

## Conference report

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# URSI XXVIth General Assembly

*13–21 August 1999, Toronto, Ontario, Canada*

## URSI

### *About URSI*

URSI (International Radio Science Union) is a union of countries (almost 50 countries). It is organized into 10 commissions covering the wide swath of radio science disciplines. Each member country has its own national committee, and its own commission organization. Further information on URSI may be obtained through their Internet home page:

<http://www.intec.rug.ac.be/Research/Projects/ursi/welcome.html>

Member countries and commissions may also have Web pages. For example, the national committee for the USA is the USNC which has a Web page at:

<http://www.usnc-ursi.org/>

(Individuals are ‘members’ of their national entities. In my case, I am a ‘member’ of US Commissions B and F of the USNC.)

### *General Assemblies*

General Assemblies are held every three years, in locations in member countries all over the world. They have, since the 1970’s, included a technical program that goes beyond the reporting of progress in the Radio Sciences in the several disciplines and countries, as was done originally. This technical program is now a major presentation of research in the Radio Sciences, and is attended by well over 1000 radio scientists, from every member country. (More background and information may be obtained through URSI.)

## XXVIth General Assembly

### *Site*

The XXVIth General Assembly (GA) was held in Toronto, Ontario, Canada, 13–21 August 1999. All but a few special functions took place on the campus of the University of Toronto. The local organizing committee was ably chaired by Prof. Keith Balmain of the University of Toronto.

### *Overview*

The activities at the GA can be split into four categories – the ‘business’ of URSI and its commissions, the GA meetings (Plenary Sessions, General Lectures, Awards, etc.), the Scientific Sessions (Technical Program) and the Social Events. All this is compacted into 8 hectic days and nights. I will deal mainly with the Scientific Sessions, and there principally with those I attended.

There were some 1300 attendees. Over 1600 papers were presented, plus Tutorial papers (for each commission) and Workshops. The papers were about evenly split between invited paper sessions and poster sessions. All were documented.

### *Documentation*

There are three archival documents – Abstracts, Modern Science 1999, and Review of Radio Science 1996–1999. They were published for URSI and URSI HQ in Brussels should be consulted for further access (see URSI Web site noted above).

*Abstracts* is a massive volume of some 930 tome-sized pages, presenting the Abstracts of all the papers, two to a page. They are organized by commission, in alphabetical order, followed by Joint Sessions and Workshops, in session sequence and an Author Index. Since each abstract contains the authors’ names and

addresses (often phone, fax and e-mail as well), one has access to more details.

*Modern Science 1999* (edited by Prof. Maria Stuchly of the University of Victoria, Victoria, BC, Canada) contains the texts of the Public Lecture, the 3 General Lectures, and the 11 Tutorial Lectures (each commission and the Inter-commission Working Group). These lectures were given by world-class radio scientists speaking to their current interests. I found them to be well worth reading.

*Review of Radio Science 1996–1999* (edited by Dr. W. Ross Stone of Stoneware Ltd., La Jolla, CA, USA). This is a tradition of URSI. It has evolved from a book containing an annotated bibliography covering the principal work of each commission in each member country of the preceding 3 years, through paper with floppy disc presentation, to its present form. This is a paper presentation of advances in some 37 key technology areas, covering all 10 commissions, and a CD-ROM presentation of Collected References covering most of the peer-reviewed publications of the disciplines covered by the 6 participating commissions. These were A – EM Metrology, B – Fields and Waves, E – EM Noise and Interference, F – Wave Propagation and Remote Sensing, H – Waves in Plasmas and K – EM in Biology and Medicine. The massive increase in radio research and publication has been a driving force behind this evolution. Both the book and the CD-ROM are of considerable use to those active in the field as the book provides a focused look at what is going on in the fields covered and the CD-ROM a substantial concentration of recent references in the fields of interest of the participating commissions.

#### *Sessions and papers of special interest*

One cannot possibly cover everything worthwhile in such a massive scientific program. Necessarily, one picks and chooses items of personal concern and interest. Mine are heavily weighted towards applications of radio sciences to endeavours in space and in space communications. In most cases, the session and paper titles are descriptive of the contents.

For me the GA scientific program started Monday morning in Session F3 on Millimetric, Sub-Millimetric and Optical Wave Propagation. Two papers of considerable interest in our disciplines were ‘EHF Earth-Space Propagation Measurements and Prediction’ by C.L. Wrench from the Rutherford-Appleton Labs (UK) using beacons on board of the ITALSAT F1, and comparing the data analysis to model predictions,

and ‘Laser-Beam Transmission Experiments on a Bi-Directional Ground-to-Satellite Link’ by K. Araki et al. from the CRL (Japan), using the ETS VI laser communications capability. Araki also described future efforts planned using the OICETS in 2001. There followed the General Lecture, given by Dr. J.V. Evans of COMSAT, ‘The Past, Present and Future of Satellite Communications’, a very comprehensive overview, whose full text is to be found in *Modern Radio Science 1999*, noted above. Monday afternoon, Session F1 on Mobile Terrestrial and Satellite Propagation Modelling was interesting, especially the two papers by Loo (CRC, Canada) and Karasawa (KDD Labs, Japan) on Land-Mobile Satellite System Channel Modeling.

Tuesday morning there was an interesting joint session (Commissions C and F) on Mobile and Personal Communications. There were several good papers presented. The session ended with a rather futuristic paper by Mann on a wearable personal safety camera/surveillance system transmitting images using Packet Transfer Protocol. Tuesday afternoon was split between a joint Commissions B–D session on ‘Integrated Antennas’ and a Commission C session on ‘Radio Spectrum Utilization and their Technologies’. Perhaps the most useful paper was ‘Adjacent Channel Power Distortion Measurement’ by J. Scott of Hewlett–Packard. The Poster Sessions had a number of papers of interest, especially session FP. The papers by Bostian et al., ‘Propagation Through Trees at 28 GHz’, and Rogers et al., ‘Earth-Space Propagation Measurements in Canada’ were quite worthwhile.

Wednesday afternoon, session E4 on ‘Spectrum Management and Utilization’ addressed a number of issues. One cannot overstate the importance of this topic. Apart from the papers, there is the growing problem of congestion in the bands used for communications, the needs of the remote sensing community and the needs of the radio astronomy community. All are gathered together at URSI GAs and there is much, much discussion outside the technical meetings on the problems in this area.

Thursday was a day with several interesting papers scattered through several sessions, but none of significant current interest to space communications, but there was some future-looking work on software radios in session C6, ‘Software Radios for Future Communications . . .’.

Friday morning, the General Lecture by Prof. Bach Andersen (Denmark), ‘Future Generations of Mobile Communications, the Scientific Aspect’, presented a thorough review of the problems and potential solu-

tions in this explosively burgeoning application. As he sees it, satellite mobile communications have a role but it will be limited and integrated into basically terrestrial systems. He concludes that there are no technical/scientific barriers to making 3rd generation mobile communications pervasive around the world. The complete text may be found in 'Modern Radio Science 1999'. Friday afternoon, session F4, 'Remote and In-Situ Sensing of Clouds . . .' was quite interesting, although a couple of papers (F4.1 and F4.4) were not presented.

The program ended Saturday morning. Session B10 on 'Asymptotic Methods' covered a topic with long-term ramifications in modeling throughout the radio sciences. The Tutorial Lecture on 'Spectral Conges-

tion' by Baan and Delogne was a painstaking effort to frame the problems and some of the areas where solutions are being sought. It concluded by pointing out how URSI Commission 'members' could act through their ITU-R activities to help matters. The full text may be found in 'Modern Radio Science 1999'.

### **XXVIIth General Assembly**

The next GA will be held in August 2002 in Maastricht, in the Netherlands. See you there !!!

Geoffrey Hyde