



Commission K

2008-2011 Triennial 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 and funding scientific meetings,
- c) Organizing and funding a major international symposium (Bordeaux, April 2010),
- d) Preparing a white paper on Wireless Communication and Health, pending the recent evaluation of the IARC (WHO - International Agency Research on Cancer) of RF and MW fields carcinogenicity,
- e) Running two business meetings in June 2009 at BioEM2009 in Davos (CH) and June 2010 at the annual Bioelectromagnetics Society Meeting in Seoul (South Korea),
- f) Developing a draft of commission strategic directions
- g) Preparing for the General Assembly and Scientific Symposium of Istanbul, Turkey, with 8 oral sessions and two poster sessions, 2 joint sessions lead by Commission K with Commissions A and E and B and E respectively, 1 joint session lead by Commission K with commission B, for a total of 81 oral presentations and 23 poster presentations.

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

2.1 **Published Invited Contribution:**

2.1.1 J. C. Lin, P. Bernardi, J.B. Andersen. 2009. "The Formation and Early Years of URSI Commission K on Electromagnetics in Biology and Medicine" *Radio Science Bulletin*. 330: 51-58

2.1.2 G.A. Lovisolo, F. Apollonio, L. Ardoino, M. Liberti, V. Lopresto, C. Marino, A. Paffi, R. Pinto. 2009. "Specifications of in vitro Exposure Setups in the Radio-Frequency Range" *Radio Science Bulletin*. 331, 21-30

2.2 **Radio – Frequency Radiation Safety and Health:**

- 2.2.1 James C. Lin 2009. Radio-Frequency Radiation Safety and Health: "International Studies of Brain Tumors in Mobile-Phone Users Heads" *Radio Science Bulletin*. 328: 49-51.
- 2.2.2 James C. Lin 2009. Radio-Frequency Radiation Safety and Health: "Development of Cancer in Normal Mice Exposed to Mobile-Phone Radiation" *Radio Science Bulletin*. 329: 44-46.
- 2.2.3 James C. Lin 2010. Radio-Frequency Radiation Safety and Health: "Frequent Exposure to Mobile Phones Changes Cognitive Behavior in Children" *Radio Science Bulletin*. 332: 103-104.
- 2.2.4 James C. Lin 2010. Radio-Frequency Radiation Safety and Health: "Mobile-Phone Popularity, Addiction, and Funding for Biological Effects Research" *Radio Science Bulletin*. 333: 51-52.
- 2.2.5 James C. Lin 2010. Radio-Frequency Radiation Safety and Health: "Mobile-Phone Use and Brain-Tumor Research" *Radio Science Bulletin*. 334: 64-65.
- 2.2.6 James C. Lin, 2011, Radio-Frequency Radiation Safety and Health: "ICNIRP and its Role in Setting Guidelines for Radio-Frequency Exposure - The Most Successful Application of Electromagnetics in Biology and Medicine: Magnetic Resonance Imaging" *Radio Science Bulletin*. 336: 95-100.

3.0 Sponsoring Scientific Meetings:

The following scientific meetings received from Commission K.

Event Name	Site and Event Date
<p style="text-align: center;">EMC Europe 2008</p> <p>International Symposium on Electromagnetic Compatibility and Technical Exhibition</p>	<p style="text-align: center;">Hamburg, Germany, 8-12 September 2008</p>
<p style="text-align: center;">Microwave 2008</p> <p>International Conference on Recent Advances in Microwave Theory and Applications</p>	<p style="text-align: center;">Jaipur, India, 21-24 November 2008</p>
<p style="text-align: center;">EMC Zurich 2009</p> <p>20th International Zurich Symposium on Electromagnetic Compatibility</p>	<p style="text-align: center;">Zurich, Switzerland, 12-16 January 2009</p>
<p style="text-align: center;">EMC-2009</p> <p>VIII International Symposium and Exhibition on Electromagnetic Compatibility and Electromagnetic Ecology</p>	<p style="text-align: center;">St. Petersburg, Russia, 16-19 June 2009</p>
<p style="text-align: center;">ISTET-09</p> <p>International Symposium on Theoretical Electrical Engineering</p>	<p style="text-align: center;">Luebeck, Germany, 22-24 June 2009</p>

ICEAA 09 International Conference on Electromagnetics in Advanced Applications	Turin, Italy, 14-18 September 2009
EMC 09 International Symposium on Electromagnetic Compatibility	Kyoto, Japan, 20-24 July 2009
META 10 Second International Conference on Metamaterials, Photonic Crystals and Plasmonics	Cairo, Egypt, 22-25 February 2010
AP-EMC 2010 Asia-Pacific EMC Symposium	Beijing, China, 12-16 April 2010
EMF Bordeaux Event, Common event of EBEA, URSI Commission K and COST BM0704	Bordeaux, France, 26-29 May 2010
OCOSS 2010 Ocean and Coastal Observation: sensors and observing systems, numerical models and information systems	<i>Brest, France,</i> <i>21-23 June 2010</i>
MSMW 2010 Symposium on Physics and Engineering of Microwaves, Millimeter and Submillimeter Waves	Kharkov, Ukraine, 21-26 June 2010
ICEAA 2010 International Conference on Electromagnetics in Advanced Applications	Sydney, Australia, 20-24 September 2010
AP-RASC - 2010 Asia-Pacific Radio Science Conference	Toyama, Japan, 22-25 September 2010
2010 Asia-Pacific Microwave Conference	Yokohama, Japan, 7-10 December 2010
EBEA2011 10th International Congress of the European Bioelectromagnetic Association	Rome, Italy, 21-24 February 2011
EMC-2011 9th International Symposium on EMC and EME	Saint Petersburg, Russia, 13-16 September 2011
ISAP 2011 International Symposium on Antennas and Propagation	Jeju, Japan, 25-28 October 2011
META'12	Paris, France,

3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics	16-19 April, 2012
EMC Europe 2012 International Symposium on Electromagnetic Compatibility,	Rome, Italy, September 17-21, 2012
ICEAA-APWC 2012	Cape Town, South Africa, September 2012
ISAP 2012 International Symposium on Antennas and Propagation	Nagoya, Japan October 29 - November 2, 2012

4.0 **International EMF Bordeaux Event May 25-29, 2007 in Bordeaux, France:**

URSI International Commission K, EBEA and COST BM0704 ran a four days meeting (see http://www.ebea.org/joint_meeting_2010.htm).

The EMF Bordeaux Event covered the following areas of EMF research:
EBEA seasonal seminar: 26 May 2010 - *"Bases for exposure limits."*

COST BM0704 workshop: 27- 28 May 2010 - *"Research strategies related to RF emerging technologies":*

- Dosimetry and exposure assessment
- Risk perception and management
- Human and epidemiological research
- Experimental research: biology and mechanisms
- "Children and EMF"

URSI Commission K mid-term meeting: 27- 29 May 2010- *"EMF Medical applications":*

- New Emerging medical applications
- Interaction of THz radiation with biological systems
- Electric and magnetic stimulation of the central nervous system
- EMF cancer treatment by hyperthermia and ablation

Joint session COST BM0704 – URSI commission K: 28 May 2010 - "MRI and occupational exposure"

More than one hundred people attended the Event. During the event several meetings were dedicated to the preparation of the Program of GASS 2011, further discussed during the Meeting of National Representatives held in Seoul, South Korea, in the following June.

5.0 **White Paper on Wireless Communication and Health:**

Bernard Veyret is involved in managing this white paper, requested by URSI. He has the contributions by most of the authors for the different sections and a draft of the document. In order to finalize the document version, Commission K was awaiting the results of the evaluation from IARC on the carcinogenicity of RF fields which was released on 31 May. The IARC summary paper to be published in July in The Lancet. The procedure used for classification and the results will be explained and discussed in the Commission K tutorial at the GASS2011 in Istanbul.

6.0 **Two Meetings of National Representatives of Commission K:**

- 1.1 June 14, 2009: A business meeting was held in Davos, Switzerland at BioEM09.
- 1.2 June 26, 2010: A business meeting was held in Seoul, South Korea at the 2010 Bioelectromagnetics Meeting.

7.0 **URSI Commission K Emerging Topic Areas**

updated by Guglielmo d'Inzeo and Masao Taki on the basis of 2008 proposal by 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.

Among these new applications, Commission K has identified the following as emergent:

Topic 1

Emerging subject: Biological effects of Wi-Fi

Why: New wireless technology expose billions

Commission actions: White paper

Potential interest from other Commissions: A, B, C, E, F

Linkages to other Organisations: WHO / ICNIRP / EBEA / BEMS

Linkages to National and International Programmes:

European cell phone studies, (Interphone, COSMOS), IEEE Society: Antennas and Propagation, Broadcast, Communications, Microwave Theory and Techniques, Product Safety, Social Implications

Topic 2

Emerging subject: Microwaves breast imaging

Why: Non-ionizing method to improve much needed diagnostics

Commission actions: Increase links to other commissions

Potential interest from other Commissions: B, E

Linkages to other Organisations: EBEA / BEMS / RSNA

Linkages to National and International Programmes:

Breast screening programs, National Breast Cancer Programs', IEEE Society: Engineering in Medicine and Biology, Microwave Theory and Techniques

Topic 3

Emerging subject: Magnetic Resonance Imaging Safety

Why: Sixty million patients exposed each year and 50,000 workers to static magnetic fields and Extremely Low Frequency Magnetic Fields that exceed WHO and ICNIRP limits

Commission actions: Encourage research on biological effects from acute exposure in patients and chronic exposure for workers

Potential interest from other Commissions: B, E

Linkages to other Organisations:

International Society for Magnetic Resonance in Medicine, Radiological Society of North America

Linkages to National and International Programmes:

National Regulatory Policies on MRI, IEEE Society: Engineering in Medicine and Biology, Magnetics

Topic 4

Emerging subject: Optical medical imaging technologies

Why: Emerging technologies allow optical signal processing not possible in the past

Commission actions: Identify as an important area of research

Potential interest from other Commissions: B, D, E

Linkages to other Organisations: Society of Molecular Imaging
Linkages to National and International Programmes:
IEEE Society: Engineering in Medicine and Biology, Photonics

Topic 5

Emerging subject: Photo-acoustic medical imaging technologies
Why: Allows advantages of optical and ultrasound to be synergistically exploited
Commission actions: Encourage research
Potential interest from other Commissions: B, D, E
Linkages to other Organisations: Cancer detection organizations
Linkages to National and International Programmes:
IEEE Society: Engineering in Medicine and Biology, Photonics

Topic 6

Emerging subject: Terahertz imaging and spectroscopy
Why: New technologies allow generation of well-characterized terahertz signals
Commission actions: Encourage research
Potential interest from other Commissions: B, C, E
Linkages to other Organisations: National Security
Linkages to National and International Programmes:
IEEE Society: Antennas and Propagation, Communications, Engineering in Medicine and Biology, Microwave Theory and Techniques

Topic 7

Emerging subject: Biological Effects of Extremely Low Frequency Magnetic Fields
Why: Exposures increasing in intensity from diagnostic medicine (MRI), electric power generation and use, electric transport and therapeutic medical devices
Commission actions: Researchers to set patient, worker and public limits of exposure
Potential interest from other Commissions: B
Linkages to other Organisations: National Power Utilities, Electric vehicle companies
Linkages to National and International Programmes:
IEEE: Engineering in Medicine and Biology, Power and Energy engineering, Product Safety Engineering, Social Implications of Technology, Vehicular Technology

Further items will be discussed during the business meetings at GASS2011.

It is important even to stress a niche area where URSI could lead rather than follows: the proposed item is "EM field applications benefiting from a wide range of technologies and scientific understanding".

8.0 Preparations for GASS2011, August 13-20, 2011, Istanbul, Turkey:

The preparation for the General Assembly of Istanbul (8 oral sessions and two poster sessions, 2 joint sessions lead by Commission K with Commissions A and E and B and E respectively, 1 joint session lead by Commission K with commission B, for a total of 81 oral presentations and 23 poster presentations. Apart the tutorial session dedicated to the recent (end of May 2011) evaluation by IARC (WHO - International Agency Research on Cancer) of RF and MW fields carcinogenicity, particular attention has been dedicated to emerging biomedical applications:

- a) Interaction between EMF and Biosystems: Molecular Modelling and Ultra Short Pulses Biological Effects,
- b) Non-ionizing Electromagnetic Breast Imaging,

- c) Diagnostic Sensing
- d) Imaging and Brain Mapping
- e) Healing and Therapy

To stress even the joint session with Commission B on “Uncertainty Management in Numerical Calculation and EM Field Dosimetry”

9.0 **Student Support at URSI:**

Commission K had \$ 5,000 € for student support and decided to use it to offset student travel costs by giving 300 € to each student.