

## **Commission K 2005 – 2008 Triennium Report**

### **1.0 Overview:**

In the last three years, Commission K and its members have been active in: a) publishing articles in the *Radio Science Bulletin*, b) sponsoring scientific meetings, c) organizing and funding a major international symposium (July 2007), d) preparing a white paper on Wireless Communication and Health, e) running two business meetings in June 2006 and June 2008 at the annual Bioelectromagnetics Society Meeting, f) developing a draft of commission strategic directions and g) preparing for the General Assembly of Chicago (9 specific sessions, and one poster session, 2 joint sessions lead by Commission K with Commissions A and E and B and E respectively, one tutorial and one lead by Commission B and one lead by Commission B with Commission F for a total of 103 oral presentations and 31 poster presentations).

### **2.0 Contributions to the Radio Science Bulletin:**

#### **Published Invited Reviews:**

- 2.1.1 Ahlbom, A., Feychting, M., and Lonn, S., 2005. Mobile Phones and Tumor Risk: Interpretation of Recent Results. *Radio Science Bulletin*. 314: 30-33.
- 2.1.2 Lin, J. 2005. Interactions of Wireless Communication Fields with Blood-Brain Barrier of Laboratory Animals. *Radio Science Bulletin*. 315: 33-38.

#### **2.2 Invited Reviews in Preparation:**

(Waiting for Guglielmo D’Inzeo email)

#### **2.3 Radio – Frequency Radiation Safety and Health:**

- 2.3.1 Lin, J. 2005. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 315: 44-46.
- 2.3.2 Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 316: 42-44.
- 2.3.3 Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 318: 67-68.
- 2.3.4 Lin, J. 2006. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 319: 67-68.
- 2.3.5 Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 320: 48-49.
- 2.3.6 Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 321: 54-55.
- 2.3.7 Lin, J. 2007. Radio-Frequency Radiation Safety and Health. *Radio Science Bulletin*. 322: 41-42.

2.3.8 Lin, J. 2008. Radio-Frequency Radiation Safety and Health.  
*Radio Science Bulletin*. 324: 41-42.

2.4 **Published Commission K Tutorial Lecture:**

2.4.1 Vecchia, P. 2006. Assessment of Health Affects Associated with Electromagnetic Fields by WHO, IARC, and ICNIRP.  
*Radio Science Bulletin*. 318: 30-33.

3.0 **Sponsoring Scientific Meetings:**

The following scientific meetings received non-financial i.e. moral support from Commission K.

Event Name	Event Date
International Symposium on Space THz Technologies (ISSTT), Paris, France	May 10-12, 2006
International Conference on Ultrawideband, Waltham, MA, USA	September 24-27, 2006
VIIth International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, St. Petersburg, Russia	June 26-29, 2007
2007 Asia-Pacific Microwave Conference, Bangkok, Thailand	December 11-14, 2007
ICMARS-2006, Jodhpur, India	December 20-22, 2006
Millimeter Waves in Medicine and Biology, Moscow, Russia	April 2-5, 2007
The Sixth International Kharkov Symposium on Physics and Engineering of Microwaves, Millimeter and Submillimeter Waves (MSMW'07), Kharkov, Ukraine	June 25-30, 2007
Electromagnetic Compatibility EMC Europe 2008, Hamburg, Germany	September 8-12, 2008
Microwave-08, Jaipur, India	November 2008
20 <sup>th</sup> International Zurich Symposium on Electromagnetic Compatibility, Zurich, Switzerland	January 12-16, 2009
Electromagnetic Compatibility – EMC-2009, St. Petersburg, Russia	2009

4.0 **International Symposium Held July 22-26, 2007, Ottawa, Canada:**

4.1 URSI International Commission K and CNC-URSI ran four symposia associated with the North American URSI Meeting in Ottawa, Canada, July 22-26, 2007 (see <http://ursi2007.ee.umanitoba.ca/Home.html>). Two were associated with Commission E CNC and US-NC. Three of the four sessions had an overarching theme: toward visualization of electromagnetic brain stimulation through electromagnetic brain imaging and mapping.

- 4.2 The first session (K2) focused on Neuronal Stimulation by both inductive and capacitive coupling including presentations on theory, simulations and/or experimentation. The third session (EK2) was a joint session on Electromagnetic Brain Imaging and Mapping with Commission E and focused on brain MRI, photo-acoustic imaging and current density imaging as well as brain mapping with EEG and electrical impedance tomography. The fourth session (K3) brought together the ideas in K2 and EK2 and covered Bioelectromagnetic Brain Imaging and Mapping of Effects from Electromagnetic Stimulation.
- 4.3 The second session was also with Commission E and this session (EK1) focused on breast imaging using microwaves - a very exciting, new and exploding field for URSI.
- 4.4 The success of these sessions allowed Commission K to decide on including similar sessions at the URSI GA08 in Chicago. These sessions especially the ones on Breast Imaging, Brain Imaging and imaging the effects of EMF brain stimulations have been oversubscribed suggesting that imaging will be a new large part of Commission K activities in the future.
- 4.5 The cost of this Symposium was about \$40,000 CAN/USD. This was raised from the \$8,000 EU available from URSI/Comm K, \$5,000 CAN from a research grant from CIHR, \$2,000 CAN for students from CNC/URSI and the remainder was generously provided by the Lawson Health Research Institute.
- 5.0 **White Paper on Wireless Communication and Health:**  
Dr. Bernard Veyret is preparing this white paper, requested by URSI. He has identified the authors for the different sections and will have a draft of the white paper ready for the general assembly in August 2008.
- 6.0 **Two Meetings of National Representatives of Commission K\*:**
- 6.1 June 12, 2006: A meeting was held in Cancun, Mexico at the 2006 Bioelectromagnetics Meeting.
- 6.2 June 9, 2008: A meeting was held in San Diego, California at the 2008 Bioelectromagnetics Meeting.
- \* Minutes of these two meetings can be found at <http://www.ursi.org/K/Index.htm>
- 7.0 **URSI Commission K Emerging Issues, Prepared by Bernard Veyret and Frank Prato:**  
The driving issue behind the creation of Commission K was health risk assessment mainly related to mobile telephony. Since then, several emerging issues of heavy societal impact have been encompassed by the terms of reference for Commission K, especially in view of the still rapid development of wireless communication technologies and the emergence of the areas of

“bioengineering” as a new area of emphasis at so many institutions, with new Departments of Bioengineering, Medical Imaging, Molecular Imaging and Molecular Biology being created. It is significant in this regard that the chairship of Commission K has alternated between world leaders in risk assessment and biomedical engineering and imaging over the last 4 cycles.

While the underlying opportunities and applications in this connection are extremely broad, and cannot possibly be all addressed by URSI, or any other single organization, the relatively small but important component of the research thrusts of such departments, namely ‘Electromagnetic Effects in Biology & Medicine’ can be uniquely and most effectively captured by URSI.

The main emerging issues are today the new EMF-emitting devices (e.g., WiFi, Wimax, RFID) linked with dosimetric and standardization issues, and the biomedical applications of biomedical imaging (e.g., very high field MRI, microwave imaging, thermal imaging, near infrared imaging, optical imaging and hybrid imaging including optical/acoustic and microwave/acoustic), electrical mapping (e.g., electrical encephalography or EEG and electrical magneto encephalography or EMG) and electrical stimulation (e.g., direct electrical stimulation and inductive non-invasive stimulation). It must be acknowledged in this regard that Commission K members must remain current in employing the latest in technology no matter where in the spectrum of these disciplines they work. For example they must use the latest in molecular biology regardless of whether research is in the traditional area of risk assessment (e.g. use of gene c-DNA arrays) or biomedical (e.g. developing reporter probes for molecular imaging).

Realization of such opportunities should be a new thrust of URSI, especially in view of their societal importance. In that context, significant interaction with other Commissions do exist already, namely commission A (e.g., field and SAR metrology), commission B (e.g., numerical methods and modeling of electromagnetic propagation in tissues, EM and statistics), commission E (e.g., development of EMI standards), commission F (e.g., terahertz propagation in tissue), and commission H (electromagnetics in conducting media).

In order to strengthen its role in health risk assessment and standard setting, commission K has built strong links with WHO and ICNIRP.<sup>1</sup>

Hence Commission K has two important roles to play within URSI. The risk assessment role is that of “hand maiden” to the other commissions where, for example, Commission K members use the latest tools to test for safety of a new wireless technology. The second role is where Commission K leads and asks other commissions to lend their expertise to develop new technologies such as the understanding of EM field transmission characteristics for microwave breast imaging. It is this second role that has the capacity of explosive growth but it is also the area most likely to be taken over once it

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<sup>1</sup> International Commission on Non-Ionizing Radiation Protection

reaches a level of commercialization for medical application by large well funded medical imaging societies. However Commission K can achieve a novel niche by leveraging the strengths of the other URSI commissions.

8.0 **Preparations for GA08, August 9-15, 2008, Chicago:**

Commission K will lead in 11 specific sessions and one poster session. This includes one session with Commissions B and E on microwave breast imaging and one with commissions A and E on exposure assessment of new emerging technologies. Commission K has combined with Commission B on a session with the title “Future Challenges of Computational Electromagnetics” and with Commission B and F with the title “Stochastic Modeling and Uncertainty Arrangement in Electromagnetics”. All 13 of these oral sessions have been filled and in addition there are a total of 31 posters and 1 Commission K Tutorial on Wireless Communication and Health. Hence there are a total of 134 Commission K presentations with 31 of these being posters.

9.0 **Nomination of Dr. Shoogo Ueno for the Balthasar Van der Pol Gold Medal of URSI Society:**

Dr. Shoogo Ueno was nominated for a Gold Medal of the URSI Society. Although Dr. Ueno was more than deserving for an extensive career in research, teaching and administration his nomination, through no fault of his own, was not successful. Dr. Ueno has served our community unselfishly as a former Chair of Commission K and President of BEMS. Although not successful, Commission K members would like Dr. Shoogo Ueno to realize that his associates and colleagues hold him in the greatest regard.

10.0 **Student Support at URSI:**

10.1 Commission K had \$5,000 US for student support and decided to use it to offset student travel costs by giving \$300 US to each of the 16 students.

10.2 Three Commission K students received Young Scientific Awards.

10.3 One Commission K student’s manuscript was selected in the 10 finalists for the URSI student paper competition.