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Contents

Front cover : *Staff of the URSI Secretariat (from left to right): Prof. P. Lagasse (Secretary General), Prof. F. Olyslager (Assistant Secretary General), Ms. I. Lievens (Administrative Secretary), Ms. I. Heleu (Executive Secretary), Dr. W. R. Stone (Assistant Secretary General - Publications) (More information on page 3 : "Latest News" on the URSI Homepage)*

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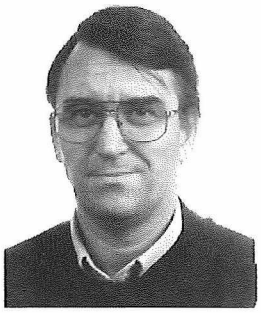
Editorial

Dear URSI Correspondent,



Welcome to the Summer issue of your Radio Science Bulletin, in which you will find several interesting topics to read through.

First of all, we have a scientific contribution by V.N. Ikonomidou and G.D. Sergiadis concerning interference. Their paper presents an overview of interfering emissions for DCS-1800 systems. As we often do, we have news, and the presentation of a Member Committee: this time, with pleasure, we host Germany in our pages.

In the administrative part of this issue, you will find news from our URSI Community. Besides the regular news section, with conference reports, award conditions, and future events, we have a short note in memory of Roger M. Gallet.

The URSI Accounts for last year are given. Also note that our next General Assembly is not so far away : hence, do keep track of actions to be taken to prepare for this event.

A last topic deals with a forthcoming reorganisation of the URSI Secretariat. As you will read Dr.W.Ross Stone has recently become the new Assistant Secretary General for Publications. In this respect, he will restructure several aspects of this very important activity of our Union. For this purpose, I will leave my function of RSB Editor in the near future to let Ross have a free hand and undertake and propose new actions for the benefit of our Union. I wish him very much success in this new responsibility.

It has been a pleasure for me to serve you as Editor, and as usual I wish you a pleasant reading.

Piotr Sobieski, Editor

"Thank you" to the Editor

It is my privilege and pleasure to express the gratitude of the URSI Board to Piotr Sobieski for his contributions and for a job well done as editor of the Radio Science Bulletin. I am sure that the whole URSI community has much appreciated his efforts and commitment to making the Radio Science Bulletin a successful and useful communication medium in the radio science area. It is only thanks to the dedication of scientists such as Piotr that URSI can further develop and prosper.

At the URSI Board meeting of May Ross Stone was named Assistant Secretary General (Publications). The considerable skill and experience of Ross in the area of publications will strengthen the secretariat and allow URSI to better serve the radio science community by means of an expanded publication effort.

As seen on the front page photo Inge Lievens has joined the secretariat team as part-time colleague of Inge Heleu who is now also working part-time (70%) while still maintaining her by now well known commitment to URSI.

Latest News on URSI Homepage

Please make it a habit of visiting the URSI Web pages regularly, there certainly is a lot of useful information there. Just go to the **"Latest News" section** at *http://www.intec.rug.ac.be/ursi/Latest.html*, and you will find the latest information with links to updated and new pages.

The URSI Board of Officers decided at the annual Board Meeting (8-9 May 2001) to appoint Dr. W. Ross Stone as Assistent Secretary General (Publications). This decision was made to improve the quality of the *Radio Science Bulletin* and to increase the amount of scientific papers in it. They also appointed Ms. Inge Lievens as Administrative Secretary. Therefore the URSI Secretariat consists of the following **staff**: Prof. Paul Lagasse (Secretary General), Prof. Frank Olyslager (Assistant Secretary General), Dr. W. Ross Stone (Assistant Secretary General - Publications), Mrs. Inge Heleu (Executive Secretary) and Mrs. Inge Lievens (Administrative Secretary).

Please send your e-mail messages to the general e-mail address of the URSI secretariat, namely : ursi@intec.rug.ac.be

You may know that the young scientists who wish to apply for a Young Scientist Award to attend the Maastricht General Assembly in 2002 have their own section on our homepage, i.e. the **URSI Young Scientist web site**. Now this section has its own "What's New" page. All recent changes and latest information for Young Scientists is shown on this page. An important change is that the Board at its annual meeting of 8-9 May 2001 decided to drop the condition that young scientists should have a Ph.D. at the age of 28.

The report from the **Long Range Planning Committee** to the URSI Board (May 2001) is published on the homepage. Please read this interesting report and send us your thoughts.

Please send your comments and your ideas to improve the URSI Homepage to : ursi@intec.rug.ac.be.

URSI Accounts 2000

The URSI accounts have always to be regarded in a 3 year cycle because of our triennial General Assemblies. Now, in the years in between we usually accumulate some funds to cover the huge expenses of the next GA. Our surplus this year stems among others from some late-paid revenues of the 1999-GA, but also from a reduction of the administrative expenses by 34%. In addition the market value of our investments has increased in 2000 by 4.3% with respect to 1999 despite of the baisse at the stock markets. On the other hand there are still nine member countries who have not paid their dues for 2000 or earlier years. Nevertheless, it can be stated that the overall financial shape of URSI is sound, and we are well prepared for the next GA in 2002.

Paul Lagasse
Secretary General

Kristian Schlegel
Treasurer

BALANCE SHEET: 31 DECEMBER 2000

ASSETS	US$	US$	EURO	EURO
Dollars				
Merrill Lynch WCMA	17,969.03		19,311.15	
Smith Barney Shearson	96.41		103.61	
Fortis	63,690.98		68,448.12	
		81,756.42		87,862.88
Belgian Francs				
Banque Degroof	3,490.67		3,751.39	
Fortis	124,805.70		134,127.56	
		128,296.37		137,878.95
Investments				
Demeter Sicav Shares	22,794.75		24,497.31	
Rorento Units	111,969.73		120,332.86	
Aqua Sicav	64,103.22		68,891.15	
Merrill-Lynch Short Term (405 units)	3,717.19		3,994.83	
Massachusetts Investor Fund	277,478.91		298,204.09	
	480,063.80		515,920.24	
342 Rorento units on behalf of van der Pol Fund	12,476.17		13,408.03	
		492,539.97		529,328.27
Petty Cash		644.78		692.94
Total Assets		**703,237.54**		**755,763.04**
Less Creditors				
IUCAF	17,371.70		18,669.21	
ISES	5,161.30		5,546.80	
		-22,533.00		-24,216.01
Balthasar van der Pol Medal Fund		-12,476.17		-13,408.03
NET TOTAL OF URSI ASSETS		**668,228.37**		**718,139.00**

The net URSI Assets are represented by:	US$	US$	EURO	EURO
Closure of Secretariat:				
Provision for Closure of Secretariat		50,000.00		53,734.55
Scientific Activities Fund:				
Scientific Activities in 2001	90,000.00		96,722.19	
Publications in 2001	60,000.00		64,481.46	
Young Scientists in 2001	50,000.00		53,734.55	
Administration Fund in 2001	80,000.00		85,975.28	
I.C.S.U. Dues in 2001	20,000.00		21,493.82	
		300,000.00		322,407.30
XXIV General Assembly 2002 Fund:				
During 2000 & 2001		110,000.00		118,216.01
Total allocated URSI Assets		**460,000.00**		**494,357.86**
Unallocated Reserve Fund		208,228.37		223,781.14
		668,228.37		**718,139.00**

Statement of Income and expenditure for the year ended 31 December 2000

I. INCOME	US$	US$	EURO	EURO
Grant from ICSU Fund and US National				
Academy of Sciences	5,000.00		5,373.46	
Allocation from UNESCO to ISCU Grants Programme	2,000.00		2,149.38	
UNESCO Contracts	0.00		0.00	
Contributions from National Members	180,437.78		193,914.86	
Contributions from Other Members	0.00		0.00	
Special Contributions	0.00		0.00	
Contracts	0.00		0.00	
Sales of Publications, Royalties	0.00		0.00	
Sales of scientfic materials	0.00		0.00	
Bank Interest	534.00		573.89	
Other Income	76,081.68		81,764.30	
Total Income		**264,053.46**		**283,775.89**

II. EXPENDITURE

A1) Scientific Activities		30,379.90		32,649.00
General Assembly 1999	4,240.82		4,557.57	
General Assembly 2002	1,263.41		1,357.77	
Scientific meetings: symposia/colloqiua	24,067.67		25,865.31	
Working groups/Training courses	0.00		0.00	
Representation at scientific meetings	808.00		868.35	
Data Gather/Processing	0.00		0.00	
Research Projects	0.00		0.00	
Grants to Individuals/Organisations	0.00		0.00	
Other	0.00		0.00	
Loss covered by UNESCO Contracts	0.00		0.00	

A2) Routine Meetings		7,901.79		8,491.98
Bureau/Executive committee	7,901.79		8,491.98	
Other	0.00		0.00	
A3) Publications		22,574.37		24,260.47
B) Other Activities		10,290.34		11,058.93
Contribution to ICSU	8,438.56		9,068.84	
Contribution to other ICSU bodies	1,851.78		1,990.09	
Activities covered by UNESCO Contracts	0.00		0.00	
C) Administrative Expenses		60,749.10		65,286.51
Salaries, Related Charges	44,886.33		48,238.93	
General Office Expenses	4,097.79		4,403.86	
Office Equipment	2,981.14		3,203.80	
Audit Fees	3,561.46		3,827.47	
Bank Charges	1,861.90		2,000.97	
Loss on Exchange	3,360.48		3,611.48	
Total Expenditure:		**131,895.50**		**141,746.89**
Excess of Income over Expenditure		132,157.96		142,029.00
Currency translation difference (USD => EURO) - investments				36,148.27
Currency translation difference (USD => EURO) - bank accounts				6,511.51
Currency translation difference (USD => EURO) - others				36.25
Accumulated Balance at 1 January 2000		536,070.41		533,413.97
		668,228.37		**718,139.00**

Rates of exchange:

1 January 2000: $ 1 = BEF 40.14 = EUR 0.995045 = CAD 1.45 = FRF 6.53

1 December 2000: $ 1 = BEF 43.35 = EUR 1.074691 = CAD 1.54 = FRF 7.58

	US$	EURO
Balthasar van der Pol Fund:		
342 Rorento Shares: market value on 31 December 2000		
(Aquisition Value: USD 12.476,17)	26,977.75	28,992.75
Market Value of investments on 31 December 2000:		
DEMETER SICAV:	42,765.56	45,959.76
RORENTO UNITS (1):	443,941.56	477,100.00
AQUA-SICAV:	66,392.08	71,350.97
M-L SHORT TERM	3,167.10	3,403.65
MASSACHUSETTS INVESTOR FUND:	307,368.84	330,326.53
	863,635.14	**928,140.91**

(1) Including the 342 Rorento Shares of v d Pol Fund

APPENDIX: Detail of Income and Expenditure

	US$	US$	EURO	EURO
I. INCOME				
Other Income				
Fee URSI Correspondents	297.57		319.80	
Levy General Assembly	48,415.73		52,031.95	
Interest on M-L Short Term	1,158.50		1,245.03	
Interest on Massachusetts Investor Fund	5.54		5.95	
Reinvestments on Massachusetts Investor Fund	14,023.74		15,071.19	
Reinvestments on Massachusetts Investor Fund	12,180.60		13,090.38	
		76,081.68		81,764.30
II. EXPENDITURE				
General Assembly 1999				
Support URSI	486.28		522.60	
Records Toronto	1,682.38		1,808.04	
Correspondent cards	918.83		987.46	
Mailing Toronto Records	1,153.33		1,239.47	
		4,240.82		4,557.57
General Assembly 2002				
General Assembly - Travel Expenses Officials	1,263.41		1,357.77	
		1,263.41		1,357.77
Symposia/Colloquia/Working Groups:				
Commission A	3,722.00		4,000.00	
Commission C	4,652.50		5,000.00	
Commission D	4,652.50		5,000.00	
Commission E	2,326.25		2,500.00	
Commission G	930.50		1,000.00	
Commission H	925.88		995.04	
Commission J	1,856.39		1,995.05	
Commission K	372.20		400.00	
Central Fund	4,629.44		4,975.22	
		24,067.66		25,865.31
Contribution to other ICSU bodies				
FAGS 2000	1,851.78		1,990.09	
		1,851.78		1,990.09
Publications:				
Printing 'The Radio Science Bulletin'	14,000.91		15,046.65	
Mailing 'The Radio Science Bulletin'	8,573.46		9,213.82	
		22,574.37		24,260.47

The URSI Young Scientists Program

In the International Council for Science (ICSU) URSI has two significant distinctions. Among the 26 international "single discipline " scientific unions it is one of the very few multidisciplinary unions. This happened because URSI was one of four original international scientific unions forming in 1919 the International Research Council, the predecessor of ICSU. A second distinction is its young scientist program. It is the largest within ICSU and URSI is frequently held up as a good example to the other unions in this regard. How did this come about?

Professor Sam Silver, URSI president from 1966 to 1969, introduced the young scientist program. At an URSI board meeting in February 1967 he proposed "each national committee nominate one or two young research workers in their countries who should be specially invited by the president of URSI to attend the general assembly. This would be a tremendous encouragement for young people and would stimulate their interest and participation in the work of the union. Moreover this should contribute to bringing fresh talent to the general assembly." He also proposed a special fund to facilitate the participation of young scientists at URSI general assemblies.

To appreciate the significance of this proposal it is necessary to recall that URSI general assemblies were much smaller than now and were closed to all but a limited number of official delegates invited by the member committees. These were mainly internationally established scientists and research administrators. This gave the general assemblies considerable mystique for younger scientists who were excluded. The first general assembly I "attended " was at University College, London in 1960, when I was finishing my Ph.D. Other graduate students and I slipped into the darkened lecture hall to see and hear the famous senior colleagues whose papers we had been studying. I similarly "attended" my second URSI general assembly in Ottawa in 1969, along with other uninvited colleagues from Ottawa laboratories concerned with radio science.

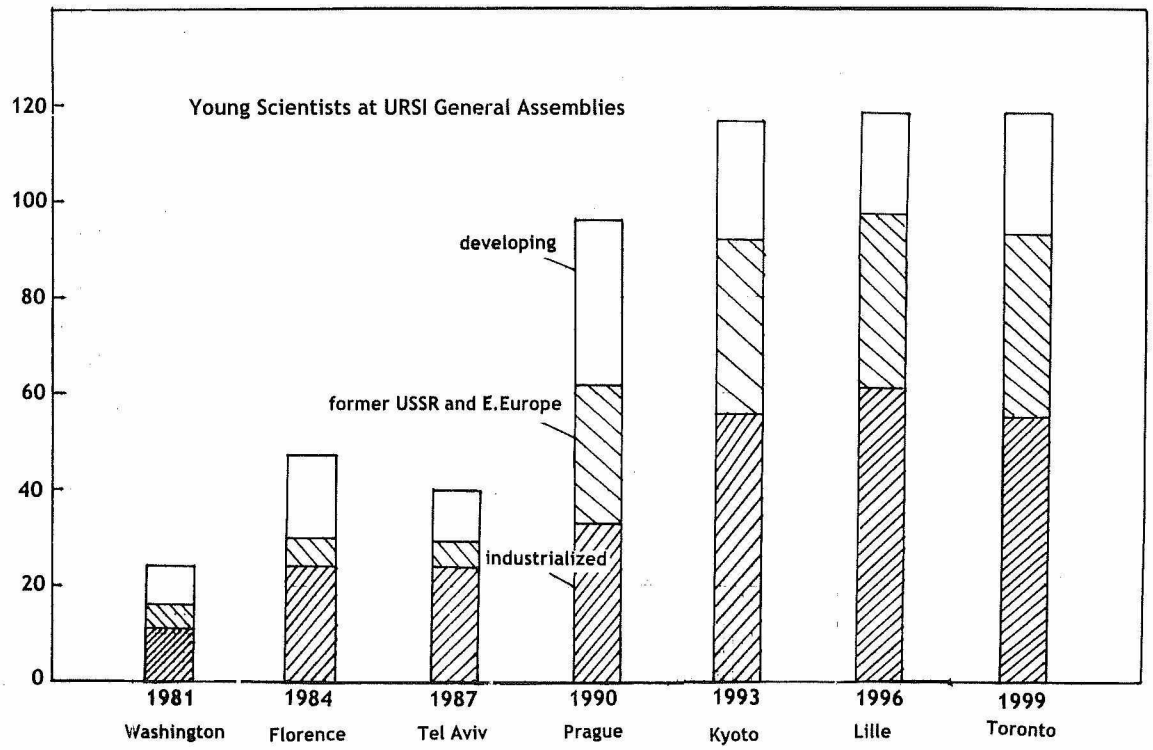
In his 1969 presidential address Prof. Silver recognised that it was "important to the union to bring to its assembly the fresh ideas and the idealism of young people. For if the union has no ear for the aspirations and interests of the younger scientists, it will ossify out of complacency and by crystallisation of patterns of thought." It was also important to help advance science and technology in developing countries. This was explicitly the duty of UNESCO, but the unions of ICSU should both participate and provide support. Prof. Silver pointed out that "bringing the young scientists to the assembly is a way for the URSI to contribute to this program of the service of science to humanity." In a Dec. 1971 URSI Bulletin article Prof. Silver indicated that as far as he was concerned, this consideration was the main motivation for the young scientists scheme at Ottawa. The scheme also helped initiate major changes in the nature of URSI general assemblies, which only later became open to all who wished to attend.

Eighteen young scientists designated by thirteen member committees from smaller and developing countries were supported by travel grants totalling $10,000 from URSI funds at the 1969 Ottawa general assembly. Also member committees were asked to include in their delegations some research workers of age 25-35 years. These came supported by their countries or on research grants. The success of the 1969 young scientists scheme prompted the URSI board to repeat it at the Warsaw general assembly in 1972 with grants totalling $11,000 for 14 young scientists from the following member countries: Australia (4), Brazil (2), India (2), Nigeria (3), South Africa (1), Sweden (1) and USA (1); that is about half from developing countries and half from industrialised countries. This balance was intended to encourage collaboration among young scientists from different backgrounds and was maintained at later general assemblies.

At the general assemblies in Lima (1975) and Helsinki (1978) there were no young scientist programs. The reasons for this are not recorded explicitly in the general assembly proceedings for these years but evidently financial and organisational changes in URSI severely limited the resources available for the program. Also by then general assemblies were open to all radioscientists regardless of whether they were invited delegates or even from member nations, so growing numbers of both young and older scientists were attending in any case.

The program was revived and enlarged at the 1981 Washington general assembly where 24 young scientists from 17 countries were supported by grants of $300 each from ICSU. Further support was provided by USNC/URSI, and travel allowances for some of the 12 from developing countries were received from COSTED, the ICSU committee on science and technology for developing countries. For the first time young scientists from the Soviet block countries appeared at an URSI general assembly held in the West: 3 from the USSR and 2 from Poland. This contingent was to grow substantially in general assemblies from 1990, as is evident in the accompanying figure. A party held for the young scientists became traditional at subsequent general assemblies. At Washington there was no requirement for a young scientist to present a paper and only two young scientists names appear as co-authors in the scientific program, all papers of which were by invitation only. It was still an exclusive honour to present a paper at an URSI general assembly.

At Florence in 1984 the program was enlarged to 47 invitees from 33 countries by A.P. Mitra, who became URSI



president (1984-1987) and a strong proponent of URSI support for developing countries, and Jean Van Bladel, who, during his term as secretary general (1979-1993) and ever since, has been a major contributor in time and effort to the success of the young scientist program. About half of the young scientists were from developing and socialist countries and received support for their travel from ICSU and COSTED. The Royal Society of London also provided funds from an account remaining from the 1960 general assembly. A source of young scientist applicants from African developing countries was found among those attending radio propagation courses at the Third World Academy of Sciences in Trieste. URSI provided all the young scientists with free registration at the general assembly and the hosts provided accommodation and living expenses. Since there were now open symposia associated with the general assembly, 9 of their names were on papers presented in the regular program. There was also a special session for those who wished to give a paper but did not have a place in the regular program.

Forty-seven young scientists from 23 countries were invited to Tel Aviv in 1987, but the accompanying figure shows fewer attendees. Usually young scientists must arrange for their visas and travel expenses, for which they are reimbursed at the general assembly. Inevitably a few are unable to do this in time and do not appear. There were two parallel special sessions of papers by young scientists chaired by URSI president (1987-1990) Alex. Cullen and vice-president S. Okamura.

Prague in 1990 was a watershed for the URSI young scientist program and indeed for URSI general assemblies for with a relaxation of travel restrictions on our Soviet colleagues there was record attendance. The numbers of official young scientists more than doubled because the local organisers, under URSI vice president V. Zima, offered to accommodate 100 young scientists at the general assembly. These extra numbers of course required extra effort from the URSI secretariat and extra sources of travel funds for those from developing countries, as indicated in the appendix. In addition perhaps a hundred more young scientists arrived from the east, mainly Russia and Ukraine, at their own expense and were accommodated and supported by the hosts. It was a tradition among the socialist countries that the local academies of sciences hosted visiting scientists from other countries at their conferences but the scale of this at Prague could have stretched the generosity of the hosts almost to the limit. At the reception and at the young scientists dinner party they appeared en masse and the Czechs, good at improvisation, hastily made extra arrangements. Most of the official awardees had indicated on their application forms that they wished to present a paper and for them 44 places were found on the regular program. For the rest there were 8 parallel sessions with a total of 60 papers, the abstracts of which appeared in a volume 3 of the proceedings. In addition some of the unofficial young scientists made presentations at the end of these lengthy sessions following the regular afternoon sessions and chaired by URSI commission chairmen and board members. The quality of most of these papers was high and many were excellent but attendance at these sessions was disappointing because most of the potential audience were too exhausted from a day already full of scientific sessions.

At Prague the first standing committee on young scientists was formed to recommend to the board ways in which the program could be improved. Previously it had

been the responsibility of the URSI secretary general and a member of the URSI board. The numbers of applicants, especially from the former socialist countries, had increased greatly and URSI felt it should respond. Fortunately its financial position allowed a further expansion of the young scientist program, not only at general assemblies but also at symposia between them. In 1992 for example about 20% of URSI's income was used for this purpose, distributed partly directly by the secretariat but increasingly by allocating funds to the commissions. It should be pointed out that URSI support for young scientists between general assemblies had been increasing for some time. Between Florence and Tel Aviv partial support of some kind was provided by URSI to 32 young scientists from 18 different countries to attend 13 different conferences. Between Tel Aviv and Prague these numbers grew to 67 young scientists from 34 different countries at 15 different meetings. Some of this support came from the conference fees, for example that at the triennial commission B symposium on electromagnetic theory, where in 1989 11 young scientists, 6 from East Europe and the USSR, were accommodated in Stockholm. By 1992 32 young scientists from East Europe, Russia and Ukraine alone were supported at the URSI symposia organized by commissions B and C and 7 were helped to attend URSI sponsored conferences.

In 1990 those bidding for the 1993 general assembly were asked how many young scientists they could accommodate and support. Professor Okoshi, representing the Japanese organising committee for Kyoto in 1993, proposed 120. In spite of their changing economic conditions between 1990 and 1993, this number was upheld by the Japanese organisers. It has been maintained subsequently because at about 10% of the total general assembly registration it was found to be about the limit of the resources URSI and the host country had available for the program. A major change in 1993 is that there were no special sessions for young scientists: all their papers were accommodated in the regular program. This required program organisers who acted quickly to inform the URSI secretariat of the program so young scientist selection could begin and awardees notified in time to complete their visa and travel arrangements. Fortunately at Kyoto we had efficient organisers in Professors Matsumoto and Kimura, but in spite of improved fax and email communications this timing has sometimes been a source of difficulty for a few of our young scientists.

With this change, acceptance and delivery of a paper on the regular program became a necessary condition for an award, with geographical distribution and financial need secondary considerations. A survey of young scientists at Kyoto indicated that most preferred to be selected primarily on the basis of the scientific merit of their paper. Then an URSI young scientist award rightly became something to include in one's resume. It was of course almost impossible for the three individuals involved in the selection process to accurately assess the relative merits of all the applicants, particularly those in commissions different from their own. So all URSI member committees were asked to rank the applicants from their countries. A few member countries had been doing this earlier but by the 1996 general assembly at Lille 88% of the 238 applications examined by the selection committee had been ranked. This ranking was adhered to in selection with a few exceptions such as if the applicant's paper was not in the program or if there was a previous young scientist award. Unranked applicants were usually from countries with few applicants or from countries not members of URSI and their numbers were small enough to be dealt with by the selection committee. In another change implemented at Lille applicants were considered on the basis of the countries in which they were working or studying rather than on their citizenship or origin as they sometimes were earlier.

At Lille 120 awards were made to applicants from 40 different countries, 18 or 15% of them female. This had risen from 10% at Kyoto and about 5% at earlier general assemblies. At Toronto in 1999 there were 222 applicants of which 120 from 36 different countries were selected. The number of women young scientists at Toronto was 24 or 20% of the total. These increasing numbers of young ladies receiving awards are almost entirely due to increasing numbers of female applicants rather than to any policy in selection. It seems likely that there will be even more women young scientists at the next general assembly.

The distribution of awards by commission at Lille and Toronto also correlates well with the distribution in applicants by commission. At these two most recent general assemblies the approximate percentages of young scientists receiving awards by commission were, respectively: A (3 %; 8%); B (25%; 18%); C (9%; 11%); D (10%; 8%); E (4%; 4%); F (14%; 8%); G (15%; 12%); H (9%; 11%); J (7%; 9%); K (4%; 11%). These percentages depend not only on the size, activity and scientific program of the commission but also on the publicity given to the young scientist program at commission activities and in commission related sources of information in the year preceding a general assembly. Evidently they can change significantly from one general assembly to the next.

Financing the travel expenses of the young scientists from developing countries and from the countries of Eastern Europe and the former USSR has been a challenge at each general assembly. It was particularly difficult in 1999 when, following a reorganisation of ICSU, funds from this major source were no longer available. URSI, which has always been the other major source, had to make up the difference with considerable impact on its general assembly budget. The situation may improve at Maastricht in 2002 because for many of the recipients travel to a European location is less costly and because in the past the EU has provided some support for this purpose. There was some discussion at Toronto on whether the young scientist program should be scaled down, but the URSI council gave clear support to maintaining it. There was general recognition that the young scientist program has been and will continue to be an important way for URSI to fulfil its mission and that it is a sound investment in the future of the union.

E.V. Jull

Appendix

Travel funds for young scientists from developing countries have been gratefully received from the following sources besides UNESCO/ICSU and URSI: COSTED (ICSU Committee on Science and Technology for Developing Countries) (1981, 1984, 1993, 1996), Royal Society (London) (1981-1999), Commonwealth Science Council (London) (1990, 1993, 1996), Indian National Academy (1990), Indian Council of Scientific and Industrial Research (1990), Canadian International Development Agency (1990), European Space Agency (1996, 1999), European Union (1996), Japan Committee for URSI (1990, 1993, 1996, 1999), USNC/URSI (1981, 1999).

An Overview of Interfering Emissions for DCS-1800

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Abstract

The operational ability of mobile cellular communication systems is inherently combined with sensitive receivers, able to deal with very low signal levels. Thus, it is important to operate in an interference-free environment. However, this is not always the case, especially in the first stages of deployment of a cellular network, where one comes across all possible interfering sources and emissions. In this paper, we present an overview of several types of interfering emissions, their effects and strategies to deal with them, during the deployment of a DCS-1800 system.

Introduction

Open space is a communication channel with several advantages. Among them is that it offers an unsurpassed mobility, since access to it is quite simple and easy. Indeed, virtually everything can radiate electromagnetic power into free space, with no interface requirements other than a simple antenna. Thus, it constitutes the only communication channel able to host the development of today's cellular mobile communication systems.

However, this easiness of access has also its drawbacks. The major one is the channel's vulnerability to interference. Literally any emission, whether from some other communicational activity, industrial process or simply some malfunctioning, non-EMC compliant device has access to the channel.

The significance of interference in cellular communication systems becomes apparent when taking into account the low signal levels involved. For systems like DCS-1800, reception threshold lies at about –104 dBm [1]. These very sensitive receivers require a minimal signal to noise ratio in order to preserve the modulation's consistency in terms of bit error, residual bit error, frame erasure and finally dropped call rates. Thus, offering an acceptable system quality to the subscriber largely depends on the system's ability to operate interference – free.

Interference – free operation can only be achieved through legal agreements or regulations. However, tendency to use free frequency bands to accommodate bandwidth needs, as well as deviation from regulations are causes of the emissions faced when trying to set up a network in a previously "unused" frequency band. In this paper, we intend to discuss emissions we came across during the deployment of a DCS-1800 network, methods for their identification and their impact on the cellular communications system.

Interference analysis

When dealing with interfering emissions in cellular communication systems, it is important to distinguish between interfering emissions in the downlink and in the uplink. Despite the propagation reciprocity and the nearby frequency ranges, there are differences in the design of the system in these frequency ranges, making response to interference different.

A main reason for this form the high signal levels emanating from the base station antenna. They may range up to 40 W for a power class 1 BTS, combined with a 10 dBi antenna gain and an optimal placing so as to ensure maximal coverage. Under these conditions, it is highly probable that the DCS emission will constitute a potent interference to any other system operating at the same frequency, and that the latter will eventually abandon the use of these frequencies. However, it is possible for an interfering emission to "survive" in the downlink frequencies if it doesn't coincide in frequency with that of a nearby base station.

It is the uplink frequencies that constitute the system's most vulnerable part. Here, we are faced with the lower end of the base station's receiver dynamic range, at about –104 dBm, near the thermal noise level. Thus, even low-power emissions can be comparable or greater than the signal level from the mobile unit, that is constrained by safety regulations and attenuated by all the problems caused from suboptimal positioning and indoor propagation.

There is also a more subtle difference between the uplink and the downlink. The downlink has by definition the character of broadcasting, since it describes the propagation from the fixed base station antenna to the mobile units, that may be everywhere in the cell. On the other hand, uplink

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operation is similar to that of a fixed link, since the destination is the base station. Even though this difference doesn't seem significant when discussing the network's operation, it is of fundamental importance when discussing interference: an interfering emission in the downlink is as "effective" as its coverage, while an interfering signal in the uplink needs only to reach the base station antenna. On the other hand, emissions that don't reach the base station antenna may be considered as harmless.

Thus, in dealing with interfering emissions in the uplink, there are several emissions that come in question. Usually, interfering emissions are associated with communication activities, like other wireless networks of similar nature or radio links of radio or television stations. However, if the only condition is to reach the base station antenna while maintaining a sufficient power level, several other signals come in question, and especially those emanating from non-EMC compliant devices.

Effective Coverage

Interference substantially degrades the system's performance since it causes a drop of the signal-to-noise ratio. Thus, more errors are caused in the decoding process, resulting in higher frame erasure, bit error or residual bit error rates.

In the GSM specification [1], reference interference levels are defined as 9 dBc for cochannel interference, -9 dBc for adjacent (200 kHz) channel interference and –41 dBc for adjacent (400 kHz) channel interference. The obvious result is that interference significantly lessens the receiver's dynamic range, usually defined by the thermal noise level and the coding's signal-to-noise ratio threshold. Thus, one might expect that for a normal DCS base station unit, that has a normal reception threshold of –104 dBm, the presence of an interfering emission of –80 dBm will raise reception threshold to –71 dBm for the case of cochannel interference, and to –89 dBm for adjacent channel (200 kHz deviance) interference.

In turn, the greater threshold means that the area covered by a single base station becomes significantly smaller. Indeed, since there are upper limits in the power emitted by both the base station and the mobile unit (which in turn results in greater exposure of the subscriber to electromagnetic radiation), for maximal power the higher threshold results in a diminished link distance.

Using the COST 231 – Hata model [2] to estimate the average received power, and assuming a transmission power level of +30 dBm, a base station height of 30 m, mobile antenna height 2m and antenna gains of 1.5 dBi for the mobile unit and 15 dBi for the base station, we see that for an interfering emission of –80 dBm received power level the coverage radius drops from 2400 m to about 900 m for adjacent channel interference and to about 300 m for co-channel interference. Effective coverage radius as a function of the received interfering signal power is shown in figure 1.

In this case, it should be noted that the interference power level may be enhanced by the gain of the base station antenna, which is in most cases about 8 – 15 dBi.

Types of Interfering Emissions

In this section, we present various types of interfering emissions we came across during the deployment of a DCS-1800 network. Their majority are associated with usual communicational activities, however we also came across non-deliberate spectral activity.

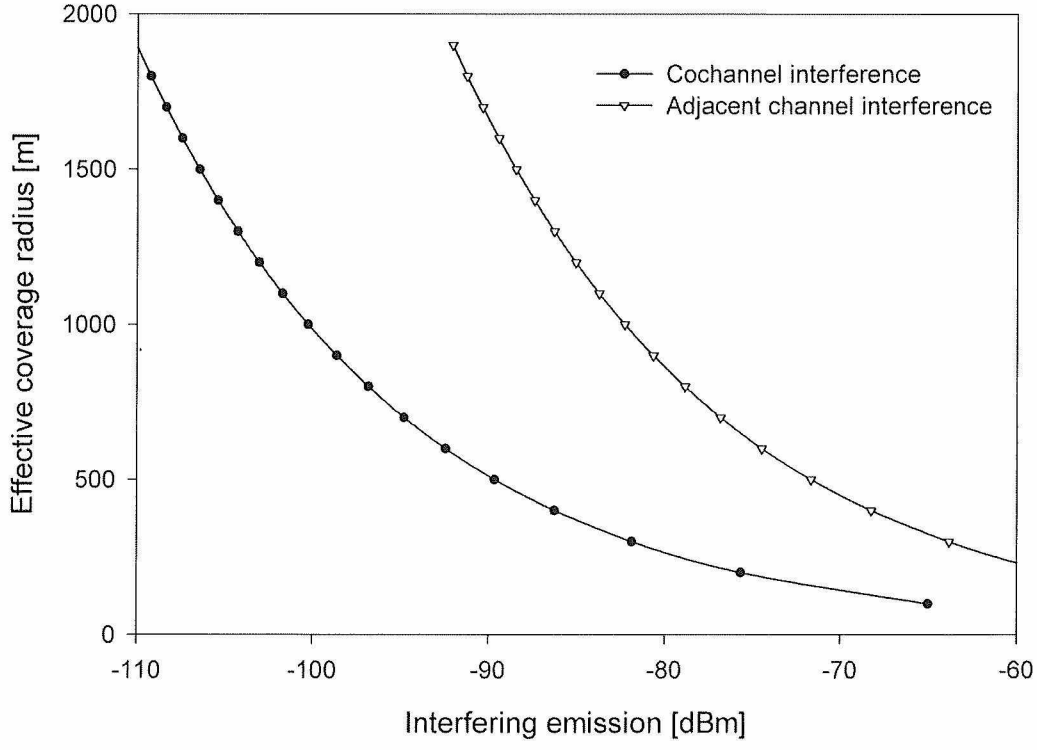

Figure 1: Effective coverage radius versus interference power level for co-channel and adjacent channel interference

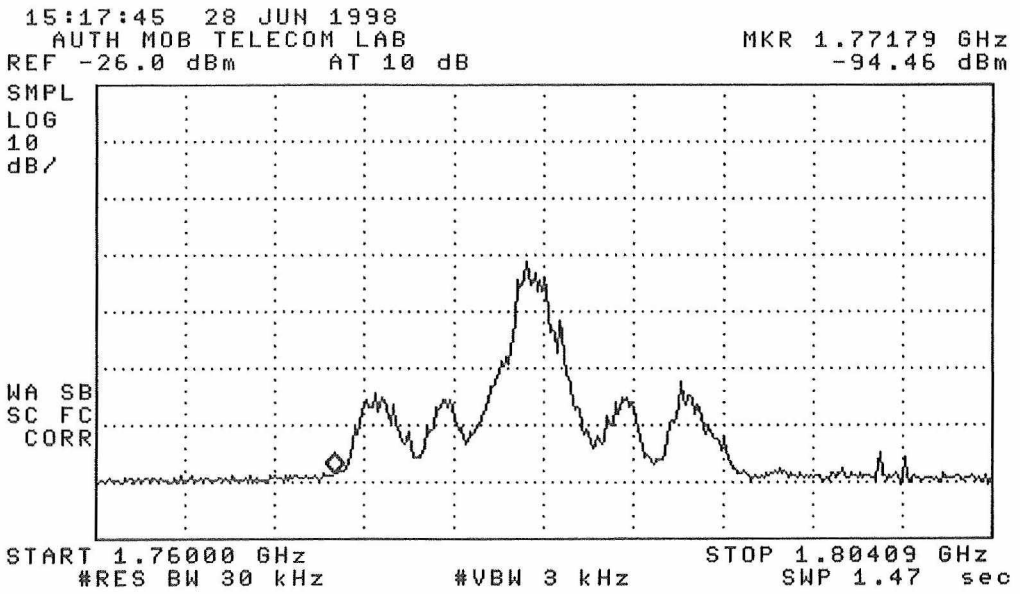

Figure 2: An actual television station link, with about 50 MHz spectral occupancy. Measurement with a 20 dB preamplifier.

1. Communicational Activity

The major part of interfering emissions seems to emanate from other communicational activities. Indeed, taking advantage of previously unused frequency bands in order to accommodate voice or data links is rather common. In our study the majority of potential interfering emissions were radio links of radio or television stations, used to send the signal from the studio to the broadcasting antenna, out of town. However, we also came across transmissions from data networks. Each of these signals exhibited special characteristics that we intend to discuss below.

A. Radio Station Links

Radio links from radio stations are very common, since they constitute the only means to get the station's signal from the studio to an out-of-town antenna. Even though most of them use frequencies around 1 GHz, in our study there was a significant number operating in the DCS-1800 spectrum.

Normally, the spectral activity resulting from an analog radio station link is the typical wideband FM modulation, with a spectral occupancy of about 300 kHz. However, the infinite WBFM spectrum combined with filter malfunctioning may lead to greater spectral occupancies. Furthermore, there are cases where the interfering emission is actually the second harmonic of a radio station link. Even though of less power, when in proximity to the base station it might cause significant distortion, resulting in dropped calls.

Identification of links can be done simply by demodulating the signal and listening to it, rather than resorting to more difficult direction finding techniques.

B. Television Station Links

Television station links pose a more difficult problem. By nature, they occupy a larger bandwidth that is normally up to 10 – 12 MHz, since in analog transmissions full DSB modulation is usually preferred to the typical VSB, due to the ease of demodulation. This is again dependent on the quality and correct application of the filters used – in some cases, the spectral activity near the emitting antenna ranged up to 40 MHz or more, as seen in figure 2.

In most cases, bandwidth is defined as the range between the two –3dB points. However, in interference studies bandwidth or spectral occupancy is defined as the frequency range to which the signal under consideration offers significant power, which may differ significantly, as one may deduce from figure 2.

Identifying the signal's source may cause more severe problems. Use of a field meter–TV signal analyzer provides the easiest solution for source identification, if it is possible to obtain a sufficient signal level. When more sophisticated equipment is not available, demodulating the sound carrier with a communication scanner may offer a solution, provided one has a way to crosscheck the emission. However, since demodulating the sound carrier at low power levels is rather difficult, finding the emitting antenna with usual direction finding techniques is in many cases an acceptable alternative. Given, however, the problems arising from the multiple reflections and the antenna's directivity as well as the fact that television stations are of limited number, locally checking each station's radio link may be in many cases the easiest solution.

C. Other Communicational Activity

Spectral activity may also emanate from less expected activities. These may be data links or their harmonics, but also weirder emissions like spying devices or military systems. In this case, locating the emission's source has to be done by means of direction finding techniques, since demodulating the signal is a very difficult task.

Spectral activity related to communicational purposes may arise due to the high power transmitted. In this case, filter problems or non-linearity in cables and connectors leading to passive intermodulation phenomena [3], may cause interfering signals.

2. Non-communicational activity

By the term non-communicational activity we refer to spectral activity that is not directly related to communication purposes. In most cases, such products arise as a result of not-EMC compliant processes. It is apparent that they can't be classified, since they may arise from industrial noise, but also from any kind of malfunctioning appliance or device.

Such emissions are expected to have only a local effect, since their radiation conditions are usually suboptimal. They arise as a by-product of the normal process, and should thus be of limited power. Furthermore, they are not associated with a radiation system like an antenna, and so usually they are confined to near-field effects, with severe locality limitations. In this form they constitute what we call man-made noise well described in several references.

However, there are cases where malfunctioning systems may cause emissions of considerable power, as for example in the case of figure 3, attributed to some intra-communication system of a hotel. In this specific case the emission's locality was a critical factor, since the signal, which is in the uplink frequencies, wasn't able to reach a base station and thus cause interference. It would cause a problem though in a potential network expansion.

If this locality constrain could be overcome, then these undesired emissions could cause significant problems, since their power level may be comparable to or greater than the reference sensitivity level for normal base stations, defined at –104 dBm at receiver's input.

3. Radiating non-EMC compliant emissions – a case study

Reaching optimal radiation conditions may be difficult, but not impossible. During outfield measurements in the city of Lamia [4], in Central Greece, the authors came across a frequent signal pattern that caused interference to the DCS-1800 uplink band. The typical signal seemed to occupy a bandwidth of 30 kHz with time-varying central frequency, resulting in a total spectral occupancy of 300 to 800 kHz.

Even though the activity was persistent, in some cases the central frequency could drift slowly, sometimes even by 2 or 3 MHz, resulting in a totally unpredictable behavior, and spectral occupancy. The signal seemed to be emanating from the roofs, while it had an approximately 800m-radius coverage on the ground. The pattern seemed to repeat itself in different neighborhoods, at slightly different frequencies. When seen from a hill near the town, all such emissions together with conventional ones added up to fill the entire uplink spectrum, as seen in figure 4.

The interfering signals showed in laboratory tests to be the fourth harmonic of a self-oscillation occurring in some UHF TV mast amplifiers of variable high gain.

Gain values of up to 32 dB are not uncommon in cases where the broadcasting TV antenna is situated far away, or where terrain form poses obstacles and further attenuation to the signal. However, such high values may easily lead to self-oscillations of the amplifier.

In radiofrequency amplifiers oscillation is a result of feedback paths. These are formed by parasitic coupling of the amplifier's elements, a phenomenon that becomes more significant as the frequency of operation increases. In turn, this leads to poor input – output isolation, and combined with the amplifier's high gain may lead to oscillation.

Furthermore, it should be taken into consideration that the amplifier's transfer functions, and therefore its stability margins, depend on the values of input and load

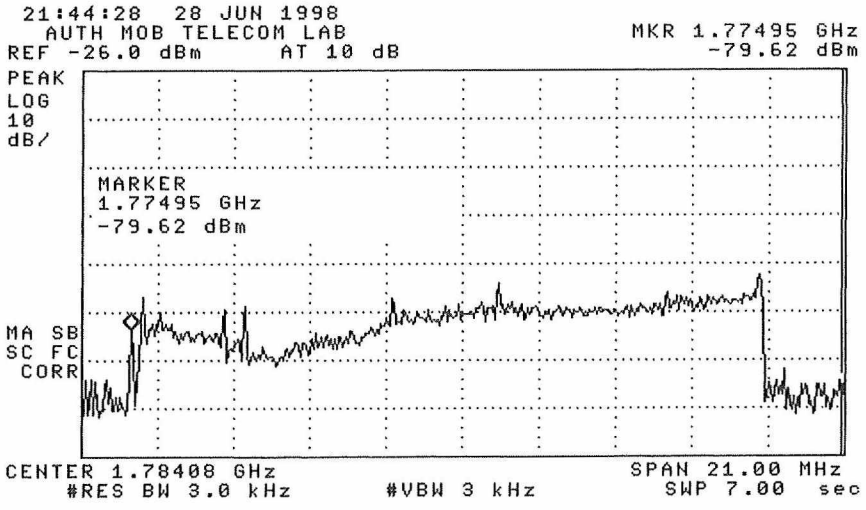

Figure 3: A local interference signal from a non-EMC compliant system. Measurement with a 20 dB preamplifier.

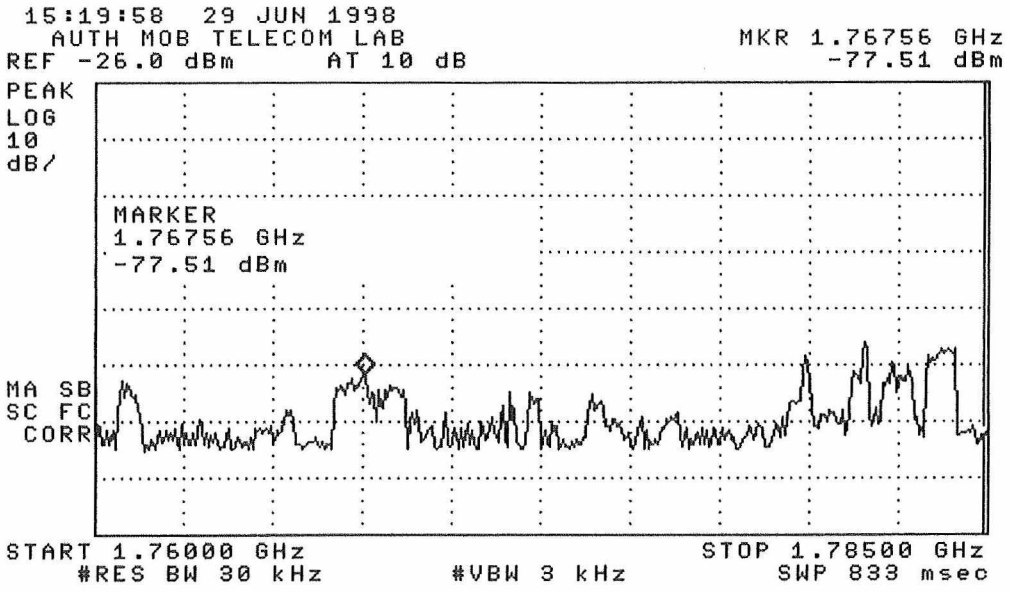

Figure 4: Spectral occupancy as seen from a hill outside the town. Interfering signals from oscillating amplifiers and other radio links add up to fill the entire uplink spectrum. Measurement with a 20 dB preamplifier.

impedance it is connected to. The amplifier is EMC compliant when tested with terminated inputs and outputs, but in practice it is highly improbable that a TV mast amplifier will have its inputs and outputs matched throughout its frequency range of operation. It is more probable that frequency sensitive loads, like the TV antenna, will exhibit varying impedance over the range of interest, and therefore cause mismatches.

Oscillation may also be driven by strong input signals from nearby stations. Such signals lead the first stage of the amplifier to saturation, thus starting or modifying the self-oscillation.

Laboratory tests showed that amplifiers typically used tend to oscillate at a main frequency in the range of 430-450 MHz, varying according to the amplifier type and the load used. It is the fourth harmonic of this oscillation, in the range of 1720 – 1800 MHz, that causes the interference measured. This signal measured up to –60 dBm at the terminated antenna input.

These power levels, in conjunction with the relatively good behavior of the UHF TV antenna, that is at its third harmonic at 1800 MHz and the close proximity, and thus low losses, of the mast amplifier to it, lead to a strong radiated signal, that virtually "blinded" base station antennas in the area.

Discussion

Dealing with interfering emissions can be based on two strategies: avoidance and elimination.

Avoidance consists of reallocating the frequencies so as to avoid the interfering emission. This is possible in cases of deterministic interference behavior, as in the case of communication links. Thus, a radio station link with typical bandwidths of 600 kHz would block (by means of cochannel and adjacent channel interference) 5 channels. However, a TV station link, with typical bandwidth occupancy of about 8 MHz would block 42 channels, thus causing a great problem to the network. Such cases of great spectral occupancy, or of unpredictable spectral behavior can't be dealt with this way – thus, the interfering source must be eliminated.

Elimination consists of a positive identification of the interfering signal's source and terminating the emission, either by fixing or replacing a malfunctioning device, or reaching an agreement so that the interfering communicational activity ceases. Identifying the signal's source may be done by means of demodulating the emission and listening to it, however in many cases one has to rely on the direction finding techniques.

Even though direction finding is a relatively easy task for communicational emissions that by definition are in an open space environment, it becomes extremely complex in a densely build urban or even an indoor environment. Thus, the importance of extensive EMC testing of appliances cannot be overestimated.

Our study has posed a new side of EMC considerations: that of the system perspective. Even though each part of the system might be in itself EMC compliant, the combination of a not-matched input and load with a high-gain amplifier was able to lead to major interference problem. Furthermore, there are always aspects that can't be accounted for, like non-linearity of the cables and the connectors at high power levels, impurities due to the normal wear of time, or just due to a bad installation.

Non-perfect conditions of operation give rise to worst-case scenarios that should be taken into consideration during both the design and the testing stage. Usually, specifications

are defined for certain anticipated conditions of operation. However, issues like input or output mismatch, or input stage saturation don't fall in the category of normal operation, but in practice they occur. Especially in cases of widely used consumer electronics, where such cases are most likely to occur, they should be taken into consideration both in the design as well as in the testing stage.

Thus, it is important that the testing range of telecommunications equipment that might be exposed to non-optimal operating conditions, especially when thought for use by the general public are extended, so as to avoid malfunctioning.

Conclusions

Interfering emissions are one of the major problems faced during the deployment of a cellular communications network. Thus, their efficient identification is of critical importance for the network's operation.

We have presented a variety of possible emissions that may interfere with a DCS-1800 system's operation, and discussed their impact on the system as well as strategies for their identification. Even though the list is not complete, it is representative of what one should expect during a network's deployment.

Furthermore, our study stresses the need for considering EMC compliance out of normal operation conditions for wide-use communication appliances, as well as the need for efficient methods of direction finding in a multiple reflection environments, like the ones typically found in densely build urban areas.

Acknowledgement

The authors would like to thank CosmOTE, greek DCS-1800 provider for their support throughout this project.

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Conferences

CONFERENCE REPORTS

The Eighth International Conference on Ground Penetrating Radar (GPR 2000)

Gold Coast, Australia, 23-26 May 2000

The Eighth International Conference on Ground Penetrating Radar (GPR 2000) was held at the Gold Coast, Australia from 23 to 26 May 2000 (see http://www.cssip.uq.edu.au/gpr2000).

It continued the biennial series of international scientific symposia devoted to the advancement of ground penetrating radar. In keeping with previous international GPR conferences, the goal of GPR 2000 was to bring together a diverse group of scientists, engineers, and users whose interest in ground penetrating radar spans a broad range, from archaeology to unexploded ordnance detection, and from antennas to signal processing techniques.

The hosts for GPR 2000 were The University of Queensland, and the Cooperative Research Centre for Sensor Signal and Information Processing (CSSIP).

Conference Program and Highlights

Two full-day tutorial sessions were held in parallel on the day prior to GPR 2000.

Dr Peter Annan gave a tutorial on "Introduction to GPR", which was especially aimed at novice GPR users. The other tutorial on "Advanced Processing and Modeling of GPR Data" was presented by Prof Gary Olhoeft to more advanced GPR users.

The main conference program consisted of 18 oral sessions, 3 poster sessions, a panel discussion, an exhibition and GPR field demonstrations. The oral and poster sessions covered broad and specialist topics across all GPR technologies and applications.

Particular technical highlights included a new tapered-permittivity rod antenna for buried land-mine detection, the latest results of nickel laterite exploration using GPR, and the delineation of a temperate glacier bed using 3-D migration.

All presented papers are contained in the GPR 2000 Proceedings (SPIE Vol 4084) and CD-ROM. A small selection of papers will be published in a special GPR issue of the Journal of Applied Geophysics, to appear in early 2002.

The topic for the panel discussion was "Interference and Regulatory Issues with GPR". As an introduction, Gary Olhoeft presented the issues currently being considered by the US FCC and other government departments in defining and regulating UWB emissions.

The panel consisted of the following representatives of GPR manufacturers and service providers- Peter Annan (Sensors & Software, Canada), David Daniels (ERA Technologies, UK), Richard Chignell (Emrad, UK) and Timo Saarenketo (Roadscanners, Finland).

The panel and audience discussed the united strategy by the GPR manufacturers and users for responding to the government regulators so that GPR remains in existence.

The exhibition showcased the latest GPR equipment and software from nine organisations: CSIRO, Detection Solutions (GSSI rep.), Emrad, Geophysics Australia (GSSI rep.), IDS Electronics, Koden, Mala Geoscience, Roadscanners and Sensors & Software.

Field demonstrations of GPR equipment were held at a local park containing a variety of buried utilities, and a water table underlying a varying surface topography.

Attendance

From the 220 submitted abstracts, the final program contained 153 papers from 27 countries. The continued growth in worldwide interest of GPR is witnessed by the increase of papers during the recent history of international GPR conferences: 97 papers from 20 countries for GPR'94, 110 papers from 22 countries for GPR'96, and 138 papers from 24 countries for GPR'98.

230 registered delegates attended from 29 different countries. The two tutorial sessions held on the day prior to GPR 2000 attracted 82 attendees.

Next Conference - GPR 2002

The biennial series of international GPR conferences continues with GPR 2002 to be held from April 29 to May 2, 2002, in Santa Barbara, California, USA (http://www.ece.ucsb.edu/gpr2002/home.htm). This conference should further demonstrate the advances by the GPR community.

David Noon
General Chair, GPR 2000

33RD COSPAR ASSEMBLY

Warsaw, Poland, 16-23 July 2000

The COSPAR Congress was held in Warsaw, Poland from 16-23 July 2000 under the auspices of Alexander Kwasniewski, President of the Republic of Poland. The host institutions were Space Research Centre of Polish Academy of Sciences and Warsaw University of Technology. R.M. Bonnet (ESA) gave the inaugural lecture.

The core of the Scientific Programme were the 78 symposia and meetings. 2470 papers ,including 654 posters, were submitted and 90% of the papers accepted for oral presentation were presented. In spite of the Scientific Programme four interdisciplinary and six public lectures, three in English and three in Polish were organised as well as two special sessions: "*Space 2000 – The European Perspective*" and "*The Next Century of Space Research*" which included speakers from many National Space Agencies.

Many organised scientific symposia were related to URSI activity subjects. I would like to stress some of them where large number of papers were presented i.e.

- C4/D3.9 – Modelling the Topside Ionosphere and Plasmasphere (conv. D. Bilitza)
- D 3.2 - Advances in Auroral Physics (conv. N. Duboulou)
- Space Weather (conv. T.G. Ousager)
- D4.1/B1.3 Dusty Plasmas and Active Experiments (conv. Z.Klos) (formally sponsored by URSI)

All of these subjects will be included in the next COSPAR Assembly in Houston in 2002 and URSI involvement has to be considered.

First of all the Scientific Commission business meetings included separated sub-commissions meeting. Some of these meetings decided new items of programs as well as according to By-low concerning terms the new officers and chairs were elected.

It seems that for URSI the most important is the proposal of Scientific Commissions C (chair D. Rees). The proposal is inviting the development of a new set of CIRA models consisting of three parts: thermosphere models, middle atmosphere models, and minor and trace constituent models; inviting other agencies (URSI, SCOSTEP, ICHA, IAGA) to participate in the new activities.

In the spirit of this proposal during the business meeting Scientific Commissions C voted to extend the terms of the chair and vice- chair of the Task Group in the International Reference Ionosphere (IRI) – co-operated activity with URSI.

During the COSPAR Bureau and COSPAR Council (22 23 July 2000) long discussions took place on this subject. As a results most of the activities related to new CIRA were welcomed

The IRI community, with the assistance of COSPAR and URSI, will have to suggest a new Chair for this activity.

The COSPAR Bureau is developing initiatives on capacity building and planning special workshops in the fields covered by COSPAR. URSI will be contacted to cooperate.

Dr. Zbigniew Klos
URSI Representative to COSPAR

COSPAR/IRI SESSION

(at the above Scientific COSPAR Assembly)

The IRI session (C4.1/D3.9 Modeling the Topside Ionosphere and Plasmasphere) was held during the 33rd COSPAR Scientific Assembly in Warsaw, Poland (16-23 July, 2000)

The 2 day session reviewed modeling efforts in the topside ionosphere and plasmasphere with special emphasis on improvements of the International Reference Ionosphere (IRI) in these regions. As always these sessions organized by the IRI Working Group are also an opportunity to discuss other IRI-related topics.

The session began with a talk by Bilitza (USA) describing the new IRI-2000 and detailing the many improvements over the previous version of the model. The first day of the session was primarily focused on the topside and plasmasphere.

Leitinger (Austria) used theoretical considerations in conjunction with empirical models for the O+ scale height and gradient and the O+/H+ transition height based on the work of Titheridge (New Zealand). Pulinets (Russia) and Radicella (Italy) are using a model approach that is based on Epstein layer functions with a height varying thickness parameter fitted to Interkosmos 19 topside sounder data. Gulyaeva (Russia) extrapolated ISIS data to plasmaspheric heights with the help of the SMI-96 model. A method for deducing Total Electron Content (TEC) from ionosonde measurements was presented by Reinisch (USA). He found good agreement with TOPEX-deduced TEC. Pavlov (Russia) using Millstone Hill data in conjunction with his theoretical model finds good agreement when applying the Carpenter-Anderson (1992) model for the boundary conditions at the magnetic equator. Ezquer (Argentina) found that IRI underestimated the measurements of the Japanese Hinotori satellite at 600 km altitude when using the CCIR or URSI F peak models and good agreement when using measured (ionosonde) peak parameters. Iwamoto (Japan) in comparisons with ISS-b measurements noted the unrealistically large values that IRI predicts at high latitudes during very large solar activities; this 'high density spot' was also mentioned by several other speakers as one of the areas where future IRI improvements are essential. Gallagher (USA) presented his new Global Core Plasmasphere Model (GCPM) and discussed ways of connecting it to the IRI model.

The GCPM is primarily based on data from the DE-1 spacecraft (RIMS, PWI data). The model merges with IRI at about 500 km altitude. One of the results of the European COST initiative is the PLES model for ionospheric characteristics developed by Stanislawska (Poland) and colleagues. Truhlik (Czech Republic) studied solar activity changes of the topside electron temperatures and density using data from the Interkosmos and Hinotori satellites. Comparing their Akebono plasmasphere temperature data (1989-1998) with simulations, Oyama and Abe (Japan) find that they need an additional energy source at the top of the magnetic field line to explain the measured values. From the huge amount of data accumulated since 1989, they made an animation showing the variation of electron temperature with solar activity as well as local time. Triskova (Czech Republic) utilized ion composition data from the Intercosmos 24 and Atmosphere Explorer satellites to propose improvements of the current IRI ion composition model. Bhuyan (India) found that H+ and O+ measurements of the Indian SROSS C2 satellite compared well with theoretical computations but differed considerably from the IRI predictions. He also pointed out shortcomings of the IRI electron and ion temperature models based on SROSS RPA data.

During the 2nd day improvement for areas other than the topside/plasmasphere were discussed. For the D-region Friedrich (Austria) presented a new model that combines his auroral and non-auroral models. The high latitude D-region was also the subject of a paper by Danilov and Smirnova (Russia). Their model includes dependences on solar zenith angle and magnetic activity. Data from the German/Indian DEOS rocket campaign were reported by Thieman and Steigies (Germany) showing good agreement with the IRI predictions. The behaviour of F1 region parameters was studied with ionosonde data by Mosert (Argentina) and Scotto (Italy). Combining IRI and GPS data for space weather applications was the topic of a talk by Juan (Spain). Another interesting application of IRI is as background ionospheric model for testing different methods of deducing TEC from GPS and NNSS measurements (Ciraolo and Spalla,Italy). Gonzalez (USA) showed that the Arecibo and Jicamarca incoherent scatter radars are good tools for measuring topside parameters from the ground (300-2000km) and he highlighted the data sets and measurement programs that could be of help for the IRI modeling effort. Bradley (U.K.) reviewed the European PRIME (Prediction Regional Ionospheric Modelling over Europe) and the IITS (Improved Quality of Service in Ionospheric Telecommunication Systems Planning and Operation) projects promoted by the European Union as part of its COST (Co-operation in the Field of Scientific and Technical Research) program from 1990 to 1994 and 1995 to 1999 respectively.

During the 'Final Discussion' session at the end of the 2nd day the status and progress of the various IRI sub-tasks was reviewed and decisions were made regarding the post-2000 updates of IRI.

- **D-Region**: The relatively small data volume remains one of the biggest hurdles in modeling this region. The IRI team has assembled all available, reliable rocket data and is at the lookout for more. Modeling efforts are continuing in Graz, Austria (Friedrich), Moscow, Russia (Danilov), and Bern, Switzerland (Kopp).
- **E-Region**: Based on the approach presented at this meeting Fuller-Rowell (USA) proposed a parameterized model of the E region enhancement due to precipitating energetic electrons in the auroral oval. He plans to present a candidate model at the next IRI workshop. Efforts to improve the description of the E peak density at night and the E peak height especially at dawn and dusk continue (Titheridge, New Zealand; Mahajan, India using radar data). It was decided that it would be a worthwhile goal to include Sporadic E occurrence statistics in IRI for VHF users. The 'older' CCIR maps and recent ITU-R recommendations will be reviewed for this purpose (Bradley, U.K.; Radicella, Italy).
- **F-Region**: IRI-2000 is going an important step forward with the inclusion of the storm-time updating algorithm for the F peak density developed by Fuller-Rowell et al. (USA). It describes quite well the Ap response of the F peak density during mid-latitude summer. The next steps are now the representation of storm effects on the F peak height and improvements of the peak density algorithm (Fuller-Rowell, Condrescu, USA; Pavlov, Karpachev, Russia). The average behavior of the quiet-time mid-latitude F peak parameters is well represented in IRI. The focus is now on a better representation of the specific features at low latitudes (equator anomaly) and at high latitudes (mid-latitude trough, polar hole etc.). A special task group is working on the development of a Spread-F occurrence statistics model for IRI (Abdu, Brazil). This will be one of the main topics of the 2001 IRI Workshop in Brazil.
- **Topside:** Several modeling efforts are underway as reported at this meeting and should lead to a new topside model for IRI in the near future (Bilitza, USA; Leitinger, Austria; Radicella, Italy; Pulinets, Russia). Meanwhile it was decided to restrict the current IRI model to a value of Rz12=100 to avoid the unrealistic steep topside gradients that were reported at high latitudes during very high solar activities.
- **Plasmasphere:** The merging of Gallagher's GCPM model with IRI will be studied to provide IRI users with the possibility of a plasmaspheric extension (Gallagher, Bilitza, USA).
- **Variability**: A quantitative description of the variability of ionospheric parameters is high on the wish list of many users; a user wants not only to know the average value s/he can expect but also the standard deviation from this average. This will be one of the main topics of the IRI Task Force Activity that is organized annually by S. Radicella at the International Center for Theoretical Physics (ICTP) in Trieste, Italy. First steps were made by Kouris (Greece) and Ezquer (Argentina) as reported at this meeting .
- **Plasma temperatures:** Inclusion of solar activity effects especially at higher altitudes is of primary interest for the IRI temperature models. Work towards this goal is progressing with data from the Intercosmos, ISIS,

Akebono, and Hinotori satellites and with theoretical models (Truhlik, Czech Republic; Oyama, Japan).

- **Ion composition**: The primary goal is the development of global models for the ion transition heights (from light ions down to O+ ions, to molecular ions, to Cluster ions, and finally to negative ions. These transition heights will then be used as anchor points for the new IRI ion composition model. (Triskova, Czech Republic; Grebowsky, USA; Danilov, Russia).
- **Miscellaneous:** The IRI Workshop is now planned for the week of June 25 to 29, 2001 at the Instituto Nacional de Pesquisas Espaciais (INPE) in Brazil. The topic will be the 'Representation of the Equatorial Region in IRI' and the Local Organizer will be M. Abdu. Prof. Kouris from the University of Thessaloniki, Greece was accepted as a new member into the IRI Working Group. The IRI team thanks K-I. Oyama and the Institute for Space and Aeronautics (ISAS, Japan) for the continued efforts and support in publishing the quarterly IRI Newsletter. Financial support for some participants was provided by COSPAR and URSI.

Dr. Dieter Bilitza

EMC Zurich '01

Zurich, Switzerland, 20-22 February 2001

The 14th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility (EMC Zurich '01) was held from February 20 through 22, 2001 at the Swiss Federal Institute of Technology in Zurich (ETH Zurich), Switzerland. The meeting was attended by 846 participants from 40 countries and has included 48 exhibitor booths.

As in the preceding years, the Symposium which is sponsored by the Swiss Electrotechnical Association (SEV), has been organized by the Communication Technology Laboratory of the ETH Zurich under the auspices of Mr. F. Rosenberg, Swisscom.

Prof. Dr. P. Leuthold and Dr. G. Meyer acted again as symposium president and symposium chairman, respectively. The technical program committee was chaired by Dr. F. Tesche (Fairview, USA).

A number of international and national professional organizations were cooperating, e.g. IEEE, ITU and URSI. As in the past URSI Commissions A and E have sponsored the participation of young scientists.

A total of 131 carefully selected technical papers were presented in 19 sessions devoted to: EMC protection, adverse effects of high power EM, medical and biological issues, EMC in networks, sensors and probes, EMC in power systems, transients, transmission lines, modelling large chips and packages, lightning, measurement techniques, computer codes and validation, high frequency methods and analysis, test chambers and cells, PCBs in the GHz range, EMC innovation, EMC in communication systems, reverberation chambers and chip-level EMC.

The sessions covered virtually all EMC "hot" topics and reviewed the current status as well as future trends of EMC technology. The full text of the presentations has been made available in the symposium proceedings and on a CD-ROM.

As in previous symposia the program did not exclusively address experts. An introduction to EMC technology for newcomers was offered by two tutorial lectures and three workshops.

In the IEEE EMC Society workshop the latest standardization for measurements above 1 GHz including the uncertainties associated with these measurements have been presented. A new platform for the symposium exhibitors has been introduced, the so-called Industrial Forums, with the objective of providing the attendees some practical and industrial aspects of EMC.

An insight into the work of URSI Commission E was offered by open meetings dealing with the progress in the different working groups and identifying outstanding topics and new lines of future research.

Once again, a number of national and international organizations used the opportunity of the symposium to held open and closed meetings in coordination with EMC Zurich.

The IEEE EMC Society Board of Directors held the first meeting of the year as an open meeting. The research cooperation on Sustainable Mobile Communication has been introduced in a meeting. Their mission is to support innovative research on EMF risks attributed to cellular phone technology.

A further open meeting was organized by the IARU (International Amateur Radio Union) on EMC problems experienced and caused by radio amateurs. The contributions of these joint events have been made available in a supplement to the symposium proceedings. Centres of gravity of this symposium have been the field of EMC analysis and prediction with six sessions and a workshop devoted to this area. These sessions focused on the continuous developments of numerical methods for modelling, analysis, prediction and mitigation of EMC effects. The basic strategies rely on a step-by-step treatment of well-structured EMC scenarios at different topological levels. Better defined and simpler test methods, with reduced measurement uncertainty, could significantly reduce the cost of design and testing of the final product. Four sessions and a workshop have dealt with this area. Testing gives the final answer to EMC, and sophisticated sensors and probes are prerequisites for efficient testing.

It is difficult to point out general trends in the field of EMC but with the growing interest in theoretical models and numerical methods, the role of computers is becoming more and more important. Also with the trends to higher integration and to nanotechnology, EMC models and tools for MMCs, microsensors and nanomachines are gaining attention and new effects will have to be taken into account.

As usual, the Technical Exhibition has significantly contributed to the success of EMC Zurich'01 by demonstrating the fast conversion of theoretical knowledge into state-of-the-art hard- and software.

The traditional inquiry returned some very interesting suggestions for the next EMC Zurich Symposium which is planned for February 18 through 20, 2003. The call for papers of the 15th International Zurich Symposium and Technical Exhibition on EMC is scheduled for November 2001.

Dr. G.V. Meyer
e-mail: emc@nari.ee.ethz.ch
http://www.emc-zurich.ch/

CONFERENCE ANNOUNCEMENTS

ISSS-6
The Sixth International School
Symposium for Space Plasma Simulations

Garching, Germany, 3-8 September 2001

Aims & Scope

The series of International Schools/Symposia for Space Plasma Simulation (ISSS) was initiated by URSI in order to promote science and technology related to space physics via computer simulations. Previous ISSS's were held in Japan (Kyoto), USA (Hawaii), France (Nice), and in 1997 again in Japan (RASC Kyoto).

The aim of ISSS-6 is to bring together scientists working in the area of MHD and particle simulations or interested in applying simulation methods in their research. The topics of the meeting include planetary and cometary physics, wave-particle interactions, turbulence, MHD modelling of magnetospheres and ionospheres, MHD modelling of coronal processes, magnetic reconnection, shocks and boundary layers, dusty plasmas, and advanced simulation techniques, computing technology, codes and vizualisation tools.

In ISSS-6 talks (invited and contributed papers, presented in oral and poster sessions) will be given on simulation results and theory, advances in space plasma, solar and solar system physics, but also on astrophysical and laboratory plasma applications . These papers will be supplemented by observational papers on results from recent spacecraft missions, laboratory and other appropriate experiments.

Programme

The Scientific Programme will be available at around 15 July 2001

Deadlines

First Announcement: 12 April 2000
Second Announcement: 15 October 2000
Abstract Deadline: 15 May 2001
Notification of acceptance to authors, issue of preliminary programme: 15 July 2001
Final deadline for pre-registration: 01 August 2001

Submission of Abstracts

All abstracts (Contribution of maximum 4 pages including figures, tables and references) can be sent directly to the Copernicus Gesellschaft either by E-mail (cop@copernicus.org) or on a Data Medium (Diskette, CD, ZIP or JAZ) by mail to the Copernicus Gesellschaft, c/o ISSS-6, Max-Planck-Str 13, 37191 Katlenburg-Lindau, Germany. In all cases, each submission must be accompanied by the corresponding hardcopy printout of the original file!

Contact

Copernicus Gesellschaft e. V.
Max-Planck-Str. 13
D-37191 Katlenburg-Lindau
Germany
Tel: +49-5556-91099
Fax: +49-5556-4709
E-mail: cop@copernicus.org
http://www.copernicus.org/ISSS-6
FTP: ftp.copernicus.org/pub/incoming

EMC 2002
International Symposium & Technical Exhibition on Electromagnetic Compatibility

Beijing, China, 21-24 May 2002

The 2002 International Symposium & Technical Exhibition on Electromagnetic Compatibility will be held in Beijing, China on May 21 – 24, 2002. The Symposium will provide excellent opportunities for EMC researchers and engineers to present the latest research results and exchange views and experience. Prospective authors are invited to submit original, unpublished papers on the current state of EMC technology. A technical Exhibition will be held along with the symposium, manufacturers in EMC area are all welcome.

Topics

- Antenna, Wave Propagation
- Probe & Sensor
- Transmission Line Theory
- EM Calculation
- Coupling & Crosstalk
- EM Environment
- EM Bioeffects
- Seismo-Electromagnetics
- Spectrum Management
- Shielding, Filtering & Grounding
- EMC Education
- Immunity & Susceptibility
- Reverberation Chambers
- EMI Prediction & Reduction Technique
- Computer Modeling & Simulation
- Absorbing Materials
- Anechoic Chamber
- EMC Test & Measurement
- EMC Standards
- EMC in Communications
- EMC in Power Engineering
- EMC in Computer & PCBs
- EMC in Microelectronics
- Lightning, ESD & EMP

Deadlines

The summary of Paper submission Deadline: Nov.30, 2001
Notification of Acceptance: Jan. 15, 2002
Paper Submission Deadline: Feb.28, 2002

Contact

Prof. Liu Dayong
EMC2002 secretary
Chinese Institute of Electronics
P.O.Box 165, Beijing 100036, China
Tel: 861068283463, Fax:861068283458
Email: dyliu@public.bta.net.cn
http://www.cie-china.org/emc2002

URSI CONFERENCE CALENDAR

URSI cannot be held responsible for any errors contained in this list of meetings.
Do you wish to announce your meeting in this Calendar? More information about URSI-sponsored meetings can be found on our Homepage at : http://www.intec.rug.ac.be/ursi/Rules.html

June 2001

Beacon Satellite Symposium
Boston, Massachusetts,USA, 3-6 June 2001
Contact: Dr. R. Leitinger, Institutt für Geophysik, Astrophysik & Meteorologie, Universität Graz, Universitätsplatz 5, A-8010 Graz, Austria, Fax +43 316-380-9825, E-mail: reinhart.leitinger@uni-graz.at, http://www2.bc.edu/~dohertpd/beacon.htm

MSMW 2001 - Physics and Engineering of mm and submm Electromagnetic Waves
Kharkov, Ukraine, 4-9 June 2001
Contact: Dr. A.A. Kostenko, Institute of Radiophysics and Electronics, Ukrainian Academy of Sciences, 12, ac. Proskura Street, 310085, Kharkov, Ukraine, E-mail: ukr-ursi@guukr.freenet.kiev.ua, http://www.ire.kharkov.ua/MSMW2001/msmw.htm

URSI/COSPAR IRI Workshop
Modeling the Low Latitude Ionosphere
Sao Jose dos Campos, Brazil, 25-29 June 2001
Contact: Dr. D. Bilitza, Raytheon ITSS/NSSDC, Code 632, 10136 Crestwood Road, Kensington, MD 20895, USA, Phone: +1 301 286 0190, Fax: +1 301 286 1771, E-mail: Bilitza@nssdca.gsfc.nasa.gov

July 2001

ISEC'01 - International Space Environment Conference 2001 - Radiation Belt Science and Technology
Queenstown, New Zealand, 23-27 July 2001
Contact: Conference Administrator: Ms. Umbe Cantu, Rice Space Institute, MS 108, Rice University, 6100 Main Street Houston, TX 77005-1892, USA, Phone: 713-348-4939, Fax: 713-348-5143, E-mail: umbe@rice.edu, http://spacsun.rice.edu/~aac/isec2001/

ISSSE'01 - Questing More Significant Harmony and Integration : Systems/Devices and Softwares/Hardwares
Tokyo, Japan, 24-27 July 2001
Contact : ISSSE'01 Secretariat, Dept. of Elec. Eng., Science University of Tokyo, 1-3 Kagurazaka, Shinjuku, Tokyo 162-8601 Japan, E-mail: issse01@ee.kagu.sut.ac.jp, http://issse01.ee.kagu.sut.ac.jp/

August 2001

AP-RASC 2001 - Asia-Pacific Radio Science Conference
Tokyo, Japan, 1-4 August 2001
Contact : AP-RASC Secretariat, c/o The Japanese URSI Committee, c/o Dr. Y. Furuhama, Executive Director, National Space Development Agency of Japan (NASDA), World Trade Center Bldg., 2-4-1 Hamamatsu-cho, Minato-ku, Tokyo, 105-8060, Japan, Phone: +81-3-3438-6007, Fax: +81-3-5402-7934, E-mail: ap-rasc@kurasc.kyoto-u.ac.jp, http://www.kurasc.kyoto-u.ac.jp/ap-rasc/

September 2001

ISSS-6 - Sixth International School for Space Simulations
Katlenburg-Lindau, Germany, 3-8 September 2001
Contact: Copernicus Gesellschaft e.V., Max-Planck-Strasse 13, D-37191 Katlenburg-Lindau, Germany, Phone: +49-5556-4709, E-mail: cop@copernicus.org, http://www.copernicus.org/ISSS-6/

ICEAA'01 - International Conference on Electromagnetics in Advanced Applications
Torino, Italy, 10-14 September 2001
Contact : COREP - ICEAA'01, Politecnico di Torino, Corso Duca degli Abruzzi 24, I-10129 Torino, Italy, Tel. +390 11-564-4056, Fax +390 11-564-4099, E-mail : graglia@polito.it, http://www.polito.it/~iceaa/

October 2001

School on analysis techniques for space plasma data
La Londe - Les Maures, France, 8-13 October 2001
Contact: Prof. Thierry Dudok de Wit, Laboratoire de Physique et Chimie de l'Environnement, LPCE-CNRS, 3A, Avenue de la Recherche Scientifique, 45071 Orleans cedex 2, France, Fax: +33-238-255277, E-mail: ddwit@cnrs-orleans.fr, http://www.tu-bs.de/institute/geophysik/la-londe/

Radio Africa 2001
Cape Coast, Ghana, 15-19 October 2001
Contact: Dr. P.K. Buah Bassuah, Local Organiser, Secretariat Radio Africa 2001, Laser and Fibre Optics Centre, University of cape Coast, Cape Coast, Ghana, Tel: +233-42-33773/33837, Fax: +233-42-32446, E-mail: lafoc@ncs.gh.com

May 2002

Third URSI International Commission G High Latitude Ionosphere Symposium
Fairbanks, Alaska, USA, 15-19 May 2002
Contact : 2002 URSI Fairbanks Conference, 7917 Gearhart, Klamath Falls, OR 97601, USA, Fax: 1 541 885 8786, E-mail: Rdhrpc1@aol.com

EMC 2002
Beijing, China, 21-24 May 2002
Contact: Prof. L. Dayong, EMC 2002 Secretary, Chinese Institute of Electronics, P.O. Box 165, Beijing 100036, China, Tel: +8610 68283463, Fax: +861068283458, E-mail: dyliu@public.bta.net.cn, http://www.cie-china.org/emc2002

June 2002

EUSAR 2002
Cologne, Germany, 4-6 June 2002
Contact: Dr. Richard Klemm, FFM-FGAN, Neuenahrer Strasse 20, D-53343 Wachtberg, Germany, Fax: +49 229 9435 618, Email: r.klemm@fgan.de, http://www.fhr.fgan.de/eusar/

September 2002

EMC Europe 2002 - International Symposium on Electromagnetic Compatibility
Sorrentino, Italy, 9-13 September 2002
Contact: EMC Europe 2002 Secretariat, AEI Ufficio Centrale, Piazzale R. Morandi 2, 20121 Milano, Italy, Phone: +39-02-77790-205/218, Fax: +39-02-798817, E-mail: emceurope2002@aei.it, http://www.aei.it/emceurope2002.html

November 2002

ISAP-i02, 2002 Intermediate International Symposium on Antennas and Propagation
Yokosuka, Japan, 26-28 November 2002
Contact: Prof. Kenichi Kagoshima, Chairperson, ISAP i-02, Ibaraki University, 4-12-1 Nakanarusawa, Hitachi, 316-8511 Japan, Internet: http://www.ieice.org/cs/ap/ISAP2002/

News from the URSI Community

IN MEMORIAM

Roger M. Gallet
1923 - 2001

Roger Gallet of Boulder died at home on March 16, 2001 after a long battle with cancer. He was 78.

He was born January 1, 1923 in Paris, France to Marcel and Suzanne Gallet. He received degrees in Physics, Mathematics, Astronomy and Philosophy at the Sorbonne University in Paris.

Roger Gallet was an officer in the French navy. During his tenure he was involved in developing the ionospheric sounder program for predicting long-range radiocommunication.

In 1955 he was offered a position as a radio physicist at the National Bureau of Standards in Boulder, Colorado and travelled to the United States. His most important contribution there was the computerisation of numerical mapping for ionospheric data, which was used for predicting the best frequencies for long-distance radio communication, such as across oceans. This was one of the first uses of electronic computers at the Boulder Laboratories. These programs yielded more information and greater accuracy than the former hand-produced charts.

For this achievement. Roger Gallet and William B. Jones were awarded the United States Department of Commerce Gold Medal in 1965 "for the development of efficient computer programs for the description and prediction of the world-wide properties of the ionosphere".

His interest in the theory of radiowave propagation in a magneto-plasma led to his design of the Plasma Physics Laboratory, for which a building was constructed on the National Bureau of Standards campus in Boulder, Colorado. He was an expert on the plasma physics and chemistry of the atmosphere of the planet Jupiter. At his suggestion a project to observe radio emissions from Jupiter was initiated.

He also did significant research on whistlers, the radio signals emitted by lightning strikes that travel great distances along the Earth's magnetic field lines to the opposite hemisphere. In 1963 Roger and his colleagues published an Atlas of Whistlers and VLF Emissions.

As professor of Upper Atmosphere Physics at Colorado State University in Fort Collins, he was praised for his ability to reach and interest the students, winning a teaching award.

Roger Gallet had few publications, but his file drawers were full of brilliant musings on a wide variety of subjects. URSI was his principal scientific forum. Examples reported in the National Bureau of Standards publication "Achievement in Radio" by W.F. Snyder and C.L. Bragaw, 1986, are : "Gallet and Jones reported on the systematic classification of VLF emissions at the May 1957 meeting of URSI in Washington, DC.

At the XIII General Assembly at Tokyo in 1963, Gallet reported on 'The VLF Emissions - Their Relation with Whistlers and High Energy Particle Phenomena'.

He is survived by his wife, Hannelore; two brothers in France, two daughters and a son. His first wife, Christiane, whom he married in 1946, was killed in a car accident in 1971.

COMMISSION B : INTERNATIONAL ELECTROMAGNETICS PRIZE

URSI Commission B and the URSI Board of Officers have approved the establishment of the **URSI Commission B International Electromagnetics Prize**.

The prize is USD 10,000 plus a commemorative plaque and is sponsored by the Summa Foundation.. It is awarded for an accurate approximate solution of a designated scattering or related problem in electromagnetics, and is presented at an appropriate URSI meeting (not at an URSI General Assembly).

Background

The last 30 years have seen enormous advances in the application of numerical techniques in electromagnetics, but there have been comparable advances in our knowledge of the scattering from simple geometric shapes. It is hoped that the prize will encourage the development of accurate physically based approximate analytical expressions for the solution of canonical and similar problems.

Each year a specific problem will be designated. Examples are the scattering of a plane wave by a perfectly conducting right circular cone and by a perfectly conducting infinitesimally thin quarter plane. In the first case an exact solution in the form of an eigenfunction expansion is available, as well as approximations for large and small cone angles. The objective here is to develop empirical analytical approximations for all cone angles of incidence and scattering, and to quantify their accuracy by comparison with exact data. In the second case there is also an eigenfunction solution, but because of the complex nature of the functions involved, it may be more effective to use the moment method or a similar numerical technique to obtain data which are highly accurate. The aim is to provide simple analytical expressions which approximate these to an adequate degree of accuracy.

Procedure

The designated problem will be announced on 15 September of each year on the URSI web page (http://www.intec.rug.be/ursi) and elsewhere, and solutions are due by 15 January, 16 months after the announcement date.

Entries must be in English in the format of a paper submission of the Journal *Radio Science*, and not exceed 25 pages in length, including tables, figures and references. Entries will be judged by a panel appointed by the chair of URSI Commission B and the Summa Foundation. Factors taken into account in the judging will be the simplicity and elegance of the expressions, for all values of the parameters involved in the problem. The winner be announced on 15 April of the year of submission. There is the right to withhold the award if, in the opinion of the panel, no worthy entry is received.

CHANGES IN THE CONDITIONS TO QUALIFY FOR A YS AWARD!

There have been some changes in the conditions for applicants to qualify for a young scientist award.

At the annual Board Meeting (8-9 May 2001) the URSI Board of Officers decided to drop the third condition stating that the candidate "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".

So, in order 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 and accepted for oral or poster presentation at a regular session of the General Assembly.

Of course, the applicant must be interested in promoting contacts between developing and developed countries and is expected to participate fully in the scientific activities of the General Assembly.

You can find a copy of the revised application form on pages 17-18. These forms can also be downloaded from the URSI homepage at http://www.intec.rug.ac.be/ursi

It is very important that all applicants of the Young Scientist Programme visit the URSI Homepage regularly. Please go to the "What's New" section of your Young Scientist web site at :

http://www.intec.rug.ac.be/ursi/YS/infoYS.htm

to see if there is news. You will probably find the answer to (most of) your questions on this web site. And, last but not least : some time around 1 April 2002 the result of the selection will be put on this site, long before the official letter will reach you by mail. Good luck to all of you!

GERMANY

Kleinheubacher Tagung 2001 - Call for Papers

Schloss Kleinheubach, Germany, 24 - 28 September 2002

Contributions in the form of oral or poster presentations to the following programme must be submitted as an abstract by 22 June 2001 to:

Copernicus Gesellschaft e.V.
Max-Planck-Str. 13
37191 Katlenburg-Lindau
Germany
Tel: +49-5556-91099
Fax: +49-5556-4709
URSI@COPERNICUS.ORG

Topics are:

A. Electromagnetic Metrology

A. 1 Electromagnetic Metrology
Convener: U. Stumper (Braunschweig) [Monday, 24. September 2001]

A. 2 Quantum Standards for Electric Units
Convener: H. Bachmair (Braunschweig) [Wednessday, 26. September 2001]

B. Fields and Waves

B.1 Fields and Waves
Convener: W. Menzel

B.2 Antennas for modern Communication Systems

B.3 Analytical and Numerical Technics for the calculation of Electromagnetic Fields

C. Signals and Systems [Tuesday, 25. Septermber 2001]

C.1 Signals and Systems
Convener: D. Wolf

C.2 Bluetooth, wireless LAN
Convener: E. Bogenfeld

C.3 Intelligent Antennas
Convener: A. Czylwik

C.4 Cellular Neuronal Network Applications
Convener: R. Tetzlaff

C.5 Mobile Cellphone

C.6 Digital Transfer

D. Electronics and Photonics

D.1 Electronics and Photonics
Convener: Ch. Münther

D.2 "Interierte" digital and analogue Circuit
Convener: H. Klar

E. Electromagnetic Noise and Interference

E.1 Electromagnetic Noise and Interference
Convener: J. Nitsch

E.2 EMV Test Environment
Convener: A. Enders

E.3 Screening
Convener: R. Sturm und/and L. Klinkenbusch

E.4 Transient Motivation Complex Systems
Convener: F. Heidler

F. Wave Propogation and Remote Sensing

F.1 Tropospheric and Geophysical Remote Sensing with Spaceborne, Airborne and Ground Based Devices
Convener: M. Chandra

F.2 Tropospheric Propogation
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- Imaging Brain Electrical Activity, Bin He, Dezhong Yao, and Dongsheng Wu
- Applications and Control of High Voltage Pulse Delivery for Tumor Therapy and Gene Therapy In Vivo, Bertil R. R. Persson
- The Electric Field-induced Electroconformational Coupling of Cell Membrane Proteins, Wei Chen
- Biological Effects of High Peak Power Radiofrequency Pulses, Shin-Tsu Lu and John O. de Lorge
- A Comprehensive Review of the Research on Biological Effects of Pulsed Radiofrequency Radiation in Russia and the Former Soviet Union, Andrei G. Pakhomov and Michael R. Murphy

December 2000, 302 pp., $95.50, Kluwer Academic/Plenum Publishing Corporation, ISBN 0-306-45484-5

Schonland: Scientist and Soldier

By Dr. Brian Austin
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Schonland was a major contributor to 20th century science, both in peace and war. He was born in South Africa but in 1955 became a British citizen when he became Deputy Director of the Atomic Energy Research Establishment in Harwell, UK.

Before that he had established an international reputation as the world's leading expert on lightning and he served as South Africa's representative to URSI from as early as 1934 when he worked alongside Appleton and Watson-Watt, and Norinder of Sweden, on the electrical characteristics of lightning and atmospheric electricity.

About the author

Brian Austin was born in Johannesburg in 1945. He obtained his BSc(Eng) degree in 1970 at the University of the Witwatersrand (Wits) and later MSc(Eng) and PhD degrees while employed, first at the research laboratories of the Chamber of Mines, and then as an academic on the staff of his alma mater. From 1976 he served in a part-time capacity in the South African Army before retiring in 1984 with the rank of major. He is presently the UK representative on Commission B (Fields and Waves) of the International Union of Radio Science (URSI).

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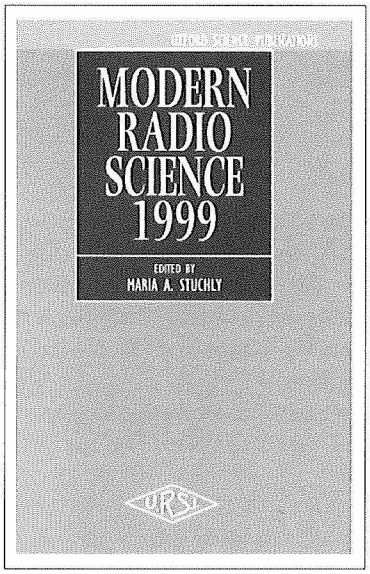

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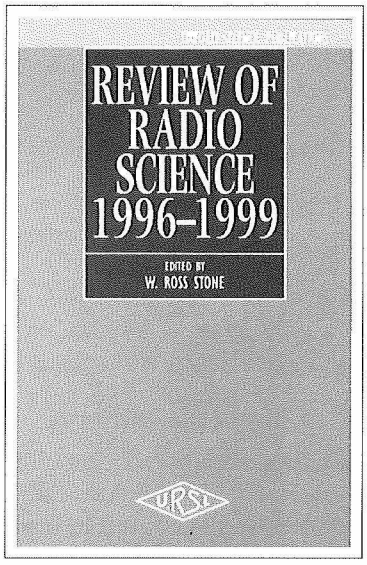

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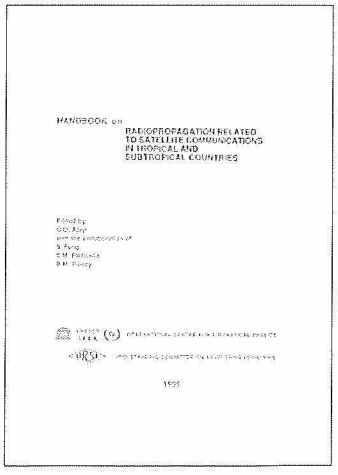

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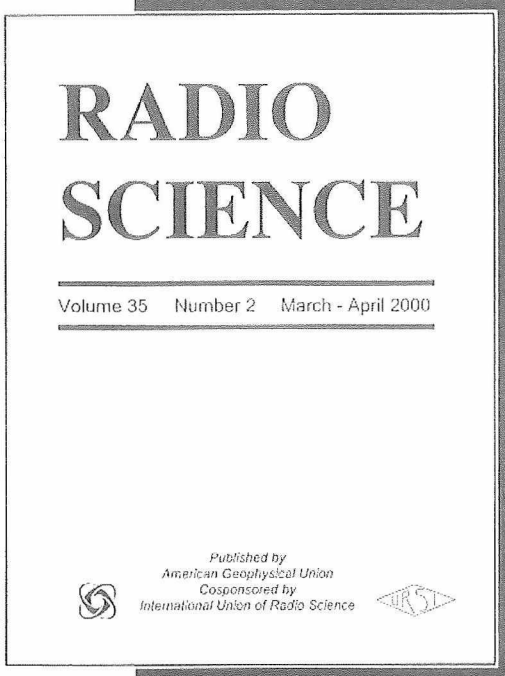

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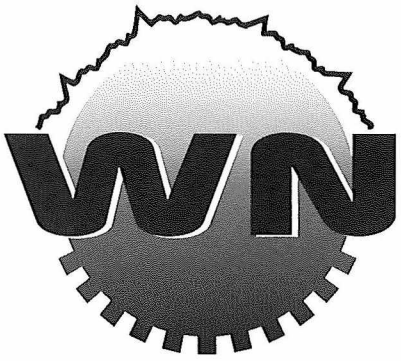

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