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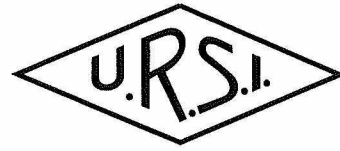
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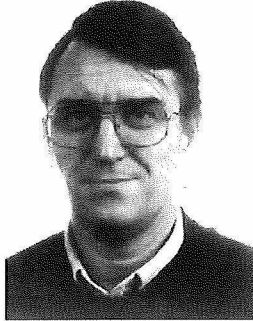
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Editorial



Dear URSI Correspondent,

You have in hand your Bulletin and you will discover that this Autumn issue has a very strong historical character. Indeed we celebrate this year twenty years of international collaboration in the context of the International Reference Ionosphere. For this purpose, in the scientific part of the Bulletin you will find a contribution by our colleague Dr. Bilitza about this collaboration under the umbrella of our Union. A few pages further you will also find a short contribution describing the early years of URSI.



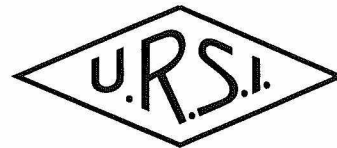
Facing the past we have the future. Indeed one year ahead we already have the General Assembly of our Union. Hence an important part of this issue is devoted to informations and the preliminary programme of this major event so you may organize your future schedules in that perspective.

In the administrative sections, as usual you will find meeting announcements and a report of a conference we have recently sponsored as well as a profile from the US Committee and some information from Commission F.

I wish you a pleasant reading.

Piotr Sobieski, Editor

URSI Homepage



The URSI Homepage, which can be found at URL <http://www.intec.rug.ac.be/ursi>, has the following contents :

A brief overview of URSI with a current list of officers

A more detailed description of URSI

1. origins
2. scientific commissions
3. working groups (including joint and inter-union working groups)
4. standing committees
5. membership of URSI
6. URSI Correspondents
7. URSI publications
8. URSI Statutes in French and in English
9. URSI General Assemblies
10. XXVIth URSI General Assembly, Toronto, Canada, 13-21 August 1999
11. URSI Young Scientist Programme at 1999 General Assembly
12. URSI Awards
13. List of URSI Officers since the foundation of URSI

Conferences

1. URSI Conference Calendar
2. how to announce your conference in these pages
3. rules for URSI Sponsorship

News from the Scientific Commissions

- Commission A
- Commission B (link to the Commission B Homepage)
- Commission C
- Commission D
- Commission E
- Commission F
- Commission G (link to the Commission G Homepage)
- Commission H (link to the Commission H Homepage)
- Commission J (link to the Commission J Homepage)
- Commission K

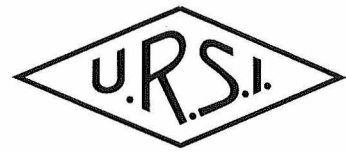
News from the URSI Member Committees

- Links to the sites of our Committees in Australia, Belgium, China, Germany, New Zealand, South Africa, United Kingdom and the USA

URSI Representatives on other Scientific Organisations

Other useful links

The International Reference Ionosphere - Celebrating 20 years of international collaboration under the URSI umbrella*



Dieter Bilitza

Abstract

The year 1998 brings a lot to celebrate for the International Reference Ionosphere (IRI) community. It will be the 30 year anniversary of the birth of the IRI project during the 1968 COSPAR General Assembly, it will be the 20 year anniversary of the first official release of the IRI in the form of an URSI Special Report, and most importantly it will be the year to celebrate the 85th birthday of the founder and father of the IRI project, Prof. Karl Rawer. It is thus a befitting time to look back at some of the mile-stones of this truly international project and at the cast of characters that has pulled it off.

The WWW homepage of IRI is located at <http://nssdc.gsfc.nasa.gov/space/model/ionos/iri.html> A quarterly published IRI Newsletter (editor: Kohichiro Oyama, oyama@bochan.ted.isas.ac.jp) and an electronic mailer (editor: Dieter Bilitza, bilitza@nssdc.gsfc.nasa.gov) provide up to date information to the IRI community.

The early days

Shortly after the Committee on Space Research (COSPAR) was founded in the late fifties, a special COSPAR working group was established to develop a standard atmospheric model. Atmospheric drag estimates and predictions are essential for spacecraft navigation and orbit control, and there was a clear need for international standardization. The first edition of the COSPAR International Reference Atmosphere (CIRA) came out in 1961 and was quickly adopted by the user community. The success of CIRA (1961) and then CIRA (1965) prompted COSPAR to think about a similar undertaking for other parts of the terrestrial environment. At the 1968 COSPAR General Assembly the development of a standard ionospheric model was proposed and accepted as a new COSPAR project. An International

Reference Ionosphere (IRI) is of importance for a wide range of application, including satellite tracking, remote sensing from space and in general for all ground and space techniques that rely on radio waves traveling through the ionosphere. In looking for a lead person to get the ball rolling, the COSPAR Commission showed excellent judgment, finding just the right man for the job. Karl Rawer was elected to become the first chairman of the IRI Task Group and has been the driving force behind the IRI effort ever since. In short, the group's charter read as follows: "*To provide vertical profiles of the main ionospheric parameters for suitably chosen locations, hours, seasons, and levels of solar activity; representing monthly median conditions based on experimental evidence.*" At the General Assembly of the International Union of Radio Science (URSI) the following year, 1969, URSI decided to concur in the IRI project; a major boost for the project in its early infancy. COSPAR's and URSI's interests and objectives in the IRI project are somewhat different as noted in the IRI Terms of Reference (see Table 1). With URSI came a considerable broadening of the IRI scope. URSI's radio propagation needs required a global analytical model and thus the "vertical profiles at specific locations" approach was no longer sufficient.

In setting up the task group K. Rawer brought together a distinguished team of experts representing the different ground and space measurement techniques and the different countries interested in ionospheric research. A well balanced team both in terms of regional interest and in terms of technical and scientific expertise is one of the secrets behind the success of the IRI mission (Table 2 shows the current membership roster). To get IRI off to a good start,

* *This article is dedicated to Professor Karl Rawer on the occasion of his 85th birthday.*

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TABLE 1. IRI Terms of Reference

- *The Task Group was established to develop and improve a standard model of the ionospheric plasma parameters. The model should be primarily based on experimental evidence using all available ground and space data sources; theoretical considerations can be helpful in bridging data gaps and for internal consistency checks.*
- *Where discrepancies exist between different data sources the IRI team should promote critical discussion to establish the reliability of the different data bases.*
- *IRI should be updated as new data become available and as old data bases are fully evaluated and exploited.*
- *IRI is a joint working group of COSPAR and URSI. COSPAR's prime interest is in a general description of the ionosphere as part of the terrestrial environment for the evaluation of environmental effects on spacecraft and experiments in space. URSI's prime interest is in the electron density part of IRI for defining the background ionosphere for radiowave propagation studies and applications.*

it was important to come up with a set of representative profiles quickly. Rawer succeeded in doing this by drawing from the expertise of his staff at the Institute für Physikalische Weltraumforschung (IPW, Institute for Physical Space Research) in Freiburg, F.R.G. that he had helped to establish in 1969 and whose director he was from the beginning. A preliminary set of IRI tables was presented at the 1972 URSI General Assembly (Rawer et al., 1972). Composite ionosonde profiles, incoherent scatter data, and total electron content (TEC) Faraday measurements played a dominant role in establishing this first precursor of an IRI model. Working at the institute during the university's summer break, I helped compile these profiles and thus had my first brief encounter with IRI. Those were busy and exciting times at the institute. Everybody was in one way or another involved in preparations for the first German AERonomy Satellite, AEROS-A, that was launched in December 1972;

a follow-on satellite, AEROS-B, was launched in 1974. K. Rawer was one of the fathers of the mission and its German project scientist (Rawer, 1986). Three of the five experiments were developed at the institute by his science staff. In the years to come data collected by the AEROS in-situ experiments would constitute an important and easily accessible data pool for updates of the IRI model.

One of the most challenging tasks in developing an empirical model, is solving the right data question for regions and/or time periods where conflicting results exist for a certain parameter. Early measurements of plasma temperatures, for example, were difficult to interpret since the results of in-situ probes were up to a factor of two higher than observations by incoherent scatter radars. Improvements in probe design and in radar data reduction led to good agreement in the early seventies. In such cases much sensitivity and insight is required to get the

TABLE 2. Membership Roster of the IRI Working Group

D. Bilitza (U.S.A.), Chairperson,
B. Reinisch (U.S.A.), Vice-Chairperson (URSI)
K. Oyama (Japan), Vice-Chairperson (COSPAR)

Members

Asia: **K. Igarashi (Japan), A. P. Mitra (India), B.C.N. Rao (India), S. Watanabe (Japan)**

Australia: **L. McNamara, B. Ward, P. Wilkinson**

North America: **D. N. Anderson, K. Bibl, K. Champion, W. Hoegy, J. Sojka, V. Wickwar (all U.S.A.)**

South America: **M. Abdu (Brazil), M. Mosert de Gonzalez (Argentina), S. Radicella (Argentina/Italy)**

Europe: **A. Alcayde (France), P. Bradley (U.K.), M. Friedrich (Austria), R. Hanbaba (France), E. Kopp (Switzerland), I. Kutiev (Bulgaria), L. Triskova (Czech Rep), K. Rawer (F.R.G.), M. Rycroft (U.K.), W. Singer (F.R.G.), B. Zolesi (Italy)**

Russia: **Y. Chasovitin, A. Danilov, T. Gulyaeva, G. Ivanov-Kholodny, E. Kazimirovsky, P. Kishcha, A. Mikhailov**

TABLE 3. IRI Workshops and Proceedings

year	location	publication
1971 [†]	Seattle, USA	Space Res. XII, 1229-1335, 1972
1973	Konstanz, FRG	*, Akademie-Verlag, Berlin, 1974
1974 [†]	Sao Paulo, Brazil	Space Res. XV 295-334, 1975
1980 [†]	Budapest, Hungary	WDC-A-STP, UAG-90, 1984
1982 [†]	Ottawa, Canada	Adv. Space Res. 2, #10, 1982
1983	Stara Zagora, Bulgaria	Adv. Space Res. 4, #1, 1984
1984 [†]	Graz, Austria	Adv. Space Res. 5, #7, 1985
1985	Louvain, Belgium	Adv. Space Res. 5, #10, 1985
1986 [†]	Toulouse, France	Adv. Space Res. 7, #6, 1987
1987	Novgorod, Russia	Adv. Space Res. 8, #4, 1988
1988 [†]	Espoo, Finland	Adv. Space Res. 10, #8, 1990
1989	Abingdon, UK	Adv. Space Res. 10, #11, 1990
1990 [†]	The Hague, Netherlands	Adv. Space Res. 11, #10, 1991
1991	Athens, Greece	Adv. Space Res. 12, #7, 1992
1992 [†]	Washington, USA	Adv. Space Res. 13, #3, 1993
1993	Trieste, Italy	Adv. Space Res. 14, #12, 1994
1994 [†]	Hamburg, FRG	Adv. Space Res. 16, #1, 1995
1995	New Delhi, India	Adv. Space Res., 18, #6, 1996
1996 [†]	Birmingham, UK	Adv. Space Res., 20, #9, 1997
1997	Kühlungsborn, Germany	in preparation

* Title: *Methods of Measurements and Results of Lower Ionosphere Structure*

[†] *Committee on Space Research (COSPAR) General Assembly*

experimenters to compare their results and to discuss possible error sources. The IRI team never shied away from these (often painful) discussions and thanks to the experience and dedication of its chairman, managed to resolve a number of conflicts. A particularly difficult problem is the modeling of D-region electron density where ground and space measurements vary by a factor of ten and more. To tackle this problem, K. Rawer organized a special Symposium on Measurements in the Lower Ionosphere in Konstanz, F.R.G., in 1973 (Rawer, 1974). The guidelines established at the meeting were the starting point for all future IRI modeling efforts in the D-region:

- * *The most reliable profiles are those derived from simultaneous Langmuir probe and radio wave propagation (differential absorption and/or phase) experiments flown on the same rocket.*
- * *All the ground-based techniques (VLF, LF) rely on inversion techniques and introduce the additional ambiguity of an assumed collision frequency profile.*

IRI Meetings and Personalities

Beginning with the Konstanz meeting, IRI-related workshops became the prime venue for development and improvement of the model (see List of Workshops in Table 3). Under the guidance and leadership of the IRI Working Group these highly focused yet informal meetings were exemplary in their productivity and accomplishments; a

trademark being the final discussion with K. Rawer setting out the course for future improvements and getting everybody to offer a helping hand, be it voluntarily or involuntarily. The truly international spirit of the IRI project is demonstrated by the typically more than 20 countries represented at the workshops. Being jointly sponsored by COSPAR and URSI, IRI workshops provide a unique meeting ground for members from the different ionospheric communities (ionosonde/ absorption, incoherent scatter radar, spacecraft experiments).

Many people and personalities contributed to the IRI success. The group photos in Figures 1 to 4 provide a glimpse of the breath and depth of the IRI effort. Several members need to be specially mentioned because of their importance for the IRI project. Lucien Bossy, the second IRI Chairman and scientist par excellence from the grand old school of Prof. Lemaitre dedicated the last part of his long science career to the IRI effort. He applied his mathematical skills to help out on many IRI modeling fronts. His ultimate death in 1996 has deprived us of a tireless IRI advocate and a kind and unselfish colleague. Outspoken and charismatic, Cyril Serafimov, helped the IRI project to steer safely through occasionally hostile council and commission meetings. Even after climbing high in the international science establishment he would never miss a IRI workshop. The IRI team was saddened by his untimely death just after having overcome political adversity in his home country Bulgaria.



Figure 1 - Participants at IRI Workshop in Abdington, U.K. in 1989.



Figure 2 - Group photo of participants of 1993 IRI meeting in Trieste, Italy.



Figure 3 - The 1995 IRI meeting in New Delhi was part of the 75 year Jubilee celebration of the Indian Academy of Sciences.

In Japan first Prof. Kunio Hirao and then his former student Kohichiro Oyama (IRI Vicechair) carried the IRI torch. Stimulating IRI-related studies in their home country they made sure that Japanese satellite data were used for IRI updates. In Russia Tamara Gulyaeva (IRI Vicechair for many years) and Alexei Danilov were the main IRI proponents and got many Russian colleagues interested and involved in the IRI modeling effort. Tamara spearheaded the half-density point that is still used in modeling the bottomside electron density profiles. Alexei and his co-

workers have developed and improved major elements of the IRI ion density model. Larry Brace was a regular at the early IRI meetings and his Langmuir probe data from several satellites of the Explorer series became one of the pillars of the IRI model. Peter Bradley provided the group with insights from the activities of the International Telecommunication Union (ITU) and its Consultative Committee on International Radiopropagation (CCIR) panels, and he and his countryman William Roy Piggott took turns as co-editors of Karl Rawer on many of the IRI



Figure 4 - The 1997 IRI Workshop was held jointly with the European COST 251 Project.

issues of *Advances in Space Research*. Not enough can be said in praise of the laborious and unpaid editing work of Karl and his many co-editors. The IRI ASR issues (Table 3) tell the story of the IRI improvement process; they are the cornerstones of the IRI path to success. Bodo Reinisch (IRI Vicechair) brought the treasure-trove of data from his worldwide-distributed Digisondes to the IRI table and has injected new life into many IRI improvement efforts not only through his data but also through his new ideas, infectious enthusiasm, and diligent follow-through. Sandro Radicella has helped the IRI effort not only with data from his home country Argentina but also with data available through his adopted new home at the International Center for Theoretical Physics (ICTP) in Trieste, Italy. After the successful 1993 IRI Workshop at ICTP, Sandro has organized annual IRI Task Force Activities at ICTP that have led to major improvements of the F2 bottomside profile.

As the IRI Chairman of the nineties I am humbled by this illustrious group of predecessors and IRI members. Working at the NASA's National Space Science Data Center (NSSDC) I have the great advantage of direct access to NASA's large data archive and the benefit of the great systems and software expertise at NSSDC, perfect for IRI-related ionospheric modeling work.

Different editions of IRI

From the beginning Rawer was a strong proponent of computer-accessibility of the evolving model, a farsightedness that paid off in the long run and contributed considerably to the popularity of IRI in the user community. One should keep in mind that those were the days of punched cards, paper tape, large mainframes and with still a considerable computer illiteracy in the science community. Making the model software accessible in computer-readable form to a wide user community was still a relatively novel approach; for example, CIRA continued to be presented primarily in the form of published tables until the release of CIRA-86 in the late eighties. The first widely distributed edition of IRI was released in 1978 (IRI-78) as an URSI Special Report (Rawer et al., 1978) and also as ALGOL and FORTRAN computer codes on punched cards and tape.

Using the CCIR (1967) world maps for the F2 peak parameters foF2 and M(3000)F2, IRI-78 was a major step forward towards a truly global representation of the ionosphere. By incorporating the maps of the CCIR, recommended for international use by the ITU and URSI, the IRI chairman and group underlined their support and concern for radio propagation studies and applications. Reporting about the discrepancies found between data and the model maps, Rawer was a strong proponent of renewed mapping efforts in the framework of a special URSI working group. Such a group was established and succeeded under the chairmanship of Kenneth Davies and later Charles Rush, in developing a new set of world maps based on a much better extrapolation scheme for the data-sparse ocean regions (Rush et al., 1989). The improved accuracy over the oceans, however, came at the expense of somewhat less

accurate maps for the continents. Different from CCIR who decided to stick with its older maps, the IRI model now provides access to both the older CCIR and the newer URSI maps, thus allowing users to utilize the superior accuracy of the URSI maps over the oceans. In recent years the IRI group has taken a more active role in the mapping of F peak parameters with particular emphasis on regional mapping; one example is the close relationship with the European PRIME team that culminated in a joint Workshop in 1997 at the Institute for Atmospheric Physics in K hlungsborn, Germany.

Several improvements and corrections of IRI-78 led to the release of Version 7 of the IRI FORTRAN program in 1979. To assist scientists with no or only limited computer access (particularly in developing countries), it was decided to pursue the possibility of generating an IRI-79 source book with a large number of plots and tables. The World Data Center A for Solar-Terrestrial Physics (WDC-A-STP) in Boulder, Colorado, offered its help and a 243-page WDC-A-STP report entitled IRI-79 was published in November of 1981 (Rawer et al., 1981). For years to come this report served as the standard IRI reference in printed form, even though the IRI program quickly evolved from Version 7 to Version 12 over the next decade.

The IRI-90 was published in November of 1990 as a special report (Bilitza, 1990) of the National Space Science Data Center (NSSDC); WDC-A-R&S is the international arm of NSSDC. By now the IRI project had carried ample fruits and IRI had become a household word in ionospheric physics. During the annual workshops the model was steadily improved using data from U.S., European, Russian, and Japanese satellites and rockets, and the long-term data records accumulated by ground-based techniques. In step with the electronic revolution of the past decade, the IRI software was first made accessible on diskettes for use on Personal Computers (PCs), then also on computer networks (NSI/DECnet, Internet, etc.) for anonymous ftp retrieval and for direct on-line computations, and now also on the WorldWideWeb. The most recent version of the model, IRI-95 (Version 13), is available from nssdc.gsfc.nasa.gov in directory models/ionospheric/iri/iri-95/ and values can be calculated directly online on the WorldWideWeb (WWW) at <http://nssdc.gsfc.nasa.gov/space/models/iri.html>.

The changes and improvements leading to the IRI-95 version of the model were described by Bilitza (1997). Several efforts are now underway that are focusing on future improvements of the IRI model. A parameter-specific matrix of these activities is given in Table 4. In addition IRI teams are involved in the development of algorithms for the updating of IRI with real-time measurements of ionospheric parameters, e.g., Komjathy et al. (1998) are using GPS measurements of the ionospheric electron content to update the IRI electron density profile.

IRI Usage and Applications

The more than 2000 accesses that NSSDC's IRI sites (WWW pages and anonymous ftp) register each month from a broad spectrum of users, underline the importance

TABLE 4. - IRI Projects

	Electron Density	Ion Composition	Electron/Ion Temperatures
Upper Ionosphere	FUTURE: New Topside Model - more than double BENT data base - more segments than BENT - dynamical segment boundaries	FUTURE: O ⁺ /light ion transition	FUTURE: T _e at 600km from HINOTORI data
Middle Ionosphere	NEXT VERSION: - B ₀ Table with good low latitude and high solar activity - New B ₁ Table - Include F1 occurrence probability	NEXT VERSION: Danilov & Smimova (1995) FUTURE: O ⁺ /molecular ions transition height	
Lower Ionosphere	NEXT VERSION: New Options: - Friedrich & Torkar (1992, 1995) dependence on neutral - Danilov et al. (1995) no solar activity variation; includes Winter Anomaly and Stratospheric Warnings	NEXT VERSION: Danilov & Smimova (1995) includes Cluster ions FUTURE: - molecular/cluster ion transition height - cluster/molecular ion ratio (f ⁺) - negative ions/electron ratio (Λ)	T _e = T _i = T _n

Additions: Plasmasphere, Ion Drift, Spread-F

of this truly international project. The reliability and easy usability of the IRI model have led to a broad spectrum of applications in science, engineering, and education. A few examples:

- IRI is used to initialize and test tomographic methods and networks (e.g., Huang et al., 1997).
- IRI has been used to eliminate ionospheric time delays from satellite altimeter measurements of sea surface heights (e.g., Geosat, ERS-1, -2).
- IRI is used in the GEODYN satellite tracking program.
- IRI F2 peak heights are being used to study the global climatology of meridional winds (Miller et al., 1997).
- IRI was used for the analysis and prediction of HF skywave characteristics (e.g., Szuszczewicz et al., 1993)
- IRI F2 peak heights are used to improve the conversion process of GPS measurements to vertical Total Electron Content (TEC) (Komjathy et al., 1998).
- Takeda et al. (1986) have used IRI for the computation of conductivity profile and height integrated conductivity in their study of the ionospheric dynamo.

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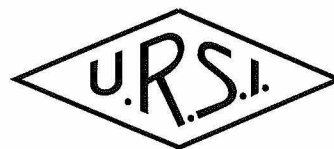
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A brief history of URSI

I - The early years



Thomas B.A. Senior
President of URSI

The origins of URSI date back to the early days of radio and are intimately associated with the country of Belgium. At the beginning of this century, King Leopold II was concerned with the problem of communication between Belgium and the Congo, and across the vast reaches of that African colony. In 1907 the Marconi Company had carried out some wireless telegraphy experiments not far from the mouth of the river Congo, but these proved unsuccessful because of equatorial (and other) effects. The following year, Professor Robert B. Goldschmidt of the University of Brussels began some wireless telephony experiments between the dome of the Palace of Justice in Brussels and balloon-borne receivers near Liege and Namur, and in view of this work, the King asked Goldschmidt to study the problem of equatorial communication, with emphasis on the separation of the signals from noise. The resulting experiments soon led to the establishment of a series of radio stations linking the main cities of the Congo. Meanwhile, in 1910, Goldschmidt set up a School for Wireless Telegraphy in the park of the Royal Palace in Laeken to develop improved equipment and to train the necessary staff. By 1911, the School had become an active and well-equipped center, and Goldschmidt had installed a 500 KW transmitter on the same site for communication with the Congo.

It was now apparent that progress in radio would require international cooperation, and at the Conference Internationale de l'Heure in Paris in 1912, Goldschmidt and Professor K. Schmidt of Germany submitted a joint proposal for the creation of a central body to coordinate studies of the propagation of electric waves, radio telegraphy measurements, and studies on related subjects. Goldschmidt offered to place the station and laboratory in Laeken at the disposal of the new body, as well as a sum of 50,000 Belgian francs. A year later, on 13 October 1913, nine scientists from six European countries met in Brussels to establish what they called the International Commission on Scientific Wireless Telegraphy, abbreviated T.S.F.S. (from the French, *Télégraphie Sans Fils Scientifique*). The scientists were all radio pioneers who knew each other well. They were Professor Robert Goldschmidt from Belgium, Colonel (later General) Gustave A. Ferrié and Professor Henri Abraham from France, Dr. William Duddell from England, Professor G. Vanni from Italy, Professor Benndorf from Austria, and Father Wulf from the Netherlands. They formed a small congenial group, but it would appear that the first five were the leaders in the new venture. The first meeting of the new organization was held in Brussels in

April 1914 and was attended by 15 scientists from six countries. The first three National Committees (Belgium, France and Great Britain) were recognized, and a Board of Officers was constituted as follows:

Honorary President: H.M. Albert I, King of Belgium

President: W. Duddell (U.K.)

Vice-President: M. Wien (Germany)

Secretary General: R.B. Goldschmidt (Belgium)

Delegates from Austria, Germany and the Netherlands also attended the meeting at which the Statutes (5 Articles) were adopted. These were published in the *Bulletin de la Commission Internationale de Télégraphie Sans Fils Scientifique*, No. 1, Mai-Juin 1914.

World War I now brought a halt to the activities, and when, in 1919, regular contacts were again possible, the Commission was reconstituted as the *International Union of Scientific Radio Telegraphy*, with the abbreviation U.R.S.I. (from the French *Union de Radiotélégraphie Scientifique Internationale*). Like similar Unions in other sciences such as astronomy, geophysics and chemistry, it was organized under the auspices of the International Research Council (which later became the International Council of Scientific Unions). Initially there were just the three National Committees that had constituted the T.S.F.S., but by early 1922, Italy, Norway and the U.S.A. had joined. The President was G.A. Ferrié and the Secretary General was R.B. Goldschmidt. The first General Assembly was held in Brussels in 1922 at which four commissions were established:

I Measurement Methods and Standardization

II Radio Wave Propagation

III Atmospheric Perturbations (or Atmospherics)

IV Liaison with Operators, Practitioners and Amateurs

There is no list of participants available, and no Proceedings were published (which is why the Proceedings of all General Assemblies are numbered one less than the Assemblies themselves). However, in the minutes of the meeting it was noted that "in view of the moral and technical importance of the Commission on Measurement Methods and Standardization, as well as the usefulness of its work for the public at large, the Commission should be numbered one since it might draw governmental subsidies."

The next General Assembly was held in Washington, DC, in October 1927 and organized by the U.S. National Committee. The hard cover Proceedings contain all the speeches and lectures, as well as a transcript of the technical discussions, and are of interest not only as an indication of the scientific knowledge at the time (for example, the

origin, nature and variability of the Kennelly-Heaviside layer was a major topic of discussion), but also in showing how the organizational structure of U.R.S.I. has evolved. The Assembly lasted three weeks (!) and started with an Opening Session very similar to what we have today, and ended with a Closing (general) Session at which all Union business decisions were taken. There was a two-part Public Session (at 2:30 and 8:30 p.m.) where 22 technical papers were presented, and the rest of the days were devoted to meetings of the Commissions, with no activities in parallel. Membership in the Union had now increased to 11, with the addition of National Committees in Australia, Japan, the Netherlands, Portugal and South Africa, but the last two did not participate in the Assembly, and attendance was limited to the delegates and scientists from the remaining nine member countries, totaling 61.

Most of the Closing Session was devoted to resolutions prepared by an Administrative Committee relating to the organization of the Union, and a few items stand out.:

- General Assemblies were to be held each year with the next one in Brussels in 1928.
- The Officers were:
President: G.A. Ferrié (France)
Vice Presidents:
V. Bjerknæs (Norway) - I
L.W. Austin (U.S.A.) - II
W.E. Eccles (U.K.) - III
G. Vanni (Italy) - IV
Secretary General: R.B. Goldschmidt (Belgium)
- They would hold office until the end of the second General Assembly following their election, and would be eligible for immediate re-election. They constituted the Bureau (our present Board). There were four Vice Presidents because each chaired a Commission as indicated above. However, it was observed that, in the future, a Commission Chair may not be the best person to serve as a Vice President, and that the procedure limited the number of Commissions. This last point was particularly relevant since it was felt that a fifth Commission was required that would, in essence, cover all topics not explicitly covered by the other four. The new Commission was approved with the provisional title *Commission on Oscillations*.
- An Executive Committee was proposed consisting of the Bureau and a representative from each National Committee, but this was felt to be objectionable because it could lead to two or more members from the same country. The stated reason for the opposition was not because of the greater weight given to that country, but because the representatives may not be of the same opinion, and this could create confusion. The matter was therefore deferred.
- The name of the Union also came up for discussion, with some objecting to the word *scientific*, others to *telegraphy*, and still others to *radio*, since this last word was not part of the French language. On the other hand, the initials U.R.S.I. were becoming known, and it was regarded as undesirable to change these. A resolution

was approved that in view of the restrictive sense of the word *telegraphy*, the 1928 General Assembly should consider changing the name of the Union.

- The minimum annual dues were set at 100 francs, but all National Committees were asked to contribute as much as they could. Many obviously did, and in 1927 the contributions totaled 7,300 francs. In spite of this relatively small amount, the Union was financially sound, helped considerably by a grant for 50,000 francs which Goldschmidt had himself provided to support the 1922 General Assembly in Brussels. We note in passing that the cost of a General Assembly was borne by the host National Committee. As reported by the Secretary General (who was also the Treasurer), the annual expenses of the secretariat, including the cataloguing and distribution of the technical documents received from the National Committees (this was a major service that the Union provided), and the salary of an adjoint Secretary General, were less than 100 U.S. dollars in 1927, but there was some concern about how to cover the cost of the Assembly Proceedings.

The General Assembly in Brussels in 1928 was a more abbreviated affair and lasted only five days. However, the format was the same as before, and with the creation by the King of Belgium of a 100 million franc National Scientific Research Fund, it was no longer necessary for Goldschmidt to cover personally the cost of an Assembly in Belgium. There were 41 attendees from eight member countries (Australia, Norway and Portugal did not participate). Some of the business matters that had been left unresolved in Washington were now decided. The name of the Union was changed to *Union Radio Scientifique Internationale*, thereby preserving the initials U.R.S.I. The fifth Commission was titled *Radiophysics* with Dr. B. van der Pol (the Netherlands) as Chairman, and Dr. D.W. Dye (U.K.), Professor E. V. Appleton (U.K.) and Professor A.E. Kennelly (U.S.A.) were elected Chairmen of Commissions I, III and IV respectively. Although the coupling between the positions of the Vice President and Commission Chair was now severed, Professor R. Nagaoka (Japan) was elected as a fifth Vice President. The other members of the Bureau were re-elected in spite of the President's expressed desire to be replaced. An Executive Committee was established consisting of the President (not the entire Bureau) and a representative from each of the 11 National Committees, and national representatives to each of the five Commissions were named. Finally, and contrary to the resolution approved in Washington, it was decided to hold the next General Assembly in 1930 (indeed, the U.K. representative proposed that Assemblies should *not* be held more frequently than *every two years*), but the site was not chosen.

In the event the General Assembly was not held until 1931 in Copenhagen by which time four more National Committees had been established: Denmark, New Zealand, Sweden and Switzerland. There were only a few minor organizational changes in the Union. A Finance Committee was created (it was merged with the Executive Committee three years later) and Dr. E.H. Rayner (U.K.) was elected

Chairman of Commission I, but all other office holders remained the same. However, some other matters are worth noting. As a means of focussing geophysical research on the polar regions, 1932-33 had been designated the Second International Polar Year, coming 50 years after the first, and U.R.S.I. established a Committee (occasionally referred to as a Sub-Commission) to develop a program of high latitude radio observations in coordination with the year. There were also discussions about how U.R.S.I. could collaborate with the *Comité Consultatif Internationale Technique des Communications Radio-électriques* (C.C.I.R.), which had been set up by the International Radiotelegraphy Conference in Washington in 1927. Though U.R.S.I. had been invited to establish a permanent relationship, this was difficult since C.C.I.R. had decided not to have a secretariat. Nevertheless, the research programs that C.C.I.R. was developing were of profound interest to U.R.S.I., and since several scientists were involved with both organizations, it was unfortunate that the next meetings of the two bodies were scheduled at the same time. We also see the first mention of the Ursigram service in which coded daily bulletins of ionospheric, geomagnetic and astrophysical data are broadcast by radio. The program originated in actions by the French and U.S. National Committees and continues to this day. In 1930, the U.S. Navy started using a high power transmitter, and there was a discussion about adding new information, including data from other countries.

The fifth General Assembly took place in London in 1934 and marked some significant changes in the leadership and structure of U.R.S.I. General Ferrié had died on 16 February 1932 and Dr. L.W. Austin (U.S.A.) had been appointed in his place, but when he died only four months later, Professor A.E. Kennelly (U.S.A.) became the President. Unfortunately, due to illness he was unable to attend the Assembly, and Dr. W.E. Eccles (U.K.) agreed to preside. There were several changes to the Statutes. All members of the Bureau (who must be from different countries) would now hold office until the end of the next ordinary General Assembly following that at which they were elected, with the President eligible for immediate re-election. Instead of being appointed by the Executive Committee, the Commission Chairmen (or Commission Presidents, as they were referred to) would be elected by the General Assembly on recommendation by the Executive Committee, and could also be re-elected. Concerning the General Assemblies themselves, they would be held every two years *if possible*.

Morocco had now become the 16th member of the Union, but the financial situation had become desperate, and was a major concern to the Executive Committee. The annual member dues ranged from 700 to 5600 francs depending on the category of membership, but had remained about the same for the past few years. The net income was about 35,000 francs per year, but the annual expenses of the secretariat had crept up to over 54,000 francs, and at the time of the Assembly the disposable funds were down to 16,000 francs. This was in part because of the growing activity of the Union, and every Commission now had at

least three Sub-Commissions devoted to specialized topics, with a consequent increase in the work load of the secretariat.

It was at this General Assembly that the title of Honorary President was instituted. The idea was first raised at the 1928 General Assembly but not pursued then, and the Secretary General now justified it as a way of retaining the expertise of those "elder statesmen" who could no longer serve as an officer because of the requirement that no two members of the Bureau could be from the same country. The designation of Dr. W.E. Eccles and Professor A.E. Kennelly as Honorary Presidents (a lifetime appointment) was approved with acclamation in spite of the fact that the Statutes made no mention of the position! The new officers of the Union were:

President: Professor E.V. Appleton (U.K.)

Vice-Presidents:

Dr. J.H. Dellinger (U.S.A.)

Professor R. Mesny (France)

Professor H. Nagaoka (Japan)

Professor B. van der Pol (the Netherlands)

Secretary General: Dr. R.B. Goldschmidt (Belgium)

The request for the Secretary General to hold his position *in perpetuity* was politely declined by Dr. Goldschmidt on the basis that no human being could do so. The Commission Chairmen elected were I: Dr. E.H. Rayner (U.K.), II: Dr. J.H. Dellinger (U.S.A.), III: Professor E.V. Appleton (U.K.) and V: Dr. B. van der Pol (the Netherlands). We observe that all but one were members of the Bureau, and the Commission IV position was left vacant.

Four years were to elapse before the Italian National Committee hosted the next General Assembly in September 1938. Its duration was approximately the same as that of most prior Assemblies, but instead of being spread over two weeks, the meetings were confined to a single calendar week. The Opening Session was on a Sunday and the Closing Session on the following Saturday, and we note that this is the format for the 1999 General Assembly in Toronto. For reasons that are not evident, the Closing Session was in Rome, but the rest of the meetings were in Venice.

It was an Assembly without the guidance of Dr. Goldschmidt. After 22 years of devoted service to U.R.S.I. and its predecessor organization, he had died in 1935, and pending ratification by the Assembly, Professor M. Philippon (Belgium) had been appointed Secretary General. We also see reference to Captain A. Dorsimont and Major (later Colonel) E. Herbays as assisting the secretariat, and each would later serve as Secretary General. As a result of strict economies by the secretariat and an increase in the member dues, the financial situation had improved, and the annual revenue was now 60,000 francs. This allowed the publication of a monthly U.R.S.I. Bulletin starting January 1938. We also note the admission of Germany to the Union, bringing the membership to 17. All the Officers and Commission Chairmen were re-elected. In addition, Professor G. Pession (Italy) and Professor J. Zenneck (Germany) were elected Vice Presidents, increasing the number to six, and Professor G. Vallauri (Italy) was chosen to fill the vacant position of Chairman of Commission IV.

The next General Assembly was scheduled for 1940 in Paris, but World War II now intervened. Radio science and, indeed, the whole world would change drastically before the French National Committee could fulfil its commitment.

Because of the key role played by Professor Robert B. Goldschmidt in guiding both T.S.F.S. and U.R.S.I., it is appropriate to end with a few words about him. He was a remarkable man with a wide range of interests and accomplishments. He was born in Brussels on 4 May 1877 and after graduating from the University of Brussels with a degree in chemistry, he obtained the degree Doctor of Science from the University of Göttingen. He was interested in all branches of science, particularly those that could be of benefit to mankind, and it is not surprising that the new science of radio attracted his attention. In 1900, he established a laboratory for the study of radio phenomena at the University of Brussels where he later became a Professor, but his interests were not limited to this. He designed and built the first Belgian airship, which had its maiden flight in 1909. He also designed a wood-burning locomotive for use in the Belgian Congo, and in his moments of leisure, invented a hydro-plane capable of carrying a ton of freight and four passengers.

As a co-owner of the Bank Degroof, he had the financial resources to pursue his passions, and he was the principal supporter of the Union both spiritually and financially. During his service as Secretary General of T.S.F.S. and later U.R.S.I., the secretariat was located in his own office at 54 Avenue des Arts in Brussels. His family was also involved, and at the 1927 General Assembly, the President acknowledged the assistance of M. Paul

Goldschmidt as "adjoint Secretary General." Robert Goldschmidt held the position of Secretary General of U.R.S.I. until his death on 28 May 1935, and was succeeded in that post by Professor Maurice Philippson, of the University of Brussels, who was Goldschmidt's brother-in-law and also a co-owner of the Bank Degroof (which continues as U.R.S.I.'s bank to this day).

To commemorate the key role played by Goldschmidt in establishing the Union and nurturing it in its early years, it was announced that each General Assembly (starting in 1960) would feature a special scientific lecture in his honor. It is unfortunate that this tribute to our "founding father" has been allowed to lapse.

Acknowledgements

The author is indebted to Mme. Yela Stevanovitch, former Executive Secretary of U.R.S.I., for assistance with this article, particularly in connection with Professor R.B. Goldschmidt.

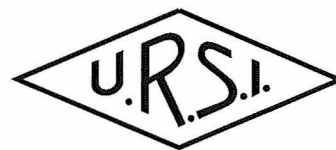
For more information about Goldschmidt, see

- *Proceedings of U.R.S.I. General Assembly V*, pp. 4-5.
- *Conférence à la mémoire de R. Goldschmidt*, U.R.S.I., 1960, pp. 15-17.

In addition to the General Assembly Proceedings, the following contain information about the early years of U.R.S.I.:

- *Golden Jubilee Memorial*, U.R.S.I., 1963 (this book includes a photograph of the participants at the 1914 meeting of T.S.F.S.)
- "U.R.S.I. - From 1922 Until Today," by P. Bauer, *Space and Radio Science Symposium*, U.R.S.I., 1995.

Toronto General Assembly 1999



PRELIMINARY SCIENTIFIC PROGRAMME

The scientific programme of the General Assembly includes sessions of individual commissions plus joint sessions organized by two or more commissions on topics of common interest. In addition, three General Lectures, a Historical Session, a Public Lecture, and eleven Tutorials will be delivered by distinguished scientists.

General Lectures

Three one-hour General Lectures of interest to the broad URSI community will be presented.

- SPACE WEATHER, L. J. Lanzerotti (U. S. A.)
- SPACE-TO-GROUND INTERFEROMETRY FOR RADIO ASTRONOMY, H. Hirabayashi (Japan)

- FUTURE GENERATIONS OF MOBILE COMMUNICATIONS - THE SCIENTIFIC ASPECT, J. Bach Andersen (Denmark)

Historical Session

A Historical Session will take place on Sunday, August 15.

Tutorials

The aim of the Tutorials is to review topics which have been given particular attention in recent years.

Poster Sessions

The poster sessions will be held on Tuesday, August 17, and Thursday, August 19, 1999 from 4.30 to 7 p.m.

ALL AUTHORS WISHING TO PRESENT A PAPER IN WHATEVER FORM SHOULD SEND A ONE-PAGE ABSTRACT TO THE URSI GA '99 MANAGEMENT OFFICE IN ACCORDANCE WITH THE GUIDELINES GIVEN IN "INSTRUCTIONS FOR ABSTRACT" TO ARRIVE BY JANUARY 15, 1999,

For further information, copies of the First Announcement and submittance of the one-page abstract :

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Detailed instructions for submission of contributions can be found on the URSI GA Homepage at URL http://www.nrc.ca/confserv/ursi99/sitetwo/author_e.htm

COMMISSION A: ELECTROMAGNETIC METROLOGY

A1 - NEW RF-TO-SUBMILLIMETER WAVE STANDARDS AND MEASUREMENTS

Recent research and developments in the field of RF to submillimeter wave standards and measurements will be reviewed by reports and contributions from different countries.

U. Stumper (Germany) and Q. Balzano (USA)

A2 - MATERIALS MEASUREMENTS

The session will cover some of the more difficult aspects of RF and microwave measurements of electromagnetic materials, including magnetic materials. Papers will include (i) medical dielectric imaging, (ii) food products, electroheat and microwave oven heating, (iii) radio wave absorbing material characterization, including measurements of magnetic and anisotropic properties, and (iv) attempts that are made to provide traceability for electromagnetic material measurements.

S. Riad (USA) and R. Clarke (UK)

A3 - TIME AND FREQUENCY STANDARDS

The research in time and frequency standards has been very fruitful and has covered all the wide spectrum range from the microwave to the optical regions. Of great interest has been the progress obtained in the Cs fountain at LPTF with a declared accuracy in the low 10^{-15} level. Successful research has been pursued also on Cs thermal beams which use magnetic or optical atom selection and in the high-C-field scheme. Moreover, cold atom standards in the microwave and optical regions are under development with advancements in stabilities and accuracies. Improvements in other areas, such as long-term stability of H masers and

short-term stability of buffer-gas cell microwave standards using laser diode pumping will also be outlined.

K. Dorenwendt (Germany) and E. Bava (Italy)

A4 - LASER STABILIZATION

Laser cooling and trapping of atoms and ions combined with modern concepts of optical frequency synthesis have introduced new impacts to the field of frequency stabilized lasers. This session will address the activities in this field and will also review the development of small efficient stabilized lasers like solid state and semiconductor lasers. Part of this session is devoted to the most recent extension of frequencies, recommended by the CIPM for research in physics, for the realization of the meter, and other applications.

J. Helmcke (Germany) and E. Bava (Italy)

A5 - TIME KEEPING AND TIME TRANSFER

In the frequency standards field, a quantum jump in accuracy is under way with the diffusion of attempts toward Cs fountains and new devices. But the possibility to investigate both the short and long-term accuracy and stability is hampered, beside the limited number of the existing devices of the new generation, by inadequate capabilities in comparing the different standards kept in remote laboratories. Two problems to be solved are: for the short-term (one day) an increase of at least an order of magnitude in the comparison accuracy is needed, and for the long-term research, the basic ingredient to be improved is time keeping, i. e. time scale formation with suitable algorithms. The state-of-the-art of two-way microwave and laser comparisons via satellite with subnanosecond accuracies and the most recent progress in time-scale formation will be discussed.

S. Leschiutta (Italy) and D. Kirchner (Austria)

A6 - OPTICAL AND FIBER MEASUREMENT

The session will focus on the recent topics about the measurement and characterization of optical fibers and related components including passive and active devices for telecommunication, novel optical and fiber sensors, optical measurement systems, and standards.

H. Yajima (Japan) and A. M. Scheggi (Italy)

A7 - QUANTUM METROLOGY

This session includes developing nuclear magnetic resonance-based current and voltage standards and measurements of the proton gyromagnetic ratio, absolute ampere, absolute volt, absolute farad and ohm, quantized-Hall resistance, and fine-structure constant. Particular interests are in refining current techniques and/or initiating new experiments to increase knowledge of these quantities or other constants of comparable importance, especially those involving the electrical units in some way.

J. Norgard (USA) and R. Yell (UK)

A8 - METROLOGY FOR INTERCONNECTS AND PACKAGING IN HIGH SPEED ELECTRONICS

In recent years, a constant increase of on-chip clock

frequency has led to a potential limitation of the system performance due to parasitic and propagation effects on off-chip interconnects and packages. An important research issue in this field is the understanding of how to perform accurate and repeatable characterization measurements of interconnects, as well as devising model verification techniques. Both frequency and time domain measurement methods are discussed, and the critical aspects of probing and fixturing are addressed. This session is intended for providing a critical overview and reporting on recent developments and approaches for measurements on chip as well as on board.

F. Canavero (Italy) and S. Nitta (Japan)

Joint Sessions led by Commission A

AB1 - ANTENNA AND EM FIELD MEASUREMENTS

This session emphasizes the accurate measurement techniques for standard EM fields, scattering, diffraction, propagation, and antennas such as microwave and millimeter wave antennas, standard horns, reflector antennas, broadband antennas, microstrip antennas, arrays, mobile and space antennas and EMC antennas. Possible topics include near-field ranges, anechoic chambers, compact ranges, open area test sites, time domain ranges, TEM cells, reverberation chambers, mode-stirred chambers, etc.

M. Feliziani (Italy) and R. Graglia (Italy)

AB2 - TIME DOMAIN MEASUREMENTS AND ANALYSES

The ever growing presence of non-linear components in electronic devices renders the time domain measurements an essential technique for systems characterization. Furthermore, the collected transient data should be processed in order to obtain significant insights and information on the measured electro-magnetic phenomena. The aim of the session is to furnish a detailed view on the most recent advances in time domain measurement procedures and on the more suitable signal processing techniques for electromagnetics.

M. D'Amore (Italy) and A. Orlandi (Italy)

AD - CHARACTERIZATION OF SEMICONDUCTOR DEVICES FOR WIRELESS APPLICATIONS

This session is devoted to experimental and theoretical techniques used for characterizing semiconductor devices for wireless applications. Papers dealing with parameter extraction techniques for small and large signal models, de-embedding methods, and time-domain and multi-tone approaches are sought and invited. S. El Ghazaly (USA) and R. Zich (Italy)

Contribution to the spectrum congestion issue is among the objectives of this session

AE - EMC MEASUREMENTS

In this joint session, papers should be given on the measurement methods and instrumentation requirements in EMC standards. Adequacy of measurement procedures and measurement specifications for radiated and conducted

emission and susceptibility tests are aspects to be critically addressed in this session. General issues such as probes and antennas calibration, uncertainty evaluation, and traceability of tests, will be presented with reference to EMC standards. Papers dealing with novel measurement methods, new sensors or probes or antennas, and advanced automatic systems for EMC measurements are welcome.

S. Celozzi (Italy) and P. Corona (Italy)

Contribution to the spectrum congestion issue is among the objectives of this session

Joint Sessions involving Commission A

EA - ELECTROMAGNETIC COMPATIBILITY AND EM POLLUTION

P. Degauque (France) and M. D'Amore (Italy)

FAB - TECHNIQUES AND APPLICATIONS FOR SUB-SURFACE REMOTE SENSING

D. Noon (Australia) and G. S. Smith (USA)

KA - EXPOSURE ASSESSMENT FOR CELLULAR AND PERSONAL TELECOMMUNICATIONS

C. Chou (USA) and M. Taki (Japan)

COMMISSION B: FIELDS AND WAVES

B1 - GUIDED WAVES

Recent advances in the theory and application of waves guided on periodic and nonperiodic structures, either closed or open, will be the theme of this session. This will include propagation of real and complex modes in closed waveguides, surface-wave and leaky-wave modes on printed-circuit transmission lines, and propagation on periodic structures. The latter category could also include propagation on photonic bandgap (PBG) structures. The excitation of modes on a guiding structure, the control of undesirable modes, the radiation from guided modes, and other practical issues will be included within the scope of this session.

D. R. Jackson (USA) and H. Shigesawa (Japan)

B2 - ELECTROMAGNETIC SYSTEM DESIGN: GENETIC ALGORITHMS

Genetic Algorithms (GAs) are on the rise as electromagnetic (EM) design tools because of their versatility and ability to optimize in complex multimodal search spaces. This session focuses on novel applications of GA-based optimizers to the synthesis of EM components as well as the development of advanced operator, EM specific GA constructs and their efficient implementation. Participants are encouraged to compare GA performance to that of other relevant optimizers in terms of design quality and computational expense.

E. Michielssen (USA) and Y. Rahmat-Samii (USA)

B3 - SCATTERING AND DIFFRACTION

This session is intended for new analytical developments in the theory of scattering and diffraction of electromagnetic

waves. New canonical solutions to electromagnetic boundary-value problems are especially welcome, as well as new analytical results at both low and high frequencies. New solutions for scatterers made of complex media, or immersed in a complex medium, are encouraged.

P. L. E. Uslenghi (USA) and G. James (Australia)

B4 - ELECTROMAGNETIC THEORY

This session focuses on the fundamental aspects of electromagnetic theory in a broad sense. It includes new solution methods and approaches for problems in electromagnetics, as well as other theoretical aspects of electromagnetic theory. Advances in mathematical methods are of interest. Contributions to basic modeling of complex and nonlinear materials and to new approaches for solving wave propagation problems in these materials are especially welcome.

G. Kristensson (Sweden) and K. Kobayashi (Japan)

B5 - TIME DOMAIN ELECTROMAGNETICS

This session will be devoted to the analysis and the utilization of transient electromagnetic waves. The session will be a mix of theoretical, computational, and experimental work. In particular, contributions are requested that show the advantages and disadvantages of carrying out calculations and/or experiments in the time domain.

A. G. Tijhuis (The Netherlands) and E. Heyman (Israel)

B6 - ELECTROMAGNETIC DETECTION AND IMAGING

Attention is to be focussed on novel and improved solution methods for the retrieval of passive objects and active sources from the inversion of diffusive and propagative time-harmonic and transient wave fields that are induced, scattered or radiated. Mathematical analyses, algorithmical developments, numerical experiments, as well as experimental applications to laboratory controlled and/or real data, will be considered. Major interest is in the development and validation of solution methods built on sound mathematical bases and giving cognizance to the challenges of the real world. Contributions involving the development of specialized inversion tools will be welcome even though applications to practical cases may still be far into the future.

D. Lesselier (France) and T. Habashy (USA)

B7 - NONLINEAR INVERSE SCATTERING

Interest lies in theoretical methods and algorithms for the reconstruction of material parameters by inversion of reflected, transmitted, and scattered wave field data. The session is especially devoted to those methods that avoid direct linearization of the problem and have capabilities to invert complex heterogeneous structures.

P. M. van den Berg (The Netherlands) and K. J. Langenberg (Germany)

B8 - ELECTROMAGNETICS IN WIRELESS COMMUNICATIONS

Electromagnetic theory and its applications to the problems

of radiowave propagation are of interest, as are deterministic and random propagation channel characterizations over a wide range of frequencies. Also to be included are propagation and field forecasting, monochromatic and nonmonochromatic wave propagation in near-the-earth space, and antenna-channel characteristics.

N. Zernov (Russia) and L. Shafai (Canada)

Contribution to the spectrum congestion issue is among the objectives of this session

B9 - PACKAGING

The microelectronics industry is being driven toward the development of highly-integrated, multi-functional, low form-factor electronic products, which call for novel and often revolutionary practices in functional-block integration and packaging. The complexity of such systems requires very accurate and versatile electromagnetic (EM) modeling and simulation methodologies and computer-aided design tools. The focus of the session encompasses a two-fold EM modeling challenge: (a) modeling fidelity, such that process variations, material interfaces and underlying physics are accurately modeled and (b) simulation efficiency, to expedite electromagnetic performance assessment of complex interconnection and packaging structures.

A. C. Cangellaris (USA) and W.J.R. Hoefer (Canada)

B10 - ASYMPTOTIC METHODS

This session will be focussed on high-frequency techniques for describing scattering and diffraction in non-perfectly-conducting and periodic structures, finite large planar arrays, as well as antenna location and propagation in complex man-made environments, with emphasis on applications in wireless communications and satellite platform designs.

R. Tiberio (Italy) and L. B. Felsen (USA)

Poster Sessions

BP1 - COMPUTATIONAL ELECTROMAGNETICS

Integral Equation Methods

The integral equation methods portion of the session will focus on recently developed fast solvers for surface and volume scattering problems. Both direct and iterative solvers with reduced computational complexities and memory storage requirements will be accounted for. The feasibility of integrating such novel solvers into existing integral equation codes in order to facilitate large scale modeling is of interest.

Y. Leviatan (Israel) and A. Q. Martin (USA)

Finite Element Methods

Papers are sought in the area of Adaptive Finite Element Methods for EM Wave Applications, including but not limited to hand refinement strategies, local error estimators, hierarchical basis functions, and multigrid or other smart iterative solvers.

A. F. Peterson (USA) and J. P. Webb (Canada)

Hybrid Methods

Hybrid methods of interest include frequency-domain and

time-domain problems formulated so as to combine integral equations with either partial differential equations or asymptotic techniques. Special attention is given to numerical techniques which incorporate two or more of the following methods: integral equations, finite elements, finite differences, mode matching, etc.

R. D. Graglia (Italy) and K. K. Mei (China CIE)

FDTD Methods

The versatility of the FDTD method is strongly related to the development of the absorbing boundary conditions (ABCs) field. Consequently, the quest for a reflectionless boundary condition is an ongoing challenge and is to be a focus of this session. Other topics of interest relative to FDTD are the perfectly matched layer, Ramahi complementary operator method, higher-order generalizations, non-rectangular and unstructured grids, and dispersive and nonlinear media. Mathematical as well as numerical issues are within the purview of the session as are applications to various practical problems.

C. S. Antonopoulos (Greece) and H. Ikuno (Japan)

BP2 - MEDIA EFFECTS IN ELECTROMAGNETICS

Artificial Media

Artificial dielectrics have been used for many years in microwave applications. Classically, these materials are fabricated by mixing metallic or other particles into a (light) host matrix in such a way that the dielectric characteristics of the composite are compatible with the design need. Recent emphasis on complex materials in electromagnetics broadens the domain of artificial materials. Artificial materials can exhibit responses beyond those available in ordinary dielectrics: anisotropy, magnetoelectric coupling, and even piezoelectricity. This session welcomes contributions on microscopic-to-macroscopic transition in the widest sense, including studies of the effects of a complicated microstructure in a composite.

A. Sihvola (Finland) and J. Cloete (South Africa)

Nonlinear Media

The design of materials and media which enhance nonlinear electromagnetic effects is becoming more important for applications in both optical and millimetre-wave parts of the spectrum. Materials which are in some sense engineered for their nonlinear properties include: semiconductor quantum-wells and superlattices; special polymers; multilayer and particulate composites; Schottky barriers and MOS capacitors for nonlinear transmission lines; photonic bandgap crystals in 1-, 2-or3-dimensions; quasiphase-matching gratings; multilayer films for magneto-optics, and many others. The focus of the session is on the electromagnetic theory, design and fabrication of such materials, and the demonstration of successful applications.

J. M. Arnold (UK)

Random Media

The last few years have seen computers make a significant impact on the modeling and understanding of scattering from randomly rough surfaces. Problems that were once

thought to be nearly impossible can now be solved in a reasonable time using relatively inexpensive computing resources. However, this redirection towards computer-intensive investigations of randomly rough surface scattering has given rise to a new class of difficulties that require intimate knowledge of electromagnetic theory and numerical analysis. Consequently, the focus will be on the numerical solutions of scattering by randomly rough surfaces.

G. S. Brown (USA) and C. H. Chan (China CIE)

Bianisotropic Media

In the past decade, the research on media with bianisotropic constitutive relations has experienced a significant increase. On one hand bianisotropic media serve as a resource to increase the understanding of the behaviour of electromagnetic fields. Recently much progress has been made on some pure theoretical aspects such as Green's dyadics in homogeneous media and waveguide structures. On the other hand many applications of these bianisotropic media in microwave devices have been studied. The focus of this session will be on theoretical electromagnetics in bianisotropic media and the advantages of the application of these media in microwave devices.

F. Olyslager (Belgium) and N. Engheta (USA)

Joint Sessions led by Commission B

BD1 - INTEGRATED ANTENNAS

Integrated antennas involve microwave or millimeter-wave circuits comprising antennas with loads, usually in close physical proximity and/ or antennas integrated with functional circuits. They include, for example, two-dimensional arrays for solid-state device power combining, beam steering or other functions, such as T/ R modules. New approaches to antenna control which incorporate integrated antennas with photonic circuits are also of interest.

Z. Popovic (USA) and H. J. Chaloupka (Germany)

BD2 - SPATIAL POWER COMBINING

Contributions are invited which illustrate coherent power combination in space, with high efficiency, of the power available from many sources or amplifiers operating at the upper microwave, millimeter and sub-millimeter wavelength region of the spectrum. Analysis, design, and applications of spatial power combining methods are of interest.

J. W. Mink (USA) and M. Steer (UK)

Joint Sessions involving Commission B

AB1 - ANTENNA AND EM FIELD MEASUREMENTS

M. Feliziani (Italy) and R. Graglia (Italy)

AB2 - TIME DOMAIN MEASUREMENTS AND ANALYSES

M. D'Amore (Italy) and A. Orlandi (Italy)

DB - 3D COMPREHENSIVE EM MODELLING

S. El Ghazaly (USA) and D. De Zutter (Belgium)

EB - NUMERICAL ANALYSIS IN EMC PROBLEMS
F. Canavero (Italy) and F. M. Tesche (USA)

FAB - TECHNIQUES AND APPLICATIONS FOR SUB-SURFACE REMOTE SENSING
D. Noon (Australia) and G. S. Smith (USA)

JBC - ADAPTIVE ANTENNA TECHNOLOGIES DM RADIO TELESCOPES
A. van Ardenne (The Netherlands)

KB - COMPUTATION OF ELECTROMAGNETIC FIELDS IN THE HUMAN BODY
O. Gandhi (USA) and Y. Rahmat-Samii (USA)

COMMISSION C: SIGNALS AND SYSTEMS

C1 - CODING - THE STATE-OF-THE-ART
The session will report on recent developments in coding techniques and applications and foreshadow future directions.
B. Forssell (Norway)

C2 - ORTHOGONAL FREQUENCY DOMAIN MULTIPLEX
The session will review the up-to-date developments in the theory and applications of OFDM.
E. Sousa (Canada)

C3 - RADIO SPECTRUM UTILIZATION AND THEIR TECHNOLOGIES
The session will address the development of a human-oriented flexible utilization of spectrum resources from both social and technological viewpoints.
S. Komaki (Japan) and N. Morinaga (Japan)
Contribution to the spectrum congestion issue is among the objectives of this session

C4 - SPACE-TIME BLIND SIGNAL PROCESSING FOR COMMUNICATIONS, INTELLIGENT ANTENNAS AND ADAPTIVE EQUALIZATION
It is widely believed that there needs to be a major breakthrough in techniques to dramatically improve the capacity of communication systems. The session will aim to bring together and report on the most recent work in the area.
R. Kohno (Japan)
Contribution to the spectrum congestion issue is among the objectives of this session

C5 - ASYNCHRONOUS TRANSFER MODE SYSTEMS
The session will report current developments of ATM including extremely broadband applications and foreshadow future directions.
J. Scott (USA)

C6 - SOFTWARE RADIO FOR FUTURE COMMUNICATIONS - INCLUDING DEVELOPMENTS

IN HIGH FREQUENCY INTEGRATED-CIRCUIT TECHNOLOGIES FOR PORTABLE/ PERSONAL COMMUNICATIONS

The session will discuss the approaches, problems and potential in the realization of software radio architecture (the implementation of modulation, demodulation etc. in software) from the viewpoints of radio communication systems, the critical devices and also software simulators.
M. Akaike (Japan)
Contribution to the spectrum congestion issue is among the objectives of this session

C7 - MULTIRATE SYSTEMS AND APPLICATIONS, FILTER BANKS, WAVELETS AND APPLICATIONS
The session will review the state-of-the-art in the broad area of digital filtering.
L. Vandendorpe (Belgium)
Contribution to the spectrum congestion issue is among the objectives of this session

C8 - GLOBAL POSITIONING SYSTEM (GPS) AND OTHER POSITIONING SYSTEMS
The session will review the latest developments in GPS and its myriad applications and foreshadow future directions.
C. Drane (Australia)

C9 - OPEN SESSION AND LATE BREAKING RESULTS
Open session and late breaking results.
P. Wittke (Canada)

Joint Session led by Commission C

CF - MOBILE AND PERSONAL COMMUNICATIONS
Joint session CF will concentrate on issues that make cellular networks work to public satisfaction. Those include the following: Capacity limits in second-generation systems - how to extend them? IMT 2000 and UMTS - compatibility or co-existence in third generation? Hierarchical cellular networks - mobility models, handover strategies; Mobile multimedia - how many bits/s do we really need? Locating mobiles - what are the benefits, what are the costs? Limitations by propagation effects.
E. Bonek (Austria) and H. Bertoni (USA)
Contribution to the spectrum congestion issue is among the objectives of this session.

Joint Sessions involving Commission C

DC1 - MICROWAVE-OPTICAL INTERACTION
H. Ogawa (Japan) and T. Berceci (Hungary)

DC2 - ADVANCED TECHNIQUES FOR WAVELENGTH DIVISION MULTIPLEX SYSTEMS
A. Seeds (UK)

GC - DIGITAL TECHNIQUES IN IONOSPHERIC RADIO PROPAGATION, CONTROL AND COMMUNICATION
D. M. Haines (USA) and P. Cannon (UK)

**JBC - ADAPTIVE ANTENNA TECHNOLOGIES FOR
DECAMETRIC RADIO TELESCOPES**

A. van Ardenne (The Netherlands) and J. G. Lucas
(Australia)

JDC - FUTURE MILLIMETRE RECEIVERS

R. Blundell (USA), J. Archer (Australia), V. Fusco (UK)
and C. Stewart (UK)

JCEG - INTERFERENCE PROTECTION MEASURES

R. Fisher (USA)

KC - HEALTH EFFECTS OF MOBILE TELEPHONES

R. Adey (USA), N. Kuster (Switzerland) and E. Bonek
(Austria)

Workshop:

**WS C- RECENT DEVELOPMENTS IN MULTI-
CARRIER TECHNIQUES**

This Commission C Tutorial/Workshop session will focus
on real world applications such as ADLS modems,
multicarrier CDMA and DS-CDMA and also multitone
CDMA.

V.U. Reddy (India)

**COMMISSION D: ELECTRONICS AND
PHOTONICS**

**D1 - ADVANCES IN SI AND SIGE HIGH FREQUENCY
DEVICES AND CIRCUITS**

The state-of-the-art of silicon and SiGe based monolithic
integrated circuits for microwave and millimeter-wave
analog applications and high-speed digital applications is
treated in this session. The technological background as
well as active and nonlinear devices and planar structures
suitable for silicon-and SiGe based monolithic integrated
circuits are discussed. Examples of such integrated circuits
as well as systems applications are presented.

P. Russer (Germany)

**D2 - LOW POWER INTEGRATED DEVICES AND
CIRCUITS: CMOS AND VLSI/ RF ORIENTED
CIRCUITS**

Low power consumption is becoming a dominating
requirement for a multiplicity of RF applications (mobile
phones, RFIDs, medical, space, RFLANs, etc.). The
combination of circuit design and the use of proper
semiconductor technologies (Si and GaAs), together with
the integration of analogue and digital functions, will be the
main topic of this session.

G. Gatti (The Netherlands)

D3 - ADVANCES IN III-V DEVICES

The goal of this session is to provide a forum for the
exchange of information on recent advances in the field of
active devices on GaAs and InP as well as to explore issues
of emerging technologies such as nitrides and antimonides.
G. Salmer (France) and A. Cappy (France)

D4 - WIDE BANDGAP DEVICES

Wide bandgap semiconductor devices, particularly the III-
Nitrides and the 6H and 4H polytypes of SiC, have many
properties ideal for electronic and optical devices for high
temperature, high frequency, high power, and radiation-
hard applications. Research and development progress is
rapid and experimental results, in many instances, are
approaching theoretical predictions. This session will
contain papers that present recent results, new device
concepts, and explore practical applications for these new
devices.

R. Trew (USA)

D5 - ADVANCES IN DEVICE MODELLING

This session will address key developments in the modelling
of active devices for RF and microwave systems. The scope
of the session will include equivalent circuit, physics-
based, physical and functional models and methodologies.
It is planned to include contributions with a strong
international flavour which reflect the state-of-the-art.

C. Snowden (UK)

Contribution to the spectrum congestion issue is among the
objectives of this session

**D6 - OPTOELECTRONIC DEVICES AND
INTEGRATION**

The Optoelectronic Devices and Integration Session will
review the current state-of-the-art and critical issues in
optoelectronic materials and devices. Integration of
functional circuits, including optoelectronic integrated
circuits (OEIC) and photonic integrated circuits (PIC), as
well as novel devices fabricated by heterogeneous
integration (wafer bonding, epitaxial liftoff) will also be
discussed.

M. Wu (USA)

D7 - PHOTONIC BANDGAP STRUCTURES

A photonic bandgap structure is a periodic structure that
interacts with electromagnetic waves just as the crystal
interacts with electron waves and takes 3-, 2- and even one-
dimensional forms. This session addresses the extremely
exciting research endeavors carried out at present in the
principles, applications to optics such as LED, as well as
microwave applications such as high performance passive
and active circuits and devices.

T. Itoh (USA)

**D8 - INTERCONNECTION AND PACKAGING OF
HIGH SPEED DEVICES**

The introduction of very high speed digital and microwave/
millimeter-wave (M) MICs into commercial high volume
applications provides new challenges to satisfy all the
requirements with respect to protection against environment,
electrical performance, and easy and low-cost production.
This session will address a number of these aspects, mainly
from a microwave point of view.

W. Menzel (Germany)

Joint Sessions led by Commission D

DB - 3D COMPREHENSIVE EM MODELLING

Papers dealing with comprehensive 3-dimensional modeling of high-frequency/high-speed circuits and components are solicited. Special topics of interest include EM coupling of semiconductor devices to circuits, hybridization of numerical techniques, and wave interactions with different materials.

S. El Ghazaly (USA) and D. De Zutter (Belgium)

DC1 - MICROWAVE-OPTICAL INTERACTION

The interactive research area between microwaves and photonics is rapidly developing the field of microwave and millimeter-wave photonics. This new concept promises to open up novel information and communication technologies. These include fiber-optic wireless access networks, wireless personal communication systems, radio local area networks, active phased array antennas, and various measurement systems. Microwave and millimeter-wave signal processing techniques composed of photonic devices will play an important role in realizing these systems. This session will emphasize merging of microwave and photonic concepts, components, circuits and systems. This session consists of several invited papers which will be presented by experts in the field of microwave and millimeter-wave photonics.

H. Ogawa (Japan) and T. Berceci (Hungary)

DC2 ADVANCED TECHNIQUES FOR WAVELENGTH DIVISION MULTIPLEX SYSTEMS

Wavelength division multiplex (WDM) optical communication is now in widespread commercial service for land systems, and submarine systems are currently being upgraded to WDM to cope with rapidly increasing data traffic. The object of this joint session is to present advances toward the creation of all-optical networks including, but not restricted to, optical frequency synthesis for dense WDM, control of non-linearity in large WDM systems, new network architectures, advanced WDM sources, amplifiers, switches and receivers. Contributed papers are most welcome.

A. Seeds (UK)

Joint Sessions involving Commission D

AD - CHARACTERIZATION OF SEMICONDUCTOR DEVICES FOR WIRELESS APPLICATIONS

S. El Ghazaly (USA) and R. Zich (Italy)

BD1 - INTEGRATED ANTENNAS

Z. Popovic (USA) and H. J. Chaloupka (Germany)

BD2 - SPATIAL POWER COMBINING

J. W. Mink (USA) and M. Steer (UK)

JD - MILLIMETRE-WAVE DEVICES OF THE FUTURE

R. Blundell (USA) and J. Archer (Australia)

COMMISSION E: ELECTROMAGNETIC NOISE AND INTERFERENCE

E1 - LIGHTNING MONITORING AND MAPPING BY MEANS OF VHF/UHF ELECTROMAGNETIC PULSES (I)

Enormous development has been done during the past ten years in the techniques of lightning source mapping by means of VHF/ UHF electromagnetic pulses emitted by progression of lightning discharges. They are Time of Arrival (TOA) and Interferometry, both of which have their own advantages and disadvantages. In spite of these disadvantages both techniques contribute to the understanding of the lightning initiation mechanism and its propagation feature inside the thundercloud. This session will deal with the review of both techniques to make clear their discrepancies quantitatively and also with the discussion on the remaining problems in this field. A technique of broadband interferometry, which has been proposed and manufactured quite recently, will be introduced as well.

Z. Kawasaki (Japan) and V. Cooray (Sweden)

E2 - GEOMAGNETIC AND OTHER EFFECTS ON TECHNOLOGICAL SYSTEMS (I)

Solar eruptions affect the Earth's magnetosphere and ionosphere via the solar wind resulting in increased particle densities in the near-space and large electric currents in the ionosphere, which produce disturbances in the geomagnetic field. Particles cause problems and interference on satellites, and geomagnetic disturbances induce harmful currents, called GIC, in the networks of conductors such as electric power transmission grids, pipelines and phone cables. This session deals with the problems experienced by different technological systems as well as studies aimed at forecasting and preventing the harmful effects.

R. Pirjola (Finland) and D. Boteler (Canada)

E3 - PLANETARY ELECTROMAGNETIC ENVIRONMENT AND DUSTY PLASMA (I)

The electromagnetic environment of the planets is characterized by a variety of sources, including plasma wave instabilities within the planetary magnetosphere, and electromagnetic waves of planetary origin such as those due to lightning. Furthermore, the presence of dust within the magnetospheres of the gas giants, and at comets, can significantly alter the electromagnetic environment. This session will review what is known about the sources of electromagnetic waves at the planets, what rôle these waves have in the dynamics of a planetary magnetosphere, and the modifications to the wave environment associated with dusty plasmas.

R. J. Strangeway (USA) and H. Kikuchi (Japan)

E4 - SPECTRUM MANAGEMENT AND UTILIZATION (I)

This session is intended to gather those interested in solving problems of RF spectrum congestion and mutual interference among wireless communication systems. The purpose is to present and discuss the progress made since the previous Assembly, and new problems that have since appeared, to exchange information and to stimulate new ideas. The session will cover four key topics: (1) review of new developments in ITU and WTO and position of radio scientists, (2) review of electromagnetic compatibility problems with new LEO and stratospheric communication systems, (3) review of interference problems with self-adaptive wireless systems, and (4) review of new mathematical methods in spectrum management/frequency assignments.

R. Struzak (Switzerland) and G. F. Hurt (USA)

Contribution to the spectrum congestion issue is among the objectives of this session

E5 - HIGH POWER ELECTROMAGNETICS (I)

High Power Electromagnetics covers a number of topics that combine solutions of Maxwell's equations with various breakdown processes. Applications include lightning, electromagnetic pulse, high power microwaves, and other high power phenomena. Some of the challenges of this area include designing antennas for high power handling and establishing the theoretical foundation for HPE. HPE has been an empirical subject so that the linkages between the theory and the observables must be made. The observables include electromagnetic radiation.

R. L. Gardner (USA) and C. Baum (USA)

E6 - TERRESTRIAL EM ENVIRONMENT (I)

The session will deal with (1) EM noise measurements, (2) global EM noise modeling (ELF to HF), (3) theory of propagation of EM noise in the Earth-ionosphere duct, (4) propagation of discrete signals (ELF events and conventional atmospherics), (5) the contribution of sprite-generated signals to the EM noise environment, (6) electromagnetic modelling of sprite sources, (7) radiolocation of EM noise sources, (8) sub-surface EM noise, and (9) noise produced by earthquakes.

D. L. Jones (UK) and M. Hayakawa (Japan)

Contribution to the spectrum congestion issue is among the objectives of this session

E7 - FIELD PROPAGATION AND COUPLING TO STRUCTURES (I)

The session deals with the propagation of an electromagnetic field over a soil with finite conductivity and field-to-transmission line coupling. Relevant topics are proposed: (1) lightning electromagnetic field propagation, (2) influence of the soil on the EM-field components, (3) ground impedance, (4) field attenuation due to "normal" buildings or shielded enclosures, (5) lightning current distribution in metallic structures, (6) coupling to networks with complex configurations, (7) transfer impedance of shielded cables, and (8) radiation losses of lines submitted to EM field

illumination. The latest models developed for numerical calculations can be compared with experimental measurements. For the comparisons, currents induced on lines illuminated in EMP simulators or by triggered lightning can be compared with calculations based on models.

M. Ianoz (Switzerland) and J. L. ter Haseborg (Germany)
Contribution to the spectrum congestion issue is among the objectives of this session

E8 - RADIATION FROM AND COUPLING TO PCBs (I)

This session deals with EMC problems involving PCBs such as radiation phenomena and immunity to external electromagnetic fields. The session will be organized the following topics: (1) recent progress in simulation of electromagnetic coupling to and radiation from PCBs, (2) effects involving the electronic components attached to the PCBs, especially radiation and susceptibility, and (3) recent progress in EMC measurement methods relevant to PCBs.

B. Demoulin (France) and Y. Kami (Japan)

Joint Sessions led by Commission E

EA - ELECTROMAGNETIC COMPATIBILITY AND EM POLLUTION (I)

The electromagnetic pollution covers a wide research area extending from the characterization of sources to the coupling of radiated waves to structures. In this session, the method of identification and of measurements of electromagnetic sources, for example on-board aircraft, will be emphasized. The noise is usually wideband and specific sensitive antennas must be developed. Furthermore, their response in the time domain is an important feature to get precise information on the source of disturbances. In case of a complex system, the location of these sources is also an interesting point. Lastly, one or sometimes the three components of radiated electric and magnetic field are measured, but great effort is needed to be able to model the complex source by an equivalent dipole or multipole.

P. Degauque (France) and M. D'Amore (Italy)

Contribution to the spectrum congestion issue is among the objectives of this session

EB - NUMERICAL ANALYSIS IN EMC PROBLEMS (I)

With the advance in the state-of-the-art in numerical analysis, numerical modeling is reaching new levels of sophistication, and electromagnetic codes are becoming a very powerful tool for EMC analysis. This session is intended to discuss the major numerical electromagnetic modeling techniques, and the papers should either demonstrate the application of a common technique or describe a new technique that may be useful to solve EMC problems.

F. Canavero (Italy) and F. M. Tesche (USA)

EF - INTERFERENCE IN COMMUNICATION (I)

This session deals with the characteristics of interference and noise in communications and also with their effects on communications.

E. J. Gavan (Israel) and B. Arbesser-Rastburg (The Netherlands)

Contribution to the spectrum congestion issue is among the objectives of this session

Joint Sessions involving Commission E

AE - EMC MEASUREMENTS

S. Celozzi (Italy) and P. Corona (Italy)

JCEG - INTERFERENCE PROTECTION MEASURES

R. Fisher (USA)

KE - ELECTROMAGNETIC INTERFERENCE WITH MEDICAL DEVICES

D. Witters (USA) and O. Fujiwara (Japan)

COMMISSION F: WAVE PROPAGATION AND REMOTE SENSING

F1 - MOBILE TERRESTRIAL AND SATELLITE PROPAGATION MODELLING (I)

A great effort has been made recently in the improvement of coverage and interference prediction methods for mobile terrestrial and satellite applications. Propagation models based on physical approaches (e. g. GTD/ UTD, PO) have started to become available. Empirical/ statistical models have continued to be produced for a very high number of situations of environments. The advent of second-generation cellular networks and multi-satellite systems has also given rise to specific issues that need to be addressed. This session is intended to examine the progress in this specific area. Of special interest are also studies that bridge the areas of wave propagation, antennas and systems.

F. Perez-Fontan (Spain) and Y. Karasawa (Japan)

Contribution to the spectrum congestion issue is among the objectives of this session

F2 - CLIMATIC PARAMETERS IN RADIOWAVE PROPAGATION PREDICTION (I)

Methods for prediction of the occurrence of various characteristics of the propagation of radiowaves in non-ionised media have been developed by the radio science community around the world. These methods generally depend on topographic and radio-meteorological or climatological parameters as well as the radio path system characteristics. New world maps of climatic parameters are being developed or becoming available. This session is intended to examine climatic aspects of radiowave prediction and the use being made of new data. In particular, consideration may be given to the effects of rainfall, anomalous propagation (ducting) on long paths and multipath effects.

J. P. V. Poiars Baptista (The Netherlands) and T. Tjelta (Norway)

F3 - MILLIMETRIC, SUB-MILLIMETRIC AND OPTICAL WAVE PROPAGATION (I)

There have been many recent advances in millimetric, sub-millimetric and optical wave propagation. The pace of

millimetric wave research has been accelerated by the development and deployment of millimetric wave radio systems for high-capacity digital communications. Both point-to-point and point-to-multipoint systems are commercially available. Issues such as the limitations on coverage caused by the effects of rain, vegetation and buildings on millimetric wave propagation are active areas of research. The session will also examine the effects of the atmosphere on sub-millimetric and optical wave propagation. Optical imaging, propagation theory, and ground-to-satellite laser propagation experiments will be reviewed.

K. H. Craig (UK) and S. Ito (Japan)

F4 - REMOTE AND IN-SITU SENSING OF CLOUDS AND THEIR EFFECTS ON RADIOWAVE PROPAGATION (I)

Clouds have in recent years become of special interest because of their impact on the radiation budget of the Earth. Several remote sensing missions are being proposed to study clouds. New airborne and ground measurements have been carried out and models developed. The use of higher frequencies in telecommunication systems has also awakened the interest of the effects of clouds in radiowave propagation. This session intends to review the status of this specific area of radio science from both its aspects of remote sensing and wave propagation.

P. A. Watson (UK) and A. J. Illingworth (UK)

F5 - ATMOSPHERIC DYNAMICS IN THE LOWER ATMOSPHERE: MEASUREMENT, MODELLING AND EFFECTS (I)

The various radio science methods have different potentials in regard to characterization of the following atmospheric phenomena: (a) line of sight system focussing on refraction phenomena; (b) forward scattering from fine-scale turbulence; (c) backscattering of radio waves relying on reflecting particles - also polarization effects; (d) forward scattering of EM waves stimulated by acoustic waves which are influenced by a wide spectrum of wind phenomena; (e) backscatter of laser waves; (f) line-of-sight laser transmission influenced by turbulence; (g) high-resolution radiometry based on multi-channel techniques; (h) line-of-sight scintillation measurements for turbulence and wind.

D. T. Gjessing (Norway)

F6 - SPACEBORNE REMOTE SENSING OF PRECIPITATION (I)

TRMM (Tropical Rain Measuring Mission) was launched in November 1997. The spacecraft carries the first ever precipitation radar in space as well as a high-resolution microwave radiometer, VIS/ IR radiometers and lightning sensors. In the course of planning for this spaceborne mission, several new techniques were developed using individual and combinations of sensors. Other spaceborne instruments have also been recently used. This session is intended to examine and review the algorithms, techniques and sensors used in the spaceborne observation of

precipitation including the combination of sensors. Results will also be reviewed.

C. Kummerow (USA) and K. Okamoto (Japan)

F7 - REMOTE SENSING OF EARTH SURFACES (I)

Recently launched remote sensing satellites offer new possibilities for retrieving geophysical characteristics of Earth surfaces with higher accuracy and better spatial and temporal coverage than the previous satellite generation. This session will review recent experimental and theoretical results in retrieving Earth surface characteristics from remote sensing data, including land surface, vegetation, snow, oceans, inland water, sea ice, and land ice. The main emphasis will be on microwave techniques. The feasibility of near-future high-resolution images for various applications will be discussed.

M. T. Hallikainen (Finland) and B. Arbesser-Rastburg (The Netherlands)

F8 - INTERFEROMETRIC TECHNIQUES IN REMOTE SENSING (I)

Interferometry has become a powerful tool in remote sensing studies of the Earth's surface. Mature applications include topographic mapping, surface deformation studies related to seismic activity and oil and ground water extraction, and glaciology. In other areas, such as forestry, the techniques are still under development with exciting results starting to emerge. This session will review the theoretical basis for interferometric remote sensing and examine the global state-of-the-art as applied to the study of the Earth.

J. Fr. Hjelmstad (Norway) and J. van Zyl (USA)

F9 - POLARIMETRIC TECHNIQUES IN REMOTE SENSING (I)

The combination of radar polarimetry with interferometry has exciting new potential applications in quantitative remote sensing. This session will begin with a review of progress in coherent radar polarimetry as it relates to this important new field. The session will also address two other important new developments in polarimetry. The first is exploitation of polarisation in ultra wide-band-radar systems and the second is the use of polarimetry in multi-static measurements where transmitters and receivers may be widely separated.

W. M. Boerner (USA) and S. R. Cloude (UK)

F10 - SYNERGETIC USE OF REMOTE SENSING INSTRUMENTS (I)

Data-sets from different sensors (active, passive, spectral range, bandwidth, resolution, etc.) usually have different information contents. Emissions, reflections and scatter phenomena often contain complementary information and, therefore, data fusion is required. Even in the same spectral region, the combination of high-geometric-resolution data with high-spectral-resolution data is desirable. For data merging, digital elevation models are needed for radiometric corrections of various image data, which also should be radiometrically calibrated. Around the world, efforts are being made to take advantage of data merging for

classification tasks. Data fusion is still a research area and not many in-depth results including models have been published yet. Therefore, the session will deliver a good overview of the present state-of-the-art.

H. Oetl (Germany) and A. J. Bedard (USA)

Poster Session

FP - WAVE PROPAGATION AND REMOTE SENSING

In recent years, Commission F has had sessions of invited papers at the General Assemblies which have given overviews of recent research developments and the current status in a number of primary topics within the scope of Wave Propagation and Remote Sensing. Papers on personal original research have (since 1977) been presented at the Commission F Triennial Open Symposia held in the year preceding General Assemblies, the next of which is to be held in Aveiro, Portugal, on 22-25 September 1998. However, a few contributed papers have been offered to Commission F for URSI General Assemblies and most of these have been included in a well attended poster session, though formally being addenda to the main sessions. In 1999, Commission F will have a poster session formally identified for such contributions.

Y. Furuhashi (Japan)

Joint Session led by Commission F

FAB - TECHNIQUES AND APPLICATIONS FOR SUB-SURFACE REMOTE SENSING (I)

The joint session will present recent developments and applications for sub-surface remote sensing. The techniques considered include ground-penetrating radar, time-and frequency-domain electromagnetic sensing (airborne and ground-based), and borehole and cross-borehole (tomography) radar. Applications are in mineral exploration and mine planning, environmental monitoring, landmine detection, civil engineering, and geological and geotechnical studies. The presentations can include models and results for antennas near a half-space, wave propagation in dispersive media, sub-surface target classification via polarimetric or resonant signatures, synthetic aperture and interferometric processing (including 3D imaging), target detection and clutter rejection techniques.

D. Noon (Australia) and G. S. Smith (USA)

Joint Sessions involving Commission F

CF - TERRESTRIAL MOBILE AND PERSONAL COMMUNICATIONS

E. Bonek (Austria) and H. Bertoni (USA)

EF - INTERFERENCE IN COMMUNICATIONS

E. J. Gavan (Israel) and B. Arbesser-Rastburg (The Netherlands)

GF - IONOSPHERIC AND TROPOSPHERIC PARAMETERS RETRIEVED FROM GPS/ GLONASS MEASUREMENTS

P. Hoeg (Denmark) and J. P. V. Poyares Baptista (The Netherlands)

JF - TROPOSPHERIC PATH DELAY CORRECTION
D. Woody (USA) and J. P. V. Poyares Baptista (The Netherlands)

Workshops

WS F1: INTERFACING PROPAGATION WITH TRANSMISSION AND ANTENNA SYSTEM STUDIES FOR MOBILE/ PERSONAL COMMUNICATIONS

This workshop, which is associated with Session F1, will cover generation of time-series, tapped-delay line, simulation of angles of arrival, requirements for wide-band system studies, requirements for smart antenna studies, etc. Topics will be addressed from the perspective of terrestrial systems and satellite systems.

F. Perez-Fontan (Spain) and Y. Karasawa (Japan)

WS F2: SYNERGY OF ACTIVE AND PASSIVE REMOTE SENSING INSTRUMENTS

This workshop, which is associated with Session F7, will focus on retrieval algorithms for active and passive remote sensing instruments with special emphasis on the combined use of such sensors. Applications can be found in all areas of Earth observation. Some examples are: (a) atmosphere (water vapour, clouds, precipitation): GPS and multi-frequency radiometers (also ground based), cloud radar/LIDAR and radiometers, sounders and imagers, rain-radar and VIS/IR radiometry; (b) agriculture (crop classification and monitoring): SAR and microwave radiometer, bare soil (soil moisture): SAR or scatterometer and radiometer; and (c) ocean (wind-speed, salinity): scatterometer and radiometer. The workshop will review the state-of-the-art in electromagnetic interaction modelling using both active and passive remote sensing instruments.

B. Arbesser-Rastburg (The Netherlands) and M. T. Hallikainen (Finland)

WS F3: WISIP - WIDEBAND (ULF TO UV) INTERFEROMETRIC SENSING AND IMAGING POLARIMETRY

This workshop, which is associated with Session F9, will address issues relating to the latest advances in wide-band polarimetric sensing. The key theme of the workshop is the advantages that accrue from using a combination of interferometric and polarimetric sensors. The workshop will review advances in both interferometry and polarimetry, and then consider their present applications before concluding with a discussion of the potential for future remote sensing developments.

W. M. Boerner (USA) and S. R. Cloude (UK)

COMMISSION G: IONOSPHERIC RADIO AND PROPAGATION

G1 - RECENT RADAR SYSTEMS AND SCIENTIFIC HIGHLIGHTS IN POLAR IONOSPHERE AND

ATMOSPHERE RESEARCH

New radar systems have been established in the Arctic and Antarctic and are contributing significantly to the understanding of coupling processes of the magnetosphere, ionosphere, thermosphere and the middle atmosphere. Particular emphasis will be placed on new as well as on planned MST, HF, MF, meteor and incoherent scatter radars and systems. Innovative radar technology and data acquisition procedures should be demonstrated. Outstanding novel observations with these systems, operated at high latitudes, are to be presented. It is expected that the authors will discuss the expansion of theoretical developments to improve radar operations and the understanding of observed phenomena, such as ionospheric irregularities and the coupling of the atmosphere and ionosphere. Updated or novel explanations of observational results are welcome. The session will be headed by a few invited focus presentations. Contributed papers are solicited for oral and poster presentation.

J. Roettger (Germany) and W. Hocking (Canada)

G2 - IONOSPHERIC STORMS AND SUBSTORMS: RADIO OBSERVATIONS AND MODELING

The session will deal with the results of the experimental observations of ionospheric storms and substorms by means of various radio techniques as well as with modeling of ionospheric parameter variations at different latitudes during these events. The special ionospheric structures appearing during the ionospheric storms and substorms and their influence on the radio systems efficiency are going to be analyzed. The topic of search of the optimal indices which could properly describe ionospheric response to these events will be especially appropriate for this session. Papers dealing with both long-term and short-term predictions of ionospheric behavior during these events are also invited for consideration. The session will include invited, contributed and poster papers.

A. Shirochkov (Russia) and J. Hargreaves (UK)

G3 - LOW LATITUDE IONOSPHERE EFFECTS ON SYSTEMS AND RADIO PROPAGATION

This session will consider the effects of the electron density gradients and irregularities of all scale lengths in the low latitude ionosphere, that may impact radio wave propagation and degrade the performance of systems operating in such an environment. These systems may include different ground based HF/ VHF communication and radar systems, and space based VHF/ UHF communication and navigation systems. Oral and poster presentations are solicited for this session.

S. Basu (USA), Su. Basu (USA) and B. M. Reddy (India)

G4 - OPEN SESSION AND LATEST RESULTS

This session will be a platform for presentations which do not directly fit into the scope of the other sessions. It should be remembered however, that the contributions should deal with the various aspects of 'ionospheric radio and propagation' (Comm. G terms of reference); purely geophysical papers will be rejected. Experimental,

theoretical and modeling papers and posters are welcome.
K. Schlegel (Germany)

G5 - INTERNET SESSION: IONOSPHERIC DATA AND MODELS ON THE WWW

This poster session will focus on Internet access to ionospheric data and to related data and value-added products of use for ionospheric physics. It will provide participants the opportunity to present their systems and Web pages in support of ionospheric science. We particularly encourage presentations that inform the audience about open and uninhibited access to near real time ionospheric measurements and deduced parameters.

D. Bilitza (USA) and T. Araki (Japan)

Joint Sessions led by Commission G

GC - DIGITAL TECHNIQUES IN IONOSPHERIC RADIO PROPAGATION, CONTROL AND COMMUNICATION

Digital techniques continue to evolve for the improvement of voice and data transmission over ionospheric skywave communications channels. Further, anticipating the enhanced propagation available as the peak of the solar cycle approaches, interest in improved skywave communications is increasing. Papers are solicited covering the following topics: the skywave channel, mitigation of propagation effects, waveforms and modulation, test and demonstration results.

D. M. Haines (USA) and P. Cannon (UK)

Contribution to the spectrum congestion issue is among the objectives of this session

GF - IONOSPHERE AND TROPOSPHERE PARAMETERS RETRIEVED FROM GPS/ GLONASS MEASUREMENTS.

Climate change monitoring and predictions depend on precise geophysical models and global coverage of observations. Radio occultation observations, using the GPS/ GLONASS system as the active transmitters, are capable of delivering crucial parameters of the atmosphere such as temperature, pressure and humidity. The observations rely on a solid understanding of the ionized upper atmosphere, since the signals traverse the ionosphere. Thus the observations give information of the 3D global distribution of the electron density of the ionosphere and its dynamics, which will be a vital source of information for space weather activities. We invite talks on three more general topics entailed in the titles, radio occultation science and applications, neutral atmosphere and ionosphere wave phenomena, and satellite system aspects for radio occultations. The themes will be: (1) space weather, (2) waves and turbulence in the ionosphere, stratosphere, and troposphere (IST), (3) tomography and imaging of IST phenomena, (4) data assimilation techniques for NWP models, and (5) impact studies of occultation observations for climate change predictions.

P. Hoeg (Denmark) and J. P. V. Poyares-Baptista (The Netherlands)

GH1 - ELECTROMAGNETIC COUPLING INCLUDING SEISMIC ACTIVITY BETWEEN THE GROUND AND THE UPPER IONOSPHERE AND MAGNETOSPHERE

This session will focus on the electromagnetic processes occurring near the Earth's surface which may influence the ionosphere and the magnetosphere. Special emphasis will be given to the seismic processes (production of electromagnetic emissions, electric potential, lightning, variations of electric conductivity and seismomagnetic effects). However, this session is also open to presentations dealing with propagation of man-made waves. Contributed papers on recent results concerning those topics are solicited. S. Pulinets (Russia), M. Parrot (France) and O. Molchanov (Russia)

GH2 - LIGHTNING IONOSPHERE INTERACTION

In recent years, new experimental evidence has emerged indicating strong electrodynamic coupling between the troposphere and the overlying mesosphere and the lower ionosphere. Sprites, blue jets, and elves, as well as radio (VLF, HF) remote sensing signatures such as rapid transient ionization and conductivity changes in patches above thunderstorms are persuasive evidence. In addition, gamma-ray flashes associated with individual lightnings suggest the presence of highly energetic (> 1 MeV) electrons. Both experimental and theoretical papers on any aspects of lightning-ionosphere interaction processes, including physical mechanisms, experimental techniques, and presentation of new data, are solicited.

U. Inan (USA) and D. Nunn (UK)

Joint Sessions involving Commission G

HG1 - THEORY & SIMULATION OF NONLINEAR KINETIC PROCESSES IN SPACE PLASMAS

Y. Omura (Japan), M. Ashour-Abdalla, (USA) and S. Ossakow (USA)

HG2 - RADIO-FREQUENCY SOUNDERS IN SPACE, NEW AND OLD

H. G. James (Canada), R. Benson, (USA) and B. Reinisch (USA)

HG3 - WAVE PROPAGATION: OBSERVATION AND DATA ANALYSIS

F. Lefeuvre (France) and Y. Hashimoto (Japan) and K. Mahajan (India)

HG4 - COMPARATIVE STUDIES OF SPACE & LABORATORY PLASMAS

W. Gekelman (USA) and C. Henuise (France)

HG5 - IONOSPHERIC MODIFICATION WITH HIGH POWER RADIO WAVES: COUPLING OF PLASMA PROCESSES

T. B. Leyser (Sweden) and S. Basu (USA)

JCEG INTERFERENCE PROTECTION MEASURES

R. Fisher (USA)

Contribution to the spectrum congestion issue is among the objectives of this session

COMMISSION H: WAVES IN PLASMA

Joint Sessions led by Commission H

H1 - ACTIVE EXPERIMENTS INVOLVING SPACE PLASMAS

Papers are invited on the topics of active experiments perturbing space plasmas by material (solid, gaseous or charged), and by electromagnetic fields (constant and waves). The perturbation sources may be in-situ or remote, including ground based facilities.

W. J. Raitt (USA)

H2 - WAVE PARTICLE INTERACTIONS: QUANTITATIVE COMPARISON BETWEEN OBSERVATIONS, THEORY, SIMULATIONS AND MODELING

A new generation of high-time-resolution and high-precision instruments for measuring waves and particles have been successfully launched into space over the past decade. Data from these along with ground-based measurements can now be used to quantitatively test or verify predictions from theory, simulations, and modeling. Papers on these comparisons are solicited. Research efforts on wave-particle interactions that provide input for theory, simulations, modeling, and space-weather predictive capabilities are also appropriate for this session.

R. R. Anderson (USA), I. Nagano (Japan) and D. Nunn (UK)

H3 - PITCH ANGLE SCATTERING (AND ACCELERATION) OF TRAPPED PARTICLES BY WAVES IN THE MAGNETOSPHERE

It is known that waves propagating through the magnetosphere can interact strongly with trapped particles which can cause a number of important effects including acceleration, pitch angle scattering and precipitation into the ionosphere. A particular example is that of whistler-mode waves which undergo transverse cyclotron resonance with energetic electrons trapped in radiation belts. The waves involved may either be naturally generated in space (e. g. hiss) or may come from powerful ground sources (e. g. transmitters, power lines or lightning). It is still not clear how important wave-particle interactions are as a loss mechanism for trapped populations, compared with other possible loss processes. It is particularly important to quantify the effect of lightning activity associated with global warming. Papers reporting experimental and theoretical results on these and related topics are invited. We also welcome contributions on comparable processes in planetary magnetospheres other than Earth's.

A. Smith (UK), J. Lemaire (Belgium) and U. Inan (USA)

H4 - OPEN SESSION AND LATEST RESULTS

Papers in all aspects of waves in plasmas and related electrodynamics not covered by other sessions can be submitted. New results from satellite missions launched in the second half of 1998 are welcome even if received within one month following the official deadline, but these contributions cannot be published in the book of abstracts.

V. Fiala (Czech. Rep.)

HG1 - THEORY & SIMULATION OF NONLINEAR KINETIC PROCESSES IN SPACE PLASMAS

Theoretical studies and computer simulations based on particle codes, hybrid codes and Vlasov codes have been performed in order to clarify basic nonlinear kinetic processes that have been absent from MHD or multi-fluid description of these phenomena. Micro-scale phenomena such as wave generation, particle acceleration and heating have been studied in more realistic models with open boundaries and spatial inhomogeneities. Some coherent wave-particle interactions can lead to formation of solitary or modulated waves through wave-wave interaction involving resonant particles. In other cases of wave-particle interactions, dynamics of resonant particles may give rise to stochastic processes, whose physical consequences need to be evaluated quantitatively. Since nonlinear kinetic processes play important roles in meso-scale phenomena such as magnetic reconnection, shocks, turbulence and plasma irregularities, a kinetic description of these phenomena is needed for quantitative evaluation of anomalous resistivity and diffusion rates. Theoretical studies and computer simulation studies on nonlinear kinetic processes in the ionosphere and space plasmas are solicited.

Y. Omura (Japan), M. Ashour-Abdalla (USA) and S. Ossakow (USA)

HG2 - RADIO-FREQUENCY SOUNDERS IN SPACE, NEW AND OLD

The topside sounder is the spaceborne equivalent of the high-frequency ionosonde that has been widely used on the ground for ionospheric research. The original topside sounders were highly successful in probing the electron density structure of near space. Such use of sounders has continued into the 1990s, augmented by other objectives in space radio science. Papers are solicited on new sounders, either recently flown or under preparation, and on recent investigations of space plasmas based on older sounder data.

H. G. James (Canada), R. Benson (USA) and B. Reinisch (USA)

HG3 - WAVE PROPAGATION: OBSERVATION AND DATA ANALYSIS

The session aims to review recent works made in the determination of the characteristic parameters of plasma waves and on the effects of these characteristics on wave-particle interactions. The topics include: identification of propagation modes, determination of propagation characteristics, ray tracing, attenuation and amplification factors, source mechanisms, detrapping, etc. Papers dealing with observations are encouraged.

F. Lefeuvre (France), Y. Hashimoto (Japan) and K. Mahajan (India)

HG4 - COMPARATIVE STUDIES OF SPACE & LABORATORY PLASMAS

In the past ten years the art of creating laboratory plasmas with parameters scaled to perform meaningful laboratory

experiments has led to the development of research quality sources and their attendant diagnostics. Research on a number of topics such as magnetic field line reconnection, Alfvén waves, the interaction of waves with striated and non-uniform plasmas, velocity shear instabilities, dusty plasmas and relativistic plasmas is progressing. These laboratory studies do not occur in isolation. There is now a meaningful effort to relate them to satellite and rocket missions such as AMICIST, SCIFER, Freja, SOHO and FAST as well as astronomical observations. Similarly, methods of diagnostics commonly used for fusion plasmas and aerodynamic flows have been applied to the analysis of ionospheric data. Among them, the collective scattering approach has, for example, led to new insights in the physics of plasma processes as observed with coherent scatter radars. Parameters such as the turbulent diffusion coefficient can now be measured. This HG4 session will be devoted to new results that laboratory studies have to offer regarding space phenomena and the application of the new analysis techniques to ionospheric and magnetospheric plasmas.

W. Gekelman (USA) and C. Hanuise (France)

HG5 - IONOSPHERIC MODIFICATION WITH HIGH POWER RADIO WAVES: COUPLING OF PLASMA PROCESSES

This symposium will cover the inter-relations between the wide range of phenomena produced by high power radio waves in the ionosphere. The purpose of this session is to provide a better understanding of the complex, non-linear processes excited during ionospheric HF pumping experiments. Contributed papers are solicited for (1) artificial generation of plasma irregularities with scales ranging from kilometers to centimeters, (2) in situ and ground-based diagnostics of the pumped volume, and (3) theoretical and computer modelling of the HF wave interactions.

T. B. Leyser (Sweden) and S. Basu (USA)

Joint Sessions involving Commission H

GH1 - ELECTROMAGNETIC COUPLING INCLUDING SEISMIC ACTIVITY BETWEEN THE GROUND AND THE UPPER IONOSPHERE AND MAGNETOSPHERE
S. Pulinet (Russia), M. Parrot (France) and O. Molchanov (Russia)

GH2 - LIGHTNING IONOSPHERE INTERACTION
U. Inan (USA) and D. Nunn (UK)

COMMISSION J: RADIO ASTRONOMY

J1 - THE FUTURE LARGE SCALE FACILITIES: PROGRESS AND PROSPECTS

This session will present progress reports from groups involved in building, designing and preparing for future large ground-based telescopes that will operate in the sub-mm to ten-meter wave-bands. In addition to reports on

organizational, siting and funding aspects, science case highlights and discussions of technology programmes will be given.

H. Butcher (The Netherlands) and P. Vanden Bout (USA)

J2 - VERY HIGH RESOLUTION IMAGING IN VLBI

The successful launch of the Japanese HALCA satellite has significantly enhanced the resolution of centimetre VLBI, allowing us for the first time to resolve structures of very high brightness temperature ($\rightarrow 10^{12}$ K). In parallel developments on the ground, VLBI is operating at ever higher frequencies, allowing even higher resolutions to be achieved. 3mm observations via the Coordinated mm-VLBI array (CMVA), utilising the world's largest millimetre telescopes and newly equipped antennas of the VLBA are becoming routine. Meanwhile pioneering observations at 2mm and 1mm are also being carried out. Such millimetre VLBI observations can probe the central regions of AGN, and can also be used to study high frequency spectral line processes. Papers are solicited in all of these areas.

J. Conway (Sweden) and H. Hirabayashi (Japan)

J3 - SUB-MILLIMETRE ASTRONOMY

Submillimeter Astronomy is entering a new and exciting era. Already, telescopes operating on high, dry sites are opening up many new areas of study. These include, for the Interstellar Medium, the spectroscopy of excited states of molecules, fundamental ground transitions of light hydride molecules and the two fine-structure lines of atomic carbon (CI). The Earth's atmosphere is now accurately modelled and observed. Planets and even comets have been detected in many submillimeter lines, including the important HDO species. Excited state and masing lines are found in material near stars. Nearby galaxies can be studied in dust emission, in molecular lines and even in CI.

The new generation of bolometer cameras is providing amazing results. Distant galaxies have been detected in dust emission to z values of 4.7. Dust polarization measurements have revealed the direction and relative magnitude of the magnetic field in star-forming clouds. Tremendous opportunities will develop with the next generation of submillimeter instruments, SWAS, ODIN, SOFIA, FIRST, SMA, MMA/LSA etc... The critical species H₂O and O₂ will be observed, and the large projects, FIRST and MMA/LSA, will detect and study dust emission and molecular and atomic fine-structure lines from the most distant objects in the Universe.

T. Phillips (USA) and K. Menten (Germany)

J4 - LARGE RADIO SURVEYS

Several new sky surveys are in progress or are planned. These include observations with dedicated multi-beam systems and are directed at HI, pulsars, masers and radio continuum. Papers are solicited on all aspects of surveys, their results and interpretation.

L. Staveley-Smith (Australia)

J5 - OBSERVATORY REPORTS

Reports on new developments taking place at Radio

Astronomy Observatories are solicited.
K. Kellermann (USA)

J6 - RECENT SCIENTIFIC DEVELOPMENTS

This session is devoted to highlights in Radio Astronomy-Scientific and Technical, over the past 3 years.

J. N. Hewitt (USA)

Joint Sessions led by Commission J

JBC - ADAPTIVE ANTENNA TECHNOLOGIES FOR DECAMETRIC RADIO TELESCOPES

The potential of using adaptive array technologies for radio telescopes is within reach of telescopes for the next decades. The large flexibility due to electronic control like multibeaming and adaptive arraying, will bring about new observing capabilities in an increasingly electromagnetically polluted observing environment. The presentations will be given by invited speakers who will address state-of-the-art aspects for several systems including wideband antenna, front-end and signal processing aspects now under study. A. van Ardenne (The Netherlands) and J. G. Lucas (Australia)

JCEG - INTERFERENCE PROTECTION MEASURES

This session will emphasize receiving techniques for removing interference from measurements of natural phenomena. Frequency management issues will be left to other sessions. Techniques from a broad range of scientific disciplines, such as sonar, remote sensing, and radio astronomy are welcome. Adaptive null steering and filter techniques from radar and other fields are also of interest, particularly where they can be applied to low receiver noise and low SNR applications. R. Fisher (USA) Contribution to the spectrum congestion issue is among the objectives of this session

JDC - FUTURE MILLIMETRE RECEIVERS

Papers are solicited on new developments in millimetre receiver technology. Mixer developments and MIMIC front-ends are of importance, as are local oscillator developments.

R. Blundell (USA), J. Archer (Australia), V. Fusco (UK) and C. Stewart (UK)

JF - TROPOSPHERIC PATH DELAY CORRECTION

Tropospheric path delay fluctuations limit the angular resolution and image quality of radio images and are particularly detrimental to interferometer arrays operating at millimeter and sub-millimeter wavelengths. The primary cause of the fluctuations is the variation in atmospheric water vapor. The session will include invited and contributed presentations on the techniques and instruments being developed to measure and correct the water vapor induced delay fluctuations.

D. Woody (USA) and J. P. V. Poyares-Baptista (The Netherlands)

COMMISSION K: ELECTROMAGNETICS IN BIOLOGY AND MEDICINE

K1 - MECHANISMS AND MODELING OF ELECTROMAGNETIC INTERACTION WITH BIOLOGICAL SYSTEMS

Description and evaluation of analytical models proposed to explain biological effects of electric and magnetic fields of low intensity from ELF to Microwaves. For ELF emphasis will be on electric fields in tissue or culture medium of less than 1 mV/m and magnetic flux densities less than 100 micro T. An attempt will be made to identify new information on biological structures and processes at the microscopic level and on critical experiments that are needed to support or reject theories. Contributions will identify processes in biological systems that could help in linking low level molecular modifications to cellular alterations.

C. Polk (USA) and G. D'Inzeo (Italy)

K2 - BIOLOGICAL EFFECTS OF ELECTROMAGNETIC FIELDS

The biological system responds to many stimuli as part of the process of living and such responses are examples of biological effects. In vitro, in vivo, and epidemiological studies designed to investigate biological responses and health implications of ELF and RF electromagnetic fields are solicited for presentation. Particular emphasis will be placed on the quantification of a specified electromagnetic environment producing a characterizable biological effect and efforts to evaluate ELF and RF fields as potential hazards to human beings.

L. Kheifets (USA) and R. Korenstein (Israel)

K3 - HAZARD ASSESSMENT FOR WIRELESS COMMUNICATION

Wireless personal communication is a rapidly expanding sector, particularly in the fields of cellular mobile phones and wireless local area networks (WLANs). Cellular phones use low-speed data transmission over wide geographical areas, while WLANs are adopted in services requiring high-speed data transmission over confined or small areas (e. g. inside or between buildings). Papers are solicited in the general area of potential health effects of the exposure conditions related to the electromagnetic fields emitted from wireless communication systems. Contributions covering induced fields in biological tissues, low level and thermal effects, in vitro and in vivo studies, epidemiological studies, as well as studies on the influence of the signal modulation (both in analog and digital systems) on the health hazard are encouraged.

P. Bernardi (Italy) and B. Veyret (France)

K4 - BIOMEDICAL APPLICATIONS OF ELECTROMAGNETIC FIELDS AND WAVES

Recent progress in bioelectromagnetics and electromagnetic technology has opened a new horizon in medicine and biology. This session focuses on the contributions of both

diagnostic and therapeutic applications of electromagnetic fields and waves. The session includes new technologies in magnetic resonance imaging (MRI), superconducting quantum interference device (SQUID) systems, magnetoencephalography (MEG), magnetocardiography (MCG), biomagnetic source imaging, impedance imaging, magnetic stimulation, electromagnetic convulsive therapy, gene expression, electromagnetic hyperthermia, soft tissue healing, nerve regeneration, bone growth and osteoporosis treatment. New biomedical applications of electromagnetic fields and waves based on established and newly observed phenomena are also emphasized.

C. Gabriel (UK) and S. Ueno (Japan)

Joint Sessions led by Commission K

KA - EXPOSURE ASSESSMENT FOR CELLULAR AND PERSONAL TELECOMMUNICATIONS

An increasing number of devices used in our daily lives depend on the transmission of microwaves and other radio frequency electromagnetic fields (3 kHz to 300 GHz). People are concerned about the safety of using these devices. In the 70's and 80's, extensive research was conducted to answer questions concerning the safety of broadcasting, radar, and microwave ovens. During the last decade, people have been more concerned with health effects using portable cellular telephones and personal communication devices, as well as exposures from base stations. In this session, invited speakers will summarize current knowledge in exposure assessment for cellular and personal telecommunications, followed by contributed platform papers and posters.

C. Chou (USA) and M. Taki (Japan)

KB - COMPUTATION OF ELECTROMAGNETIC FIELDS IN THE HUMAN BODY

Computational methods are being developed to calculate internal EM fields in realistic, anatomically-based models of the human body both for far-field and near-field exposure conditions from ELF to microwave frequencies. These methods are being used for assessment of EM safety as well as for design of antennas for personal wireless devices and for biomedical applications. The session will consist of

about half of the papers invited from leading researchers and the remaining presentations based on contributed papers. The session emphasis will be on the applications of advanced numerical techniques, hybrid methods, more in-depth presentation of cause and effects, establishment of useful engineering design data, novel antennas and comparative evaluations of various numerical techniques and measured data.

O. Gandhi (USA) and Y. Rahmat-Samii (USA)

KC - HEALTH EFFECTS OF MOBILE TELEPHONES

Cellular phone systems expose users to microwave fields at the head under near-field conditions. Increasing use of digital systems has raised questions about possible health effects attributable to the extremely-low-frequency AM components of the TDMA and CDMA signals. Research in animal models has addressed possible tumor promotion effects. Neurobehavioral studies in man have investigated a variety of symptoms, including headaches, altered attention span, and changed sleep patterns. Reports are solicited that describe results related to these topics.

R. Adey (USA), N. Kuster (Switzerland) and E. Bonek (Austria)

KE - ELECTROMAGNETIC INTERFERENCE WITH MEDICAL DEVICES

With the increasing use of radio frequency waves for communications, and the rapid development of medical device sophistication, there are increasing risks to patient health and safety from the potential for interference among these technologies. There are many aspects of electromagnetic interference (EMI) with medical devices: the proliferation of radio sources in and around healthcare facilities, the rise in wireless technology and its application in medical care, the realization of EMI as a potential risk for devices, the increased reliance on national and international standards addressing device EMI, and the need for international cooperation. This session will deal with the concerns about EMI with medical devices and what is being done to address these concerns as we approach the 21st century.

D. Witters (USA) and O. Fujiwara (Japan)



AWARDS FOR YOUNG SCIENTISTS

CONDITIONS

These awards are intended to assist young scientists from both developed and developing countries to attend the General Assembly of URSI.

To qualify for an award the applicant :

1. must be less than 35 years old on September 1 of the year of the URSI General Assembly;
2. should have a paper, of which he or she is the principal author, submitted for oral or poster presentation at a regular session of the General Assembly;
3. should hold a Ph.D. if older than 28 years, or have equivalent research experience as evidenced by a list of publications or contributions to conferences. This condition may be waived in the case of some applicants from developing countries.

Applicants should also be interested in promoting contacts between developed and developing countries.

All successful applicants are expected to participate fully in the scientific activities of the General Assembly. They will receive free registration, and financial support for board and lodging at the General Assembly. Supported accomodation will be only in places arranged by the organisers. Limited funds will also be available for part or all of the travel costs of young scientists from developing countries.

Apply before 15 November 1998 through the URSI Member Committee in the country (or territory) in which you are normally working (an address list is appended). Only if there is no such committee, apply directly to the URSI Secretariat (address below). Please submit all necessary documents including abstract of paper.

After collecting and ranking the applications, the URSI Member Committees is requested to send all applications to the URSI Secretariat before 15 January 1999.

The URSI Secretariat
c/o University of Gent / INTEC
Sint-Pietersnieuwstraat 41
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<http://www.intec.rug.ac.be/ursi>

APPLICATION FOR AN URSI YOUNG SCIENTIST AWARD

I wish to apply for an award to attend the XXVIth General Assembly of the International Union of Radio Science in Toronto, Canada, 13th - 21st August 1999, under conditions of financing and lodging fixed by the organising committee.

Name : Prof./Dr./Mr./Mrs./Ms.

Sex : male / female Family Name First Name Middle Initials

Date of birth (day / month / year) : / /

Studying/Employed at :

Institution

Department

Mailing address : Please send all correspondence to my business / home address, i.e.

Street

City and postal code

Province/State Country

Fax E-mail

Academic qualifications, with date(s) obtained :

.....

I wish to present a paper entitled :

.....

in a regular oral session of the General Assembly in a regular poster session

This paper should be in a session of Commission : (leave blank if uncertain).

A_Electromagnetic Metrology

F_Wave Propagation & Remote Sensing

B_Fields and Waves

G_Ionospheric Radio and Propagation

C_Signals and Systems

H_Waves in Plasmas

D_Electronics and Photonics

J_Radio Astronomy

E_Electromagnetic Noise & Interference

K_Electromagnetics in Biology & Medicine

Please attach a brief (one or two pages) curriculum vitae, including a list of publications.

Date : Signed

Mail this form to the URSI Member Committee in your territory before 15 November 1998 (see address list overleaf). Only if there is no such Committee, apply directly to the URSI Secretariat.

For applicants from developing countries only :

I estimate the cheapest return APEX air fare to the URSI meeting is US\$.....

For graduate students only - Supervisor's endorsement :

I support the application for an award to enable this young scientist to attend the forthcoming General Assembly of URSI for the following reasons :

.....

.....

Supervisor's Name and Title :

Address :

Date : Signed :

URSI MEMBER COMMITTEES

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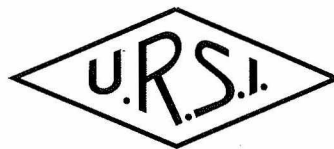
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CONFERENCE REPORT

ICT'98

Chalkidiki, Greece, 21-25 June 1998

The International Conference on Telecommunications 1998 (ICT'98) was held at Porto Carras Resort, Chalkidiki, Greece, on 21-25 June 1998.

The conference had attracted more than 530 papers and 30 tutorials and the technical programme committee had endeavoured to arrange a conference of high quality and interest. After an extensive peer review carried out on full length papers 399 papers were included in 63 technical and 2 poster sessions. In addition, 4 tutorials were presented in parallel to the main activities.

Two plenary sessions covered hot topics on telecommunications like UMTS standardization, Multimedia applications, Satellite Communications and High Speed networking.

Furthermore, the International Conference on Telecommunications 1998 justified very well its theme "*Bridging East and West through telecommunications*" with papers received from 40 different countries from all

over the world, both from the industrial and the academic telecommunications sectors.

More than 500 participants attended the conference and they enjoyed the interesting programme as well as the social events offered at the nice resort of Porto Carras. Internet lines were offered free of charge to the participants to access their email while being in Greece.

The conference was organised by the Aristotle University of Thessaloniki and the King's College of London and was supported by IEEE, IEE and URSI.

Sponsorship has been received by TELESTET, PANAFON, SIEMENS, ERICSSON HELLAS, OTE and EGNATIA BANK. The sponsors had organised an exhibition in parallel to the conference activities which succeeded very well in attracting the interest of the participants.

Dr.F-N.Pavlidou
Technical Programme Chair ICT98

CONFERENCE ANNOUNCEMENTS

10TH MICROCOLL

Budapest, Hungary, 21-25 March 1999

The Microcoll conference series was started in the Spring of 1959 to promote personal contacts and exchange of ideas between scientists in the field of microwave communications. It was organized every fourth year with success, the last time in 1990. Recently it was decided to re-establish the Microcoll series on its 40th anniversary, i.e. in March, 1999.

The aim is the same, however, the covered topics will be broader because in the meantime new areas emerged like mobile and optical communications.

The 10th Microcoll will be organized based on a broad international scientific background and sponsored by the main international scientific societies.

Conference Chairman: Zombory L., Technical University of Budapest, Hungary.

International Programme Committee Chairman: Veszely G., Technical University of Budapest, Hungary.

Topics

- Mobile cellular urban and rural communications
- Wireless access networks
- Terrestrial microwave radio links
- Indoor wireless and optical systems
- Satellite mobile and fix services
- Optical communications
- Remote sensing

- Microwave and wireless antennas and propagation
- Microwave and optical electronics
- Microwave and optical integrated circuits (monolithic and hybrid)
- CAD for RF/microwave/optical integrated circuits and subsystems
- Electromagnetic field theory and numerical techniques
- Microwave/optical measurements
- Biological effects

Contact

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 E-mail : diamond.eft@mtesz.hu
<http://www.mtesz.hu/tagegy/diamond/eindex.htm>

RADIO METHODS FOR STUDYING TURBULENCE

Urbana, Illinois, USA, 9-12 August 1999

Turbulence is a phenomenon common in nature, observed in geophysical and astrophysical, neutral and ionized, media. Specialists working on turbulence, whether in the atmosphere, ionosphere, or solar wind, encounter similar problems with data analysis and interpretation in terms of theoretical models.

The Workshop is intended to meet the general need for an exchange of information and ideas between scientists working on turbulence in various environments. It will bring together experts from all over the world that work on turbulence using radio methods. The emphasis will be put on data analysis, characterization and interpretation, but theoretical results are also welcomed. Participation by Young Scientists (less than 35 years of age at the time of the meeting) is encouraged.

All papers will be presented at plenary sessions. Poster sessions can be arranged if needed. An abstract book will be distributed at the Workshop.

The Workshop is a joint effort of URSI Commissions: E - Electromagnetic Noise and Interference, F - Wave Propagation and Remote Sensing, G - Ionospheric Radio and Propagation, H - Waves in Plasmas, and J - Radio Astronomy. The Workshop is sponsored by URSI, but sponsorship by various other scientific organizations is being sought. The Registration fee is USD120 and for Young Scientists USD70.

Deadline

Submission of the pre-registration form : September 15, 1998

Programme and Scientific Committee:

H. Kikuchi (Japan) and S. Moiseev (Russia) (Comm. E), A. W. Wernik (Poland) and K. C. Yeh (USA) (Comm. G), V. Krasnoselskikh (France) and F. Lefevre (France) (Comm. H), B. J. Rickett (USA) (Comm. J), + representatives of other sponsors

Organizing Committee:

Belva Edwards, Steven J. Franke, Erhan Kudeki, Joyce Mast, K. C. Yeh, George Swenson, Jr. (all from University of Illinois at Urbana-Champaign, USA), and Andrzej W. Wernik (Space Research Center, Poland)

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THE UNIVERSE AT LOW RADIO FREQUENCIES

Pune, India, 30 November - 4 December 1999

The above symposium, sponsored by the International Astronomical Union (as IAU Symposium 199) and co-sponsored by URSI, will be held in Pune, India from November 30 to December 4, 1999. The symposium will focus on all aspects of radio astronomy at frequencies below about 1 GHz.

Topics

1. High redshift HI in emission and absorption
2. Radio source surveys at low frequencies

3. Extragalactic radio sources
 - extended lobes, tails and bridges
 - relic radio emission
 - cluster halos
 - non-thermal halos in spirals
 - sub-milli Jansky source populations
 - low frequency variability of radio sources
4. Galactic radio sources and the interstellar medium
 - diffuse Galactic non-thermal background
 - SNRs and HII regions

- Pulsars
- Sun and radio stars
- recombination lines and the ISM
- interstellar scintillations

5. Instruments and techniques for low-frequency radio astronomy

- self calibration and non-isoplaniticity of the ionosphere
- wide-field imaging
- wide-band feeds

- phased arrays at low frequencies
- interference rejection/cancellation

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URSI CONFERENCE CALENDAR

URSI cannot be held responsible for any errors contained in this list of meetings.

The Guidelines and Rules for URSI Sponsorship of Meetings can be found at <http://www.intec.rug.ac.be/ursi/Rules.html>

September 1998

EMC Roma'98

Rome, Italy, 14-18 September 1998

Contact : Symposium Secretariat EMC'98 Roma, AEI-Ufficio Centrale, Attn. Daniela Fioramonti, Piazzale R. Morandi 2, I-20121 Milano, Italy, Tel. : +39 2-77790205/218, Fax : +39 2-798817, E-mail: conferencesaei@aei.it, <http://www.aei.it/emc98roma.html>

Physics and Engineering of Millimeter and Submillimeter Waves

Kharkov, Ukraine, 15-17 September 1998

Contact : Dr. A.A. Kostenko, Institute of Radiophysics and Electronics, National Academy of Science of Ukraine, 12 Acad. Proskura St., Kharkov 310085, Ukraine, Tel. & Fax +380 572-44 1105, E-mail : symposium@ire.kharkov.ua, <http://www.intec.rug.ac.be/ursi/SMW98.html>

Spanish National Symposium URSI'98

Pamplona, Spain, 16-18 September 1998

Contact : Secretaría del Symposium URSI'98, UPNA, Dpto de Ing. Eléctrica y Electrónica, Campus de Arrosadía, s/n, 31006 Pamplona, Spain, E-mail: congreso.ursi@upna.es

URSI Commission F Triennial Open Symposium Wave Propagation and Remote Sensing

Aveiro, Portugal, 22-25 September 1998

Contact : Dr. Armando C.D. Rocha, Instituto de Telecomunicações, Universidade de Aveiro, 3810 Aveiro, Portugal, Tel. +351 34-370324, Fax +351 34-381128, E-mail : arocha@av.it.pt, <http://www.av.it.pt/ursi/>

ISSSE'98 - 1998 International Symposium on Signals, Systems and Electronics

Pisa, Italy, 29 September - 2 October 1998

Contact : Organizing Secretariat, ISSSE'98, University of Pisa, Dept. Information Engineering, Via Diotisalvi 2, I-

56126 PISA, Italy, Tel. : +39 50-879740/879768, Fax : +39 50-879812, e-mail: incor@sirius.pisa.it, <http://www.iet.unipi.it/ISSSE98>

November 1998

IEEE-APS conference on Antennas and Propagation for Wireless Communications

Waltham, MA, USA, 2-4 November 1998

Contact : Prof. Tuli Herscovici, APWC98, 52 Agnes Drive, Framingham, MA 01701, USA, Tel. : +1 508-788 5152, Fax : +1 508-788 6226, E-mail : tuli@tiac.com, <http://www.tiac.net/users/tuli/apwc98/welcome.html>

JINA 98 - Tenth International Symposium on Antennas

Nice, France, 17-19 November 1998

Contact : Secretariat JINA 98, France Telecom/CNET, Fort de la Tête de Chien, F-06320 La Turbie, France, Fax: +33 4-9210 6519, E-mail: jina.cnet@wanadoo.fr, <http://wwwwelec.unice.fr/JINA-98/>

4th EBEA Congress and Round Table on Standards

Zagreb, Croatia, 19 November 1998

Contact : 4th EBEA Congress Secretariat, University of Zagreb, Faculty of Electrical Eng, Institute for Radiocommunications and Microwave Eng, Unska 3, HR-10000 Zagreb, Croatia, Fax +385 1-6129 606, E-mail : 4thebea@fer.hr, <http://www.radio.fer.hr/cost244/4thebea>

December 1998

Asia-Pacific Microwave Conference

Yokohama, Japan, 8-11 December 1998

Contact : Prof. Yoshio Kobayashi, Faculty of Engineering, Saitama University, Urawa, Saitama 338, Japan, Fax +81 48-857 2529, E-mail : yoshio@reso.ees.saitama-u.ac.jp

January 1999

Commsphere'99

Toulouse, France, 25-28 January 1999

Contact : Dr. Pierre Bäüer, CESBIO, 18, avenue Edouard Belin, F-31401 Toulouse Cédex 4, France, Tel : +33 5-6155 8525, Fax : +33 5-6155 8500, e-mail : pierre.bauer@cesbio.cnes.fr, <http://www.cnes.fr/actualites/commsphere>

February 1999

13th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility

Zurich, Switzerland, 16-18 February 1999

Contact : Dr. Gabriël Meyer, Communication Technology Laboratory, Sternwartstraße 7, CH-8092 Zurich, Switzerland, Tel. +41 1-632 2790, Fax +41 1-632 1209, E-mail : gmeyer@nari.ee.ethz.ch, <http://www.nari.ee.ethz.ch/emc/emc.html>

March 1999

MICROCOLL

Budapest, Hungary, 21-23 March 1999

Contact : Ms. K. Lang & Mr. A. Varga, Diamond Congress Ltd. - Microcoll, Fo u. 68, H-1027 Budapest, Hungary, Tel. +36 1-214 7701, Fax +36 1-201 6383, E-mail : diamond.eft@mtesz.hu, <http://www.mtesz.hu/tagegy/diamond/eindex.htm>

August 1999

Radio Methods for Studying Turbulence

Urbana, Illinois, USA, 9-12 August 1999

Contact : Prof. A. W. Wernik, Space Research Center, Polish Academy of Sciences, ul. Bartycka 18a, 00-716

Warsaw, Poland. Tel +48-22-403766 ext 379; fax +48-22-403131; email aww@cbk.waw.pl

XXVIth URSI General Assembly

Toronto, Canada, 13-21 August 1999

Contact : URSI GA '99 Secretariat, National Research Council Canada, Ottawa, Ontario K1A 0R6, Canada, Tel. +1 613-993 7271, Fax +1 613-993 7250, E-mail : ursi99@nrc.ca, <http://www.nrc.ca/confserv/ursi99/welcome.html>

November 1999

The Universe at Low Radio Frequencies

Pune, India, 30 November - 4 December 1999

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August 2000

ISAP 2000

Fukuoka, Japan, 22-25 August 2000

Contact : Dr. Yoshio Karasawa, ISAP 2000, KDD R&D Labs, Inc. 2-1-15 Ohara, Kamifukuoka-shi, Saitama 356-8502, Japan, Tel. +81 492-78 7327, Fax +81 492-78 7524, E-mail karasawa@lab.kdd.co.jp

UTC Time Step



Une seconde intercalaire positive sera introduite à la fin de décembre 1998. La séquence des dates des repères de secondes de UTC sera :

1998 décembre 31,	23h 59m 59s
1998 décembre 31,	23h 59m 60s
1999 janvier 1,	0h 0m 0s

La différence entre UTC et le Temps Atomique International TAI est:

de 1997 juillet 1, 0h UTC, à 1999 janvier 1, 0h UTC : UTC-TAI = -31 s

de 1999 janvier 1, 0h UTC, jusqu'à nouvel avis : UTC-TAI = -32 s

Des secondes intercalaires peuvent être introduites à la fin des mois de décembre ou de juin, selon l'évolution de UT1-TAI. Le Bulletin C est diffusé deux fois par an, soit pour annoncer un saut de seconde, soit pour confirmer qu'il n'y aura pas de saut de seconde à la prochaine date possible.

Daniel GAMBIS
Directeur, Bureau Central de l'IERS
Service International de la Rotation Terrestre

A positive leap second will be introduced at the end of December 1998. The sequence of dates of the UTC second markers will be :

1998 December 31,	23h 59m 59s
1998 December 31,	23h 59m 60s
1999 January 1,	0h 0m 0s

The difference between UTC and the International Atomic Time TAI is:

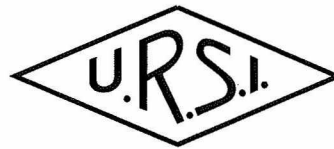
from 1997 July 1, 0h UTC, to 1999 January 1, 0h UTC : UTC-TAI = -31s

from 1999 January 1, 0h UTC, until further notice : UTC-TAI = -32 s

Leap seconds can be introduced in UTC at the end of the months of December or June, depending on the evolution of UT1-TAI. Bulletin C is mailed every six months, either to announce a time step in UTC or to confirm that there will be no time step at the next possible date.

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News from the URSI Community



PROFILE OF A MEMBER COMMITTEE

THE U.S.A.

U.S. representation to URSI is through the National Academy of Sciences in Washington, DC, and this is the organization which adheres to the Union. The URSI Member (or National) Committee is commonly abbreviated USNC/URSI, and is a committee of the National Research Council (NRC) of the National Academy of Sciences, National Academy of Engineering and Institute of Medicine. The Committee was established in early 1922, on the admission of the U.S. to the Union, and hosted the second General Assembly of URSI in Washington, DC, in October 1927. It has been prominent in URSI ever since. Six scientists from the U.S. have served as URSI President: L.W. Austin (1932), who was one of the first Vice Presidents of URSI and died shortly after taking over as President from General Ferrié; A.E. Kennelly (1932-34); L.V. Berkner (1957-60); S. Silver (1966-69); W.E. Gordon (1981-84); and T.B.A. Senior (1996-). In addition to the 1927 General Assembly, the Committee hosted the meeting on two other occasions: in Boulder, CO, in 1957, and Washington, DC, in 1981.

The Committee is quite large and its members are widely representative of radio science in the U.S. The officers are the Chair and the Secretary. In addition, the Committee includes the immediate Past Chair; the Chairs of the USNC/URSI Commissions, corresponding to the 10 Commissions of URSI; any (international) URSI Officers, Commission Chairs and Vice Chairs residing in the U.S. (these presently total eight); six members-at-large; six representatives of scientific societies; and six liaison representatives from U.S. Government organizations involved with radio science. The Foreign Secretary of the Academy is a member ex officio, and staff assistance is provided by the NRC. All members are appointed by the NRC for three-year terms corresponding to the three-year cycle of URSI. The Committee meets once a year, generally on the occasion of the January National Radio Science meeting held in Boulder, CO. The officers are elected by the Committee, with the Chair previously having served as the Secretary. At a General Assembly, the USNC/URSI Chair heads the U.S. delegation and represents the U.S. in Council meetings. The Chair of each USNC/URSI Commission is likewise the Official U.S. Member of the corresponding URSI Commission. In collaboration with

the Commission Chairs, the Secretary is responsible for organizing the Boulder meeting. A listing of USNC/URSI Chairs since World War II is given at the end of this article.

The Executive Committee consists of the officers, the immediate Past Chair and any (international) URSI Officer residing in the U.S., and is responsible for decisions that must be made between meetings of the entire USNC.

Each USNC/URSI Commission has members who are elected by the Commission, based on criteria that include technical qualifications, publications in refereed journals, and participation in USNC/URSI activities. Some Commissions have as many as 250 members, and the list is reviewed every three years to ensure that it contain only those with a continuing interest in URSI. Every Commission holds a business meeting at the time of the USNC meeting and, perhaps, at other symposia where the Commission is involved. The Commission Vice Chair is elected by the members and succeeds to the Chair except in unusual circumstances. On completion of a term in office, a Commission Chair is an obvious candidate for the position of USNC/URSI Secretary. This guarantees that the Secretary has prior URSI experience, but has the disadvantage of requiring a time commitment to USNC/URSI that could last as long as 15 years. To many young scientists in the U.S., USNC/URSI is synonymous with URSI itself, and membership in a USNC/URSI Commission is regarded as membership in URSI.

Shortly after World War II the Committee began holding a few technical sessions at the time of its annual meeting. This was typically in late April or early May at an hotel in Washington, DC (the famous Willard Hotel was an early choice), in conjunction with a meeting of the American Geophysical Union. The sessions were shown as jointly sponsored by four or five Professional Groups of the Institute of Radio Engineers (IRE, now IEEE). By the late 1950s, the increasing popularity of these sessions justified an additional meeting, and in 1960 one was held in Austin, TX, in October. This was the pattern for the next few years, with a "Spring" meeting in Washington, DC, and a "Fall" meeting at a varying location. Meanwhile, the IRE Professional Group on Antennas and Propagation had started its own International Symposium, and in 1966 this was combined with the USNC/URSI Fall meeting. This

joint scheduling has continued ever since, and over the years the IEEE AP-S International Symposium and URSI Radio Science Meeting (as it is now called), has moved gradually from Autumn to its present Spring/Summer time. About half of the USNC/URSI Commissions now participate, and the 33rd such meeting was held recently in Atlanta, GA, 21-26 June 1998. The meetings attract over 1200 registrants and are scheduled at least five years in advance.

By 1973 the size of the USNC/URSI Spring meeting and the popularity of Washington, DC, as a conference location made it necessary to seek another site, and it was decided to move the meeting to Boulder, CO, where the facilities of the National Bureau of Standards (now National Institute of Standards and Technology), and the University of Colorado were available. It has remained there ever since, and by 1981 had settled into its present early January time frame. These National Radio Science (or Boulder) meetings last four days and have about 350 participants. It is here that the U.S. National Committee meets, and all 10 Commissions hold business meetings and technical sessions. For the past 15 years, a feature has been the Student Prize Paper Competition open to any student in a graduate-degree program at a U.S. university. This is a method for attracting young scientists to URSI and there are usually about a dozen contestants. Based on their paper presentations, the best three share cash prizes totaling \$2250 and have their expenses paid for attending the meeting. The Committee also selects the Booker Fellow. The Fellowships were established in 1981 to honor Henry G. Booker, who served as Vice President of URSI (1969-75) and Honorary President (1978-89), and provide support for an outstanding young U.S. scientists to attend a General Assembly.

At intervals of about six years the January and Spring/Summer meetings are combined with a meeting of the Canadian National Committee for URSI (CNC/URSI), at a location in Canada. The last such meeting was held in Montreal, 13-18 July 1997. The URSI portion is then referred to as a North American Radio Science Meeting, and with the creation of an URSI Member Committee in Mexico, it is hoped that future meetings in the series will involve all three countries.

The Boulder meetings are financially self-supporting but do not, in general, provide any income. However, the joint meeting with IEEE AP-S is different. Thanks to the time and effort donated by the scientists at the host institution and the large number of registrants, even a registration fee of (typically) \$400 generates a substantial surplus. This is divided between the two participating organizations according to a formula which takes into account the number of registrants for each meeting, and can produce an income to USNC/URSI of as much as \$50,000 per year. Most of this is used to support the attendance of the U.S. delegates at a General Assembly. Although an Assembly is now open to all registrants, the U.S. still names an official delegation of about 120 scientists, and only they are eligible for support. The slots are allocated among the Commissions according to the activity of their members at USNC/URSI meetings during the past triennium. Each Commission then elects its representatives taking into account the technical program at the General Assembly. It is a process fitting for the "cradle of democracy."

A USNC/URSI Homepage has just been developed at <http://www.usnc-ursi.org> and will contain information about the Committee's activities.

The USNC/URSI Chairs have been :

1940-48	John H. Dellinger
1949-51	Lloyd V. Berkner
1952-53	Charles R. Burrows
1953-54	Arthur H. Waynick
1955-57	Harry W. Wells
1958-60	William E. Gordon
1961-63	John P. Hagen
1964-66	Millett G. Morgan
1967-69	Edward C. Jordan
1970-72	Alan T. Waterman, Jr.
1973-75	Francis S. Johnson
1976-78	John V. Evans
1979-81	C. Gordon Little
1982-84	Thomas B.A. Senior
1985-87	Robert K. Crane
1988-90	Sidney A. Bowhill
1991-93	Chalmers M. Butler
1994-96	David C. Chang
1997-	Susan K. Avery

Thomas B.A. Senior

NEWS FROM THE COMMISSIONS

COMMISSION F

As a result of conversations subsequent to the Coordinating Committee meeting in Toronto in May 1998, Dr. Yoshio Karasawa has kindly agreed to act for

Commission F as an Associate Editor of *the Radio Science Bulletin* alongside Dr. Pedro Poiaras Baptista.

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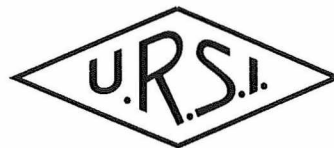
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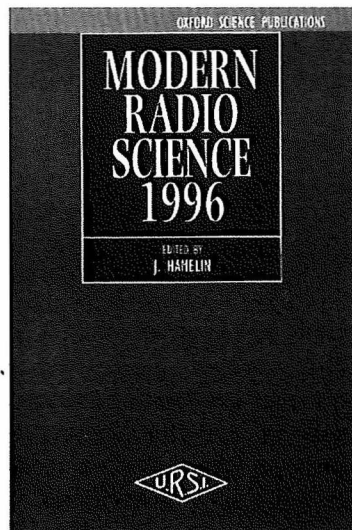
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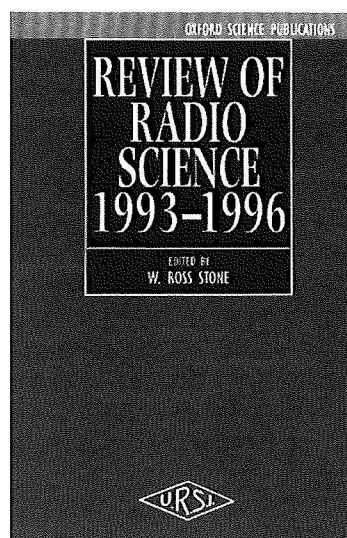
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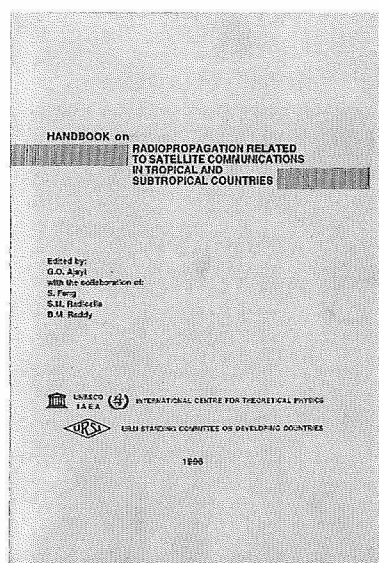


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