
- Innsbruck, Austria; 28 May - 11 June 1978
- India, 1979; (location and dates to be decided later).

3. In view of the increasing importance of studies relating to the behaviour of materials in space, COSPAR has created Working Group 8 on Materials Science in Space under the Chairmanship of Dr. A. Bewersdorf (F.R. Germany)

It has been decided also to reconstitute the Panel on Potentially Harmful Activities in Space in order to deal with certain problems raised by infra-red astronomers and with the risk that active experiments in space may produce major and long-lasting changes in the Earth's environment.

4. Future Symposia on the following subjects are being planned jointly with other organisations:

Tel Aviv 1977

- Travelling interplanetary phenomena
- New instrumentation for space astronomy
- Solar fluxes (x-rays to ultra-violet).

Innsbruck 1978

Solar-terrestrial physics (interactions)
Atmospheres and surfaces of planets (excluding the
Moon)
Non-solar x-ray astronomy (provisional).

5. Brief references are given below to those decisions adopted by COSPAR which are of interest to URSI. The decisions deal with the following subjects:

- 1/76 - the desirability of installing radio beacons on geostationary satellites, the space shuttle and space laboratories;
- 3/76 - the importance of making space and ground-based observations of space phenomena during STIP Interval III (15 March - 15 May 1977);
- 4/76 - the desirability of limiting scientific meetings on solar-terrestrial physics to a small number of first-rate events;
- 5/76 - the importance to scientists of making better use of the facilities of and data stored in the World Data Centres;
- 7/76 - Proposed by the Executive Council on a proposal from Working Groups 4 and 1

COSPAR,

noting that ionosonde records complement spacecraft electron density data by providing detailed profiles with high time and altitude resolution at fixed locations for long periods of time,

draws the attention of URSI and CCIR to the need for an adequate network of ionosondes at key locations supplemented by special purpose temporary stations, and

requests URSI to define these requirements more precisely.

(Note. The URSI Ionospheric Network Advisory Group is aware of these needs and those of CCIR and this Decision has been passed on to the Chairman by the Secretary General of URSI).

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SATELLITE BEACON OBSERVATIONS

A Symposium, cosponsored by COSPAR and URSI, on the Geophysical Use of Satellite Beacon Observations was held at Boston University, USA, from 1 - 4 June 1976. The

Chairman of the Programme Committee was Prof. M. Mendillo (Boston University) who coordinated the event with the support of the Air Force Geophysical Laboratories.

There were 75 registered participants from 18 countries in Africa, Asia, Europe, and North and South America. It was regretted that, apart from one participant from Poland, the Eastern European countries, including the USSR, were not represented.

The main topics discussed are outlined below.

1. Beacon Studies of Ionospheric Structure and Dynamics

J.V. Evans (USA) presented an invited review paper and the contributed papers which followed covered: latitudinal morphology of electron content; the main plasma trough in the topside ionosphere; determination of lunar-dynamo electric fields from electron content measurements; ionospheric experiments of the Apollo-Soyuz Project; gravity waves, the INTASAT satellite, etc.

2. ATS-6 Results and F-Region Disturbances

Invited review papers were presented by: M. Mendillo (USA) on Solar-terrestrial F-region disturbances; and by G. Prölss (F.R. Germany) on Storm-time coupling of the neutral atmosphere and the ionosphere.

Contributed papers dealt with: F-region enhancements induced by solar flares; multi-station observations of F-region response to SC storms; vertical distortions of the night-time ionosphere; interrelated disturbance phenomena at an equatorial station, etc.

3. Scintillations and Irregularities

A.W. Wernik (Poland) presented an invited review paper on scintillations. The contributed papers covered many observational and theoretical studies, including some relating to fluctuations in angle of arrival and phase.

4. Specification of Trans-ionospheric Functions for Engineering Purposes, Equipment and Systems Performance

This subject was introduced in an invited paper by J.A. Klobuchar (USA).

An open discussion was held on the final afternoon and this permitted participants to refer to outstanding problems raised in the preceding sessions, to future plans for observational and theoretical studies, and to

various organisational problems, including the handling of data.

The COSPAR Beacon Satellite Group met during the Symposium and adopted five Resolutions on various aspects of beacon satellite observations.

Copies of the Proceedings of the Symposium will be sent free of charge to those who submitted abstracts. Others who wish to acquire copies from the limited stock remaining should apply to:

Prof. M. Mendillo,
Department of Astronomy,
Boston University,
725 Commonwealth Avenue,
Boston, Mass.02215, USA.

It is intended to arrange a similar Symposium in 1978. Details will be announced in the Circulars of the COSPAR Beacon Satellite Group.

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INFORMATION THEORY

An international Symposium on Information Theory was held at the Ronneby Brunn Hotel in Southern Sweden from 21-23 June 1976. The fact that nearly all the participants were accommodated in the Hotel greatly facilitated informal contacts.

Following the opening of the Symposium by Prof. Zetterberg, Prof. Stumpers reminded the audience of the rôle played by URSI in the development of the subject. An URSI Sub-Commission on Information Theory had been formed in 1950 under the chairmanship of Balth. van der Pol. In it many of the scientists who have later participated in IEEE Symposia made their first contributions to the subject e.g. Elias, Gabor, Siforov and Kailath.

A special invited lecture entitled "Stochastic Processes: the Rise and Development of a Theory" was given by Prof. Cramer, a former President of the University of Stockholm and one of the best known authorities on probability theory and stochastic processes. He discussed the unfolding of this branch of mathematical science since the end of World War I when his own early interest began. The audience greatly appreciated the wisdom of the lecturer and his clarity of expression.

On the second morning, the Shannon Lecture was given by Prof. R.M. Fano (MIT) who reminisced on his own early interest in information theory and also treated the subject of computer communication. Prof. Kailath gave an invited lecture on "A Return to Input-Output Methods in Statistical System Theory". In the evening an interested audience listened to a lecture by Mr. Eskil Block about various aspects of the Swedish way of life and asked many questions.

The Symposium banquet was held on the third evening and the guest speaker was Prof. J.B. Wiesner, President of MIT, who was well known as President Kennedy's scientific adviser at the beginning of the space era and who now saw the possibility that information theory would become a unifying link between mathematics and the life sciences.

Participants could usually choose between lectures in five different halls in each of which 8-10 presentations were given in a half-day session. The abstracts of all the papers were available in book form and copies can be ordered from the IEEE office in New York.

Several of the announced speakers were unfortunately unable to be present and it was especially regretted that none of the guests expected from the USSR could participate. There remained, however, a wide choice of subjects: Shannon theory, pattern recognition, coding theory, detection and estimation theory, speech processing and optical communications. Among the more unusual applications of information theory it seems worth mentioning cryptography, the study of electroencephalograms, the evaluation of ionograms, estimation of subsurface coal-burn volumes, and a model of the human respiratory control mechanism. Clearly the subject is still full of life.

F.L.H.M. Stumpers

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CPEM 1976

The Conference on Precision Electromagnetic Measurements was held in Boulder, USA from 28 June - 1 July 1976 at the invitation of the National Bureau of Standards which celebrates its 75th anniversary this year. About one third of the 270 participants came from 16 countries other than the USA.

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